US Critical Materials Corp.

Company Deck

February 2025

U S CRITICAL MATERIALS

Security of Supply

- US Critical Materials is a privately owned, rare earths exploration, development, and critical mineral technology processing company.
- The company holds a portfolio of U.S. based rare-earth and critical mineral deposits encompassing approximately ten square miles in Montana and Idaho.
- US Critical Materials Sheep Creek Property has some of the highest rare earths grades in the United States averaging 9% percent (90,000 parts per million) with some TREE as high as 20.1 % . The deposit contains at least thirteen of the “critical risk” minerals defined by the current administration, together with gallium, strontium, niobium, and scandium.
- In December 2023, US Critical Materials entered into a Cooperative Research and Development Agreement (CRADA) with Idaho National Labs(INL) to develop cutting edge, environmentally sensitive technology for the separation of rare earths and other critical minerals vital to the United States.
- On June 3rd, 2024, Idaho National Labs confirmed the presence of significant levels of high-grade gallium at Sheep Creek. Idaho National Labs is creating an environmentally responsible separation process for the gallium and the other critical minerals.
- On February 1st 2025 US Critical Materials entered into a Phase 2 CRADA with INL which details a path forward to further develop the cutting-edge separation and processing technologies that are being developed for Sheep Creek critical minerals and rare earths.
- Geology, geophysics, and predictive analytics indicate that the carbonatites extend down considerably and there is strong evidence that they connect at depth.

Sheep Creek Montana Critical Minerals Deposit

The finest example of an essential critical minerals deposit in the United States is the US Critical Materials minerals property at Sheep Creek, Montana. A deposit of high-grade rare earths and gallium located in southwest Montana continues to be developed using state-of- the-art processing techniques.

Under a Cooperative Research and Development Agreement (CRADA), the U.S. Government's Idaho National Laboratory has developed an environmentally responsible separation process for the Sheep Creek rare earths and gallium. US Critical Materials plans to license this cutting- edge processing technology to other deposits in the United States and friendly countries, giving the U.S. a strong "bargaining chip" in its desire to work with overseas critical minerals deposits.

Idaho National Laboratory (INL) is a U.S. Department of Energy (DOE) National Laboratory engaged in world-leading critical materials research and development. INL excels in technology development in the Advanced Separation Science & Engineering technology space and is known throughout the DOE system as the Separation Sciences Testbed.

Funded by US Critical Materials, the separation process will be used on Sheep Creek's 52 carbonatites covering 800 acres under mining claims on U.S. Forest Service lands. Averaging 9.1 percent rare-earth oxide, and 300 ppm gallium, the deposit may be one of the richest in North America. Geophysical and Artificial Intelligence data suggest that there may be a continuous source of ore at depth.

The United States imports most of its rare earths from China. China also has a near worldwide monopoly on the processing of rare earths. The U.S. Department of Defense (DoD) uses rare earth elements for a variety of purposes in its weapon systems – in radar, guidance systems, precision-guided munitions, lasers, satellites, and equipment including night vision goggles, yet mostly depends on China for its supply.

According to the DoD "Continued U.S. reliance on foreign sources for rare earth products poses a risk to national security. The U.S. and most of the world depends on China for many rare earth elements." [1]

Rare Earths are also essential for the production of a full range of industrial and consumer goods including batteries, mobile phones, laptops, hard drives, lasers, electric vehicles, semiconductors, computer chips, 5g technology, solar panels, wind turbines and medical diagnostic devices.

China had the foresight many years ago to capitalize on its rare earths' dominance. In 1987, then-Chinese President Deng Xiaoping famously said, "The Middle East has oil, China has rare earths." [2]

China has recently begun to weaponize its control of rare earths and rare earths processing, and in the past year has limited the export of gallium, germanium, and antimony, to the United States.

US Critical Materials provides a high grade, reliable domestic source, with the ability to economically extract, separate and process within the United States, and to also export its superior processing technology.

Gallium, scandium, strontium, and rare earths from Sheep Creek are sufficient to meet the needs of the industries in the United States and other friendly countries. Work under the Joint CRADA will allow environmentally responsible processing technology developed at Idaho National Laboratory to economically produce gallium, rare earths, and other critical minerals.

