



June 15, 2023

**Ivanhoe Mines replaces outstanding \$76-million loan receivable from High Power Exploration with equity investment in I-Pulse, its parent company**



**Ivanhoe Mines to join BHP as an investor in I-Pulse, a global leader in pulsed-power technology**



**Ivanhoe Mines intends to enter into collaboration agreement with I-ROX, an I-Pulse subsidiary, to investigate and develop applications for pulsed-power technology in the mining sector**



**Kamoa-Kakula Copper Complex to commence test program with I-ROX, targeting improved copper recoveries**

**LONDON, UNITED KINGDOM – Ivanhoe Mines (TSX: IVN; OTCQX: IVPAF) Executive Co-Chair Robert Friedland and President Marna Cloete announce today that an agreement has been reached to replace the outstanding convertible loan balance owed to Ivanhoe Mines by High Power Exploration (HPX) into an equity investment in I-Pulse Inc. (I-Pulse), HPX's parent company. I-Pulse, a private American company, is a global leader and developer of pulsed-power technology with its research facilities based in Toulouse, France.**

**Pulsed-power is a technology that releases the equivalent power output of a nuclear power station in a billionth of a second. The technology has already found commercial application in high-speed metal forming and welding, as well as in mineral exploration.**

**Ivanhoe extended a \$50 million convertible loan to HPX on April 25, 2019. As at May 31, 2023, the loan balance including accrued interest totaled approximately \$76 million. Under the new agreement, Ivanhoe will transfer all convertible loan obligations from HPX to I-Pulse, in exchange for the issuance of common shares in I-Pulse to Ivanhoe.**

**Ivanhoe will also receive certain investor rights, including a pre-emptive right to maintain its percentage ownership in I-Pulse in the event of an equity financing, which ceases upon an initial public offering of I-Pulse securities.**

Watch a video introducing I-Pulse's proprietary technology:  
<https://vimeo.com/836258943/8dcc5db181?share=copy>



### **Collaboration agreement being developed between Ivanhoe Mines and I-Pulse subsidiary, I-ROX**

I-ROX SAS (I-ROX), a subsidiary of I-Pulse, is focused on the deployment of I-Pulse technology to transform the processes of crushing and grinding mineral ores in the mining industry. I-ROX was established in November 2022 by I-Pulse and Breakthrough Energy Ventures-Europe (BEV-E), in conjunction with €12 million in funding from BEV-E. Link to press release: <https://www.prnewswire.com/news-releases/i-rox-announces-12m-funding-round-from-breakthrough-energy-ventures-europe-to-advance-the-application-of-pulsed-power-in-the-mining-industry-301684019.html>

In December 2022, I-Pulse and I-ROX entered into collaboration arrangements with world-leading resources company, BHP Group Limited (BHP), which included an equity investment in both I-Pulse and I-ROX. Link to press release: <https://www.newsfilecorp.com/release/147549/BHP-IPulse-and-IROX-Enter-into-Strategic-Collaboration-to-Advance-New-Applications-of-IPulse-Technology>

Ivanhoe Mines and I-ROX are working together to also form a collaboration agreement to investigate ways of deploying I-Pulse technology across Ivanhoe's operations. The collaboration arrangement aims to link the mining and processing expertise of Ivanhoe Mines with the pulsed-power technology and expertise of I-Pulse and I-ROX, to transform the economic and environmental impact of mining.

### **I-Pulse technology has potential to significantly lower the cost and environmental impact of processing mineral ores**

Crushing and grinding of mineral ores into small particles, which is a required step prior to mineral concentration, is the most energy- and capital-intensive aspect of the entire mineral extraction process. Crushing and grinding is achieved by using energy-

