



BacTech
E n v i r o n m e n t a l

BacTech Provides Update on Sudbury Pyrrhotite Tailings R&D Project for Clean Recovery of Metals

Team to Kick Off Detailed Bench-Scale Testing Program in January

TORONTO, ON, December 12, 2023 – BacTech Environmental Corporation (“BacTech” or the “Company”) (CSE: **BAC**, OTC: **BCCEF**, FSE: **0BT1**), a well-established environmental technology company specializing in environmentally friendly bioleaching and remediation solutions for the recovery of precious metals and critical minerals, has issued an update on its proposed pyrrhotite bioleach R&D project in Sudbury, Canada.

As [previously reported](#), BacTech is part of a consortium aiming to provide innovative solutions for remediating 80-100 million tonnes of pyrrhotite tailings deposited in and around Sudbury. Pyrrhotite (“**Po**”) is a highly reactive iron sulfide mineral that reacts strongly when exposed to oxygen, releasing soluble acidic iron harmful to the environment. Historically, predecessor companies such as INCO and Falconbridge separated pyrrhotite from the more valuable nickel cobalt pentlandite, depositing resulting pyrrhotite waste either underwater or under caps/covers to prevent oxidation. Despite being contained, natural bacteria can cause some degradation over the years. Currently, Vale and Glencore, continue managing these tailings to reduce their long-term liabilities.

Dr. Nadia Mykytczuk, President and CEO of Mirarco, a leader in innovative solutions for the mining industry, confirmed that the continuous laboratory-scale bioleach pilot plant is undergoing pre-testing of equipment. This will lead to BacTech’s technology being tested on a few kilograms a day basis starting in January 2024, with the program estimated to run approximately 6 months.

Techno-Economic Feasibility Testing

The objective of the overall test is to determine if bioleaching can not only break down pyrrhotite to liberate small amounts of cobalt and nickel values as project revenue streams but also if other by-products from bioleaching can be manipulated into intermediary products of value, creating additional revenue streams. Technically, the results will be crucial for BacTech in securing patent protection for this innovative process, representing the next step in advancing the provisional patent application already in place. Commercially, the results are vital for designing a fully integrated demonstration plant using commercial-scale equipment, proving the techno-economics of the entire process and producing tonnage quantities of products for end-user testing. This would lead to the construction of a full-scale prototype production facility.

Readying Proven Tech for Today's Economy

Over 20 years ago, BacTech conducted a pilot project in Australia (Radio Hill Mine), successfully bioleaching pyrrhotite to recover nickel and cobalt into a saleable mixed precipitate. However, economic viability was hindered by the need to dispose of benign waste from the bioleach process. Fast forward to the present, the total flowsheet concept has been redesigned, focusing on managing benign waste streams as a key process driver to enhance profitability. The combination of reducing the need for benign waste disposal facilities and diversifying revenue streams benefits project economics. Proven technologies can integrate with conventional bioleach processes to create saleable intermediary products from waste streams, reigniting research in this area.

Ross Orr, President and CEO of BacTech, explained, *“Pyrrhotite is an interesting mineral. The idea here is to create separate products for sale from the original elements. For example, roughly 60% of pyrrhotite is iron. If the free iron generated from the bioleaching process can be reconstituted as a feed to replace iron ore as an input to steelmaking instead of being disposed of as benign waste, we would have a major breakthrough.”* Orr added, *“In addition to iron, production of elemental sulfur, another major component of the original pyrrhotite waste, could be sold to the sulfuric acid industry. The nickel grade in Po is roughly 0.8%, with some associated cobalt, a key feature of revenue. At today's nickel prices, the tails contain approximately \$15 billion alone. These could be precipitated for sale, as demonstrated from BacTech's piloting experience in processing Radio Hill material in Australia. Finally, the clean siliceous waste from our processing, making up about 15% of the original feed, can be used to produce construction materials using innovative proven geopolymer technology.”* Orr concluded, *“It may be that we cannot successfully manipulate all of these by-product streams, but the transformation of a majority of process streams into revenue creators, as opposed to creating benign wastes, would be an economic game-changer for environmental remediation of pyrrhotite tailings using bioleaching.”*

Success factors for this program include co-production of metals and materials, demonstration of environmentally benign processing, and competitive economics in today's evolving market. BacTech anticipates providing results on an ongoing basis over the 6-month test program

About BacTech's Tenguel – Ponce Enriquez Bioleaching Project

BacTech plans to construct an owner-operated bioleaching facility in Tenguel, Ecuador, a region known for its association with arsenic in sulphide gold ore (Arsenopyrite). The company intends to build a 50 tpd bioleach plant capable of treating high gold/arsenic material. Such a plant, processing feed with 1.75 ounces of gold per tonne, similar to what local miners provide, would yield approximately 31,000 ounces per year. The modular plant designs allow for expansion without disrupting ongoing production. BacTech has also signed an agreement with the government for a Phase 2 plant that would add 150-200 tpd of capacity, producing more than 100,000 ounces per annum.

Key economic highlights, assuming a base gold price of \$1,600 per ounce, include:

- Pre-tax NPV (Net Present Value with a 5% discount rate) of \$60.7 million
- Pre-tax IRR (Internal Rate of Return) of 57.9%
- Annual Gold Production of 30,900 ounces • Capital Cost of \$17.0 million
- Bioleach Operating Cost of \$212 per tonne
- Pre-tax Earnings Prior to Employee Bonus – \$10.9 million annually
- Estimated local employee bonus pool – \$1.64 million

The area hosts over 100 small mines, and BacTech is actively exploring the possibility of establishing modern bioleaching facilities in other regions of Ecuador, Peru, and Colombia. The company aims to collaborate with national and local governments, non-governmental organizations (NGOs), and other stakeholders to fund these projects and ensure adherence to high environmental and ESG (Environmental, Social, and Governance) standards.

About BacTech Environmental Corporation

BacTech Environmental Corporation is a company that specializes in environmental technology. We use a process called bioleaching to recover metals like gold, silver, cobalt, nickel, and copper, while also safely removing harmful contaminants like arsenic. This process is eco-friendly and uses naturally occurring bacteria that are safe for both humans and the environment. By using our proprietary method of bioleaching, we can neutralize toxic concentrates and tailings while also creating profitable opportunities. The company is publicly traded on several stock exchanges, including the CSE, OTCQB, and Frankfurt Stock Exchange.

For further information contact:

Ross Orr

President & CEO, BacTech Environmental Corporation

416-813-0303 ext. 222

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This news release contains “forward-looking information”, which may include, but is not limited to, statements with respect to future tailings sites, sampling or other investigations of tailing sites, the Company’s ability to make use of infrastructure around tailings sites or operating performance of the Company and its projects. Often, but not always, forward-looking statements can be identified using words such as “plans”, “expects”, “is expected”, “budget”, “scheduled”, “estimates”, “forecasts”, “intends”, “anticipates”, or believes” or variations (including negative variations) of such words and phrases, or state that certain actions, events or results “may”, “could”, “would”, “might” or “will” be taken, occur or be achieved. Forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance, or achievements of the Company to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements contained herein are made as of the date of this news release and the Company disclaims, other than as required by law, any obligation to update any forward-looking statements whether because of new information, results, future events, circumstances, or if management’s estimates or opinions should change, or otherwise. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, the reader is cautioned not to place undue reliance on forward-looking statements.

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