US Critical Materials is a private Nevada corporation, with corporate headquarters in Salt Lake City, Utah. The company has been self-financed and is now considering various funding opportunities.

The US Critical Materials deposit in Montana has sufficient rare earths and gallium to provide the world with the critical elements it needs to help meet demand well into the future.

By James B. Hedrick, former rare-earths commodity specialist at the U.S.G.S., and U.S. Bureau of Mines from 1979 to 2010. President-US Critical Materials Corp. 2021-Present.

REFERENCES

1. https://www.defense.gov/News/News-Stories/Article/Article/3700059/dod-looks-to-establish- mine-to-magnet-supply-chain-for-rare-earth-materials/

2. https://www.economist.com/china/2019/06/15/rare-earths-give-china-leverage-in-the-trade-war-at-a-cost

FEBRUARY 2025

Rare Earths and Critical Minerals: A National Security Imperative

Rare earths and critical minerals are indispensable to U.S. consumer, industrial, and government technologies. These materials serve as the foundation for emerging and future technologies, playing a vital role in manufacturing, clean energy production, semiconductor fabrication, and the defense and aerospace industries.

The United States Geological Survey (USGS) consistently ranks critical minerals among the top supply risks impacting national security and defense. The absence of a domestic rare earth mining and processing capability poses a direct threat to U.S. national security. Rare earth elements (REEs) are essential for semiconductors, 5G technology, smartphones, satellite systems, fiber-optic networks, medical diagnostics, and healthcare therapeutics. They are also critical components in next- generation defense systems, including lasers, radar, sonar, night vision, missile guidance systems, jet engines, and armored vehicle alloys.

Some analysts have dubbed rare earths "the new oil" due to their indispensable role in powering modern and future technologies. With the increasing demand for semiconductors driven by advancements in artificial intelligence (AI) and 5G telecommunications, the global necessity for rare earths is projected to grow exponentially.

U.S. DEPENDENCE ON IMPORTED RARE EARTHS

The U.S. remains heavily dependent on imports for rare earth elements and lacks an emergency stockpile for many critical minerals. According to the Congressional Research Service, The National Defense Stockpile (NDS) has a $13.5 billion gap between the current stockpile minerals and current stockpile requirements. This lack of preparedness places the U.S. at significant national security risk, especially as China dominates the global production and processing of rare earths.

China's near monopoly on rare earths grants it the ability to influence global markets and make decisions with far-reaching national security and economic implications. In December 2024, China imposed an embargo on exporting certain critical minerals to the United States, intensifying the ongoing geopolitical tensions. This restriction has highlighted the U.S. military's reliance on rare earths for critical technologies and weapon systems, further underscoring the urgent need for a domestic supply chain.

EXECUTIVE ACTIONS TO RESTORE U.S. MINERAL DOMINANCE

On January 20 2025, President Trump signed two Executive Orders aimed at restoring American leadership in rare earth mining and processing. The orders—Unleashing American Energy and National Energy Emergency—prioritize the strengthening of U.S. production capabilities and supply chain security for critical minerals.

- The Unleashing American Energy order focuses on establishing the U.S. as a leading producer and processor of non- fuel materials, including rare earth elements. It seeks to alleviate regulatory burdens, update the USGS critical minerals list, accelerate the identification of unknown deposits, and increase federal funding for critical mineral projects. A key objective is to address and remedy shortfalls in the National Defense Stockpile.
- The National Energy Emergency order declares that inadequate access to critical minerals poses an imminent threat to national security. The directive identifies vulnerabilities in permitting, outdated regulations, and insufficient federal attention. It mandates actionable recommendations to mitigate these risks and bolster domestic supply chains.

RARE EARTHS AND AI: THE STARGATE PROJECT

On January 21, 2025, President Trump announced The Stargate Project, a $500 billion dollar AI initiative that underscores the importance of rare earths. Chips and semiconductors essential for advanced AI technologies depend heavily on rare earth elements, making their availability a cornerstone of U.S. technological advancement and competitiveness.