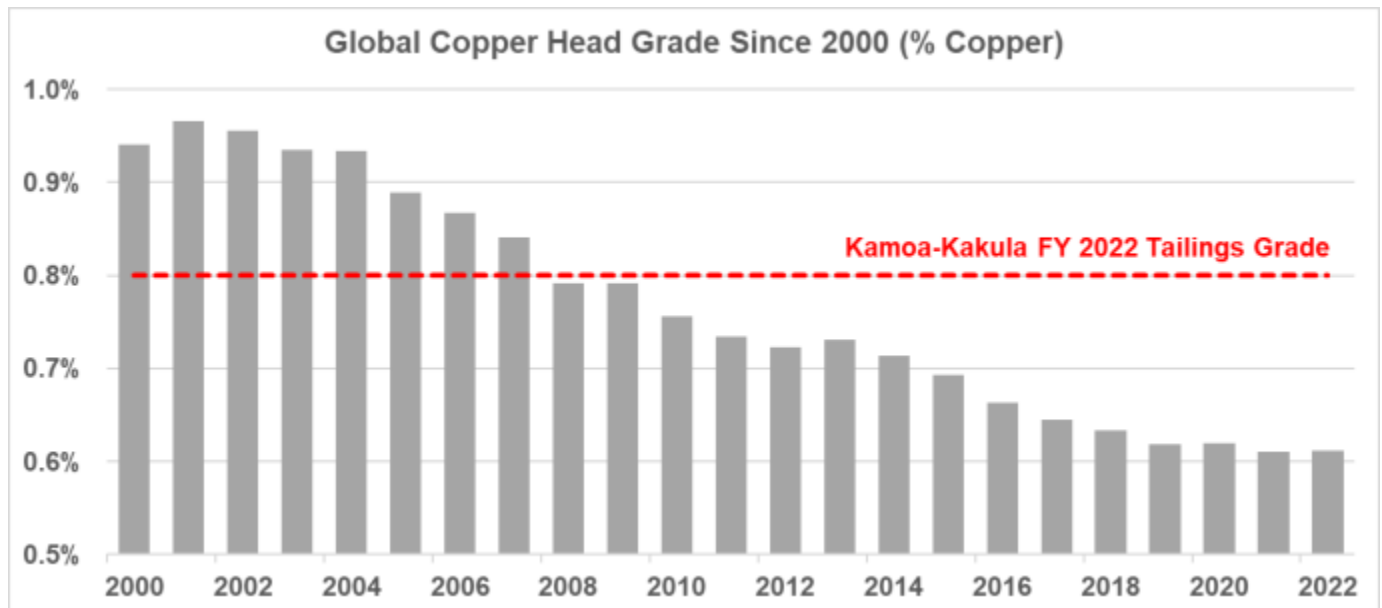
intensive conventional mechanical equipment such as jaw crushers, semi-autogenous (SAG) mills, ball mills and high-pressure grinding rollers (HPGR).

I-ROX has demonstrated that short, high-intensity bursts of electrical energy, delivered using pulsed-power technology, can quickly and efficiently shatter rocks and mineral ores. This process, which targets tensile weakness in rocks, could substantially reduce the time, energy usage and greenhouse gas (GHG) emissions currently generated by the planet's mining activities.

Samples of both copper ore and tailings from the Kamo-Kakula Copper Complex in DRC have been sent to I-Pulse's headquarters in Toulouse, France, for test work. The purpose of the test work is to evaluate opportunities to increase life-of-mine copper recoveries, by either improving recoveries through the milling and flotation process, or by recovering additional copper from the tailings stream.

During 2022, Kamo-Kakula achieved an average copper feed grade of 5.5% and recoveries of approximately 86%, meaning that the grade of Kamo-Kakula's tailings was approximately 0.8% copper, significantly higher than the average head grade of the copper mines globally. The recoveries achieved in 2022 were in line with design parameters, and more recently have been above design parameters and periodically achieving 88%. Any further improvement in copper recoveries presents a significant opportunity to generate additional revenue at Kamo-Kakula.

Figure 1. Global average copper head grade since 2000, compared with the average copper grade of Kamo-Kakula's tailings during 2022.



Source: BMO Research

Watch an animation of how I-Pulse technology could potentially be used to replace conventional crushing and grinding processes:

<https://vimeo.com/836259238/af19ef6aba?share=copy>



## About I-Pulse

Founded by Robert Friedland and Laurent Frescaline in 2005, I-Pulse Inc., a private U.S. company headquartered in Toulouse, France, uses its unique expertise in electrical energy to power disruptive industrial solutions.

Mr. Frescaline is a plasma physicist and an electrical engineer who founded a successful high-technology company specialising in pulsed-power applications with domestic and international governmental agencies.

The I-Pulse suite of technologies utilises proprietary capacitors that safely and repeatedly compress and release stored electricity in billionths of a second. The extremely high-powered discharges, which utilise extremely small amounts of energy, generate precise shockwaves directed to shape and assemble metals to previously unachievable degrees of precision; generate electrical fields that reveal chargeable or resistive mineral deposits, or water, at depth; and crush rock containing minerals or gemstones.