SHEEP CREEK: A SOLUTION TO U.S. RARE EARTH DEPENDENCE

US Critical Materials' Sheep Creek deposit in Montana represents the highest-grade rare earth deposit in the United States, with average concentrations of 90,000 parts per million (ppm). The company is collaborating with the Idaho National Laboratory to develop environmentally responsible processing and separation methods, positioning Sheep Creek as a cornerstone of U.S. rare earth independence.

Unlike most rare earth sources globally, where extraction is complex due to mixed ore compositions, Sheep Creek's deposits offer a more straightforward and efficient processing pathway. This makes it a uniquely valuable domestic resource, capable of reducing U.S. reliance on imports while bolstering national security.

GLOBAL COMPETITION FOR CRITICAL MINERALS

The Trump administration's interest in Greenland has drawn significant attention, given its strategic importance as a source of critical minerals. However, based on reports from the Geological Survey of Denmark and Greenland, Greenland's rare earth grades average just 1.5% (15,000 ppm), far below the 9% (90,000 ppm) concentration found at Sheep Creek. Additionally, Greenland faces considerable permitting, access, and political challenges, making Sheep Creek a far more viable and strategically advantageous option.

CONCLUSION

Rare earths and critical minerals are the backbone of modern and emerging technologies, making their secure and reliable supply a matter of national urgency. The development of Sheep Creek's rare earth resources offers a unique opportunity to address U.S. vulnerabilities, strengthen supply chains, and ensure the country's continued leadership in critical industries. By investing in domestic production and processing, the U.S. can mitigate supply risks, safeguard national security, and drive economic growth.

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Gallium: A Strategic Mineral for U.S. Technology and National Security

Gallium plays a crucial role in a broad array of U.S. consumer, industrial, and government technologies. The United States Geological Survey (USGS) has consistently identified gallium as a critical mineral supply risk, emphasizing its significance for national security and defense.

Demand for gallium is particularly acute in the production of gallium nitride (GaN) and gallium arsenide (GaAs) high-performance chips, which are foundational to semiconductors, 5G technology, smartphones, satellite systems, medical diagnostics and therapeutics, and next-generation defense platforms. As advancements in artificial intelligence (AI) and telecommunications drive a surge in semiconductor demand, the need for gallium is projected to grow substantially.

Despite its criticality, the United States remains entirely dependent on imported gallium, with no emergency reserves in the Department of Defense (DOD) National Defense Stockpile. Gallium is a scarce resource, with most global production concentrated in China. A November 2024 USGS report estimated that a total cessation of China's gallium exports could result in a $3.1 billion dollar reduction in U.S. GDP, underscoring the vulnerability of supply chains. This concern materialized in December 2024 when the Chinese government implemented an embargo on gallium exports to the United States, heightening tensions over access to critical minerals.

On January 20, 2025, the first day of President Trump's new administration, the White House declared a National Energy Emergency, highlighting the severe risks associated with restricted access to critical minerals. Gallium is consistently ranked among the most strategically important minerals.

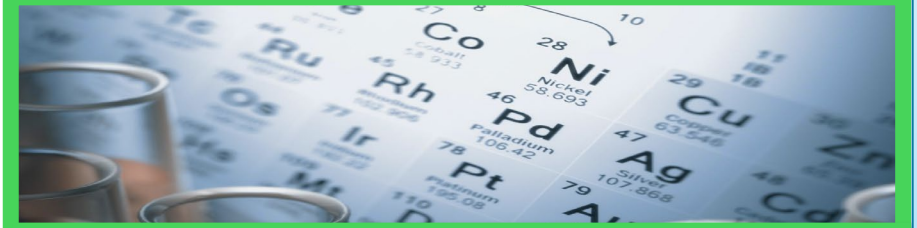
The following day, President Trump announced The Stargate Project, a $500 billion AI initiative, underscoring gallium's indispensable role in advancing AI technologies.

US Critical Materials' Sheep Creek deposit in Montana offers the only economically viable domestic source of gallium, with an average grade of 300 parts per million (ppm)—far exceeding the 50 ppm typically found in Chinese production. This unique deposit positions the United States to establish an independent and secure gallium supply chain. To this end, US Critical Materials is collaborating with the Idaho National Laboratory to develop environmentally sustainable methods for processing and separating gallium. Unlike most global sources, where gallium is a byproduct of bauxite processing, Sheep Creek's gallium is contained within rare earth minerals, simplifying extraction and refining processes.

The Trump administration has also focused on Greenland, a region of significant global competition involving China and Russia, due to its reserves of rare earth elements and critical minerals. However, based on reports from Geological Survey of Denmark and Greenland, Greenland's gallium concentrations, which range from 66 ppm in North Greenland to 81–117 ppm in Southern East Greenland, are significantly lower than those at Sheep Creek, further highlighting the strategic value of the Montana deposit.

In conclusion, US Critical Materials' Sheep Creek project represents the nation's only viable domestic gallium initiative, providing a pivotal opportunity to secure and stabilize the U.S. supply of this essential mineral. Developing Sheep Creek's gallium resources will not only bolster national security but also support the continued growth of key technologies vital to America's economic and strategic interests.

FEBRUARY 2025



Rare Earth Calculations from Samples Taken From the US Critical Materials' Sheep Creek Property and Analyzed at Idaho National Laboratory

Idaho National Laboratory

134,515 ppm (parts per million) of TREE - **13.4% Total Rare Earths**

187,480 ppm (parts per million) of TREE - **18.7% Total Rare Earths**

138,199 ppm(parts per million) of TREE) - **13.8 % Total Rare Earths**

177,849 ppm (parts per million) of TREE - **17.7 % Total Rare Earths**

GALLIUM AS HIGH AS 350 PPM. CURRENTLY PROFITABLE @ 50 PARTS PER MILLION

These gallium and rare earth numbers are higher than any that we are aware of in the United States.

US Critical Materials is currently working with Idaho National Laboratory on an environmentally responsible separation and processing system.

GALLIUM SEPARATION AND PROCESSING METHOD

Electrochemical Extraction and Purification of Gallium and the full spectrum of rare earth critical minerals from Carbonatite Ore Leachate.

The US Critical Materials/ INL project targets extraction of >90% Ga and the full spectrum of rare earth critical minerals from carbonatite ore leachate through use of a novel Electrochemical Membrane Reactor (EMR).

The proposed recovery methodology overcomes technical barriers associated with state-of- the-art critical mineral extraction technologies including fractional precipitation and carbonation methods; commercial electrolysis methods (i.e., mercury usage); solvent extraction; and ion-exchange. The proposed EMR will use only electricity, water, and N2 gas without need for other chemical reagents to recover REE's from the ore leachate. US Critical Materials will file national and international patents on these technologies.

The electrochemical method here is targeted at Ga, however the method is adaptable and useful for recovery of many value-add metals. Although Sheep Creek carbonatites are the target feedstock for this study, the EMR can be used on multiple critical mineral and material sources that have undergone chemical dissolution to form a metal-rich liquor.

QUAD CHART

Description: The project will develop an electrochemical membrane reactor (EMR) to extract and concentrate Ga from the leachate of carbonatite and refine and reduce the concentrated $Na[AlGa(OH)_4]$ to pure Ga metal by using electrolysis in non-aqueous electrolytes.

Novelty: The proposed EMR consumes only electricity, water and nitrogen to remove impurities and separate Ga. Reagent usage and waste generation are dramatically reduced. To refine the recovered Ga, non- aqueous electrolytes, including organic electrolyte or low temperature molten salt NaOH/KOH mixture will be employed to eliminate the H_2 evolution reaction.

Scientific and Technical Merit: All the metallic elements inside carbonatite ore have different electroplating potentials, and their metal hydroxides have different solubilities. Those differences enable the EMR to separate and purify Ga from the carbonatite leachate. The project targets investigation of the influence of the electrode material and structure, current density, atmosphere, pH, reactor configuration etc. on the reactions including electroplating, electrochemical precipitation and electrochemical dissolution of precipitates. Through a series of electroplating, precipitation, dissolution and re-precipitation reactions using the EMR >90 % of Ga will be extracted and purified as $Na[AlGa(OH)_4]$, which will be refined and reduced to Ga metal with 99.9% purity in a non-aqueous electrolyte.