I-Pulse is commercializing these applications in industries such as advanced manufacturing and mineral exploration. I-Pulse operates its I-Cube research and development facilities in Toulouse, France. Visit [www.ipulse-group.com](http://www.ipulse-group.com) to learn more.

## About Ivanhoe Mines

Ivanhoe Mines is a Canadian mining company focused on advancing its three principal projects in Southern Africa; the expansion of the Kamo-a-Kakula Copper Complex in the DRC, the construction of the tier-one Platreef palladium-rhodium-platinum-nickel-

**copper-gold project in South Africa; and the restart of the historic ultra-high-grade Kipushi zinc-copper-germanium-silver mine, also in the DRC.**

**Ivanhoe Mines also is exploring for new copper discoveries across its circa 2,400km<sup>2</sup> of 90-100% owned exploration licences in the Western Foreland, located adjacent to, or in close proximity to, the Kamao-Kakula Copper Complex in the DRC.**

### **Information contact**

**Follow Robert Friedland ([@robert\\_ivanhoe](#)) and Ivanhoe Mines ([@IvanhoeMines](#)) on Twitter.**

### Investors

**Vancouver:** Matthew Keevil +1.604.558.1034

**London:** Tommy Horton +44 7866 913 207

### Media

Tanya Todd +1.604.331.9834

### **Forward-looking statements**

Certain statements in this news release constitute "forward-looking statements" or "forward-looking information" within the meaning of applicable securities laws. Such statements and information involve known and unknown risks, uncertainties and other factors that may cause the actual results, performance or achievements of the company, its projects, or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements or information. Such statements can be identified using words such as "may", "would", "could", "will", "intend", "expect", "believe", "plan", "anticipate", "estimate", "scheduled", "forecast", "predict" and other similar terminology, or state that certain actions, events, or results "may", "could", "would", "might" or "will" be taken, occur or be achieved. These statements reflect the company's current expectations regarding future events, performance and results and speak only as of the date of this news release.

Such statements include without limitation, the timing and results of: (i) statements that I-Pulse is a global leader and developer of pulsed-power technology; (ii) statements that pulsed-power is a technology that releases the equivalent power output of a nuclear power station in a millionth of a second; (iii) statements that Ivanhoe Mines and I-ROX are working together to form a collaboration agreement to investigate ways of deploying I-Pulse technology across Ivanhoe's operations; (iv) statements that the collaboration arrangement aims to link the mining and processing expertise of Ivanhoe Mines with the pulsed-power technology and expertise of I-Pulse and I-ROX, to transform the economic and environmental impact of mining; (v) statements that I-ROX has demonstrated that short, high-intensity bursts of electrical energy, delivered using pulsed-power technology, can quickly and efficiently shatter rocks and mineral ores due to targeting tensile weakness in rocks; (vi) statements that pulsed-power technology could substantially reduce the time, energy usage and greenhouse gas (GHG) emissions currently generated by the planet's mining activities; and, (vii) statements

that test work is to evaluate opportunities to increase life-of-mine copper recoveries, by either improving recoveries through the milling and flotation process, or by recovering additional copper from the tailings stream

Forward-looking statements and information involve significant risks and uncertainties, should not be read as guarantees of future performance or results and will not necessarily be accurate indicators of whether such results will be achieved. Many factors could cause actual results to differ materially from the results discussed in the forward-looking statements or information, including, but not limited to, the factors discussed above and under the "Risk Factors" section in the company's MD&A for the three months ended March 31, 2023, and its Annual Information Form, and elsewhere in this news release, as well as unexpected changes in laws, rules or regulations, or their enforcement by applicable authorities; the failure of parties to contracts with the company to perform as agreed; social or labour unrest; changes in commodity prices; and the failure of exploration programs or studies to deliver anticipated results or results that would justify and support continued exploration, studies, development or operations.

Although the forward-looking statements contained in this news release are based upon what management of the company believes are reasonable assumptions, the company cannot assure investors that actual results will be consistent with these forward-looking statements. These forward-looking statements are made as of the date of this news release and are expressly qualified in their entirety by this cautionary statement. Subject to applicable securities laws, the company does not assume any obligation to update or revise the forward-looking statements contained herein to reflect events or circumstances occurring after the date of this news release.

The company's actual results could differ materially from those anticipated in these forward-looking statements as a result of the factors outlined in the "Risk Factors" section and elsewhere in the company's MD&A for the three months ended March 31, 2023, and its Annual Information Form.