Relevance and Impact: The project is dedicated to secure Ga through electrochemical extracting from Montana carbonatite. The electrochemical separation and purification and the electrolysis for refining will use an environmentally benign electrode and electrolyte and will consume no reagents other than water and N_2. This robust method will reduce chemical cost, mitigate waste emissions significantly. State-of-the-art technologies need to utilize notable amount of chemicals or unstable resins to separate Ga; those processes are costly. Current electrolysis methods use Hg to suppress the H_2 evolution reaction in aqueous electrolyte. Hg is prohibited for industrial scale usage.

Industry Engagement: US Critical Materials and INL will work closely together to develop this technology. U.S. Critical Materials will supply the carbonatite ore with known composition and phases. The company will test and scale up the technology on site once INL develops and de-risks it at the lab scale.

Community Benefits: INL is dedicated to becoming a diverse workplace. INL is ranked 14th nationally for best workplaces for women. The electrochemistry team at INL is a diverse team with researchers from five different ethnicities and has hosted CMI supported summer interns every year since 2013 coming from diverse backgrounds. Some of the internships have led to employment in critical materials-related jobs.
Seven postdoctoral fellows have been converted to staff who actively support CMI work at INL. The electrochemistry team has hosted a CMI-supported graduate student from Ghana for his Ph.D. and will continue to intern undergraduate and graduate students from minorities and under-represented communities.

Project Team and Resources:

- PI: Rachel Winn, US Critical Materials Corp.
- CoPI's: Qiang Wang, Robert V. Fox
- Institutions: US Critical Materials (lead), Idaho National Laboratory
- Funding level by Institution: $ 1.2 M total funding (INL); The industry partner has requested no federal funds.
- Industry Members: US Critical Materials Corp.

Gallium at Sheep Creek

Commercially recoverable gallium grades at Sheep Creek show on the surface, and in the adits 150-400 feet below ground.

The U.S. is 100% import dependent on gallium, coming mostly from China.

US Critical Materials is not aware of any other domestic companies that are pursuing gallium processing and separation with the goal of being a U.S. source of gallium.

US Critical Materials has high grades of gallium and will be working with Idaho National Labs to invent and perfect a process to separate the gallium from the Sheep Creek ore.

Gallium is one of the top supply risks to our national security and defense.

Gallium in the Media

Click the hyperlinks below to find out more

PR Newswire

https://www.prnewswire.com/news-releases/us-critical-materials-corp-announces-major-discovery-of-gallium-on-their-sheep-creek-montana-properties-302095342.html

HuffPost

https://www.huffpost.com/entry/gallium-critical-minerals-us_n_65fb62fde4b07c954d54942c

Yahoo News

https://www.yahoo.com/news/u-may-just-scored-win-094516254.html

Mining.com

https://www.mining.com/us-critical-materials-makes-gallium-discovery-at-sheep-creek-in-montana/

Global Mining Review

https://www.globalminingreview.com/mining/25032024/us-critical-materials-announces-major-discovery-of-gallium/

Mining Technology

https://www.mining-technology.com/news/us-critical-materials-discovers-gallium-deposit-in-montana/

Semiconductor Today

https://www.semiconductor-today.com/news_items/2024/mar/uscriticalmaterials-210324.shtml

Adits at Sheep Creek

In the 1960's Hecla Mining excavated 3 adits at Sheep Creek.

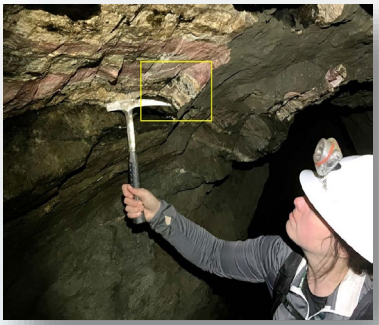
The significance cannot be overstated of actual confirmation of high-grade rare earths and other critical minerals below the surface that are fresh, not weathered, and can be seen, touched, sampled, measured and studied.

Two of these mine shafts were reopened in 2023 and showed a view of the property 150 - 400 feet below the surface.

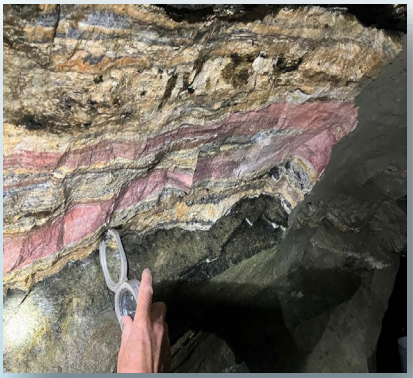
The samples taken from within the adits were tested at Activation Laboratory. The results reflect economical below-surface mineralization at very high grades.

Strong mineralization, including gallium, was found in these tunnels,150-400 feet below ground. US Critical Materials geologists entered theadits and sampled the rocks for analyses at Activation Laboratories.

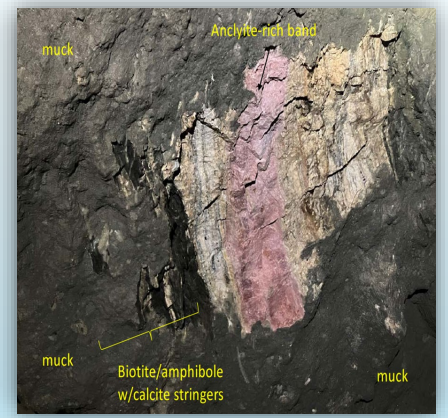
Sheep Creek Adit Photos



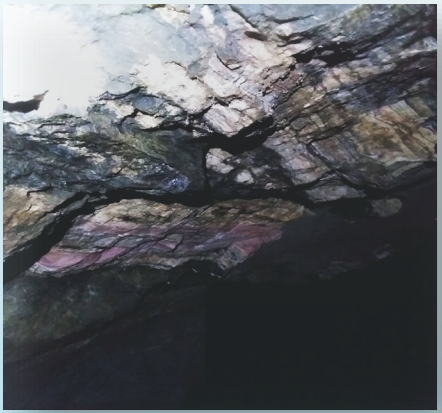
Ancylite Mineralization on right rib in Sheep Creek Adit



US Critical Materials Chief Geologist Peter Mejstrick taking a dip measurement of the exposed carbonatite. Approximately 4 feet of vein.
(Not including the calcite stringers in footwall and hanging wall.)



Carbonatite with Allanite, Columbite, and Monazite



Banded Carbonatite with Ancylite

The TREE (Total Rare Earth Element) at Sheep Creek averages 9% and the mineralization is up to feet wide, with highly mineralized carbonate dikes that go up to feet wide.

Idaho National Lab tests Sheep Creek samples; one rock from Montana project contains 17.8% rare earths and 350 ppm* gallium.

-Metal Tech News, Shane Lasley, May 30th,2024

Recent analysis by Idaho National Laboratories confirms that US Critical Materials Corp.'s Sheep Creek project in southwestern Montana hosts extremely high concentrations of gallium alongside the high-grade rare earth elements found there.

"The gallium and rare earth grades, calculated and verified by Idaho National Laboratory, are higher than any that we are aware of in the United States," US Critical Materials President Jim Hedrick said upon receiving a report detailing the national lab's analysis of several samples collected from Sheep Creek.

Both rare earths and gallium are highly critical to America's high-tech sector, as well as the nation's overall economic well-being and security.

The suite of 15 rare earth elements lend their extraordinary properties to a broad range of high-tech applications, including electric vehicles, wind turbines, and military hardware.

Gallium is an important ingredient for semiconductors used in 5G communication technologies, smartphones, satellite systems, solar energy, and next-generation defense systems.

Kingly rare earth grades at Sheep Creek

Metal Tech News – February 1, 2023
Shane Lasley, Metal Tech News

“Assay lab results affirm high-grade nature of critical minerals deposit in SW Montana.”

“If "grade is king," then US Critical Materials Corp.'s Sheep Creek in Montana wears the crown when it comes to rare earth projects in the United States.

The mining sector mantra "grade is king" alludes to the idea that a mine capable of producing one kilogram of rare earths for every 11 tons of ore dug up will be more profitable and have a smaller environmental footprint than a mine that must move more than 500 tons of ore for the same kilogram of this suite of critical elements.”

“Recent testing by Activation Labs, a Canadian analytical laboratory renowned for its rare earth analysis, of 52 surface samples collected at Sheep Creek returned an average grade of 9% total rare earth oxides, with individual samples containing as much as 21.7% TREO.”

“In fact, the Sheep Creek samples collected so far are higher grade than most other global rare earth deposits, which tend to run from 0.1% to 4% TREO.”

US Critical Materials Announces the Results of Study by Idaho National Laboratory Showing Definitive High Grade, Economic Gallium at Sheep Creek, Montana Deposit

Idaho National Laboratory is currently exploring ways to separate and process the Sheep Creek gallium and other Critical Minerals.

December 04, 2024, 9:00 AM EST | Source: US Critical Materials Corp.

Salt Lake City, Utah--(Newsfile Corp. - December 4, 2024) - US Critical Materials is pleased to announce that Phase One of the Cooperative Research and Development Agreement (CRADA) with Idaho National Laboratory (INL) has been completed. This phase involved studying, testing, and confirming the gallium and other critical minerals content at US Critical Materials Sheep Creek Deposit.

Simultaneously, INL had a team of scientists, engineers, lab technicians, and critical mineral experts begin to explore ways to create a separation and process system for the Sheep Creek ore. The next phase is being structured to cover the next 2 years of continued development of multiple separation and processing technologies.

Idaho National Laboratory is a U.S. Department of Energy (DOE) National Laboratory engaged in world leading critical materials research and development. INL excels in technology development in the Advanced Separation Science & Engineering technology space and is known throughout the DOE system as the Separation Sciences R&D Testbed.

US Critical Materials can confirm that INL measured grades of gallium from 180 parts per million (ppm) to 385 ppm and up to 18% (tree) total rare earth elements. "We are now able to confirm the presence of high-grade gallium at Sheep Creek. We look forward to continued work which will further develop a process to separate the gallium and other elements in an efficient and sustainable manner," stated Dr. Robert Fox, Critical Materials Business Lead for INL Energy, Environment, Science & Technology Directorate.

"The gallium and rare earth grades, calculated and verified by Idaho National Laboratory, are higher than any that we are aware of in the United States," stated Jim Hedrick, US Critical Materials President, and former 31-year rare earth commodity specialist for the USGS and US Bureau of Mines.

According to the 2024 USGS gallium Mineral Commodity Summary, the average gallium content worldwide is 19 ppm, and potential U. S. gallium deposits consist mainly of subeconomic resources. No gallium is currently produced in the United States.

Gallium is consistently listed as one of the top supply risks related to US National Security, as the U.S. is 100% dependent on imported gallium, primarily from China. In July 2023 the Chinese government embargoed the export of gallium, which is critical for national defense and many other vital applications. Gallium is used for semiconductors, 5G technology, smartphones, satellite systems, critical photonics technologies, and especially current and next generation defense systems.

The US currently has no separation and processing technology, with China dominating the world's critical minerals processing.

The Scope of Work of the CRADA between US Critical Materials and INL includes identification of materials handling, beneficiation, and separations technologies for carbonatite ore handling, preparation, and extraction of targeted, value-added metals. This will be done in a sustainable, efficient manner with a minimal carbon footprint.

"The U.S. has very little commercial rare earth processing capabilities," said Hedrick. "This research agreement, and the tech that will be developed, will help advance U.S. rare earth processing proficiency. Not only is our gallium high grade, but we are also confident that working together with Idaho National Laboratory, we will be able to create a proprietary separation process that will be environmentally respectful," said Hedrick."

US Critical Materials Corp. is a private rare earths exploration and development company based in Salt Lake City, UT with holdings in Montana and Idaho. Mineral deposits held by US Critical Materials in Montana and Idaho are unique due to high grades of rare earths, low levels of thorium, large numbers of surface carbonatites, and contain some of the highest grades of rare earth minerals in the United States (U.S.) including at least thirteen of the currently listed "critical" minerals (e.g., gallium).

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METAL TECH NEWS
THE ELEMENTS OF INNOVATION DISCOVERED

High-grade gallium, rare earths verified

U.S. Critical Minerals Chief Geologist Peter Mejstrick measures the dip of a carbonatite vein enriched with high-grade rare earths, gallium, and other critical minerals in a historical underground adit at the Sheep Creek project in Montana.

Shane Lasley, Metal Tech News | May 30, 2024

Idaho National Lab tests Sheep Creek samples; one rock from Montana project contains 17.8% rare earths and 350ppm* gallium.

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Both rare earths and gallium are highly critical to America's high-tech sector, as well as the nation's overall economic well-being and security.

The suite of 15 rare earth elements lend their extraordinary properties to a broad range of high-tech applications, including electric vehicles, wind turbines, and military hardware.

Gallium is an important ingredient for semiconductors used in 5G communication technologies, smartphones, satellite systems, solar energy, and next-generation defense systems.

Idaho National Laboratory's sampling of this rock collected from Sheep Creek (SH-7) returned 17.8% rare earths and 350 ppm gallium

During 2023, the U.S. relied on imports for 95% of its rare earths and 100% of its gallium, according to the U.S. Geological Survey.

(Continued on next slide)

China, which dominates the global supply of both, has put in place state-controlled restrictions on its gallium exports and has previously used its rare earth monopoly as a geopolitical and economic tool.

According to the 2024 edition of USGS's annual Mineral Commodity Summaries, China is the world's top producer of at least 29 of the 50 minerals deemed critical to the U.S.
"Despite a great deal of rhetoric around supply chain security, China continues to be our top source of the minerals needed by our economy and these numbers show very little movement to get us back on competitive and secure footing," National Mining Association President and CEO Rich Nolan said.

Extraordinary rare earths, gallium

Recent analysis carried out at Idaho National Lab highlights Sheep Creek's potential as an extraordinarily high-grade domestic source of both rare earth and gallium.

Highlights from the samples analyzed by Idaho National Lab include:

- **13.45%** total rare earth elements (TREE) and approximately 250 parts per million* gallium in sample SH-1.
- **13.82%** TREE and approximately 300 ppm* gallium in sample SH-6d.
- **17.78%** TREE and approximately 350 ppm* gallium in sample SH-7.

The nine Sheep Creek rock samples analyzed by Idaho National Lab averaged 8.48% TREE and 451.8 ppm* gallium. These samples were collected over a two-mile-long area of the Sheep Creek property.

Robert Fox manages the Materials Separations and Analysis department at Idaho National Lab.

"We have confirmed that Sheep Creek is the highest-grade rare earth deposit in the United States, with a multibillion-dollar resource value," said Hedrick, who served as a rare earth commodity specialist at the USGS and former U.S. Bureau of Mines for three decades. "Over the course of my 30- year career evaluating properties for the U.S. government, I have never encountered a deposit with the high rare earth and gallium grades being generated at Sheep Creek."

In addition to the rare earths and gallium currently being evaluated, the southwestern Montana project hosts niobium, scandium, strontium, and other minerals critical to the U.S.

(Continued on next slide)

Developing processing tech

U.S. Critical Materials work with Idaho National Lab is less about evaluating the quantities of rare earths and gallium, which had previously been quantified by another lab, and more about developing a process to separate and extract the rare earths and 11 other critical minerals found at Sheep Creek.

Late last year, the critical materials exploration company and national lab entered into a cooperative research and development agreement (CRADA) focused on developing a technology to recover and separate the rare earths, gallium, and other critical minerals found at Sheep Creek efficiently and sustainably.

The U.S. has very little commercial rare earth processing capabilities," said Hedrick. "This research agreement, and the tech that will be developed, will help advance U.S. rare earth processing proficiency."

Idaho National Lab, which has been involved with rare earth separation since the dawn of the nuclear age, brings more than six decades of expertise to bring to the table.

"Our latest separations technologies target the energy critical materials and span the entire supply chain from mining to recycle/recovery," Robert Fox, materials separation and analyses department manager at Idaho National Laboratory, told Metal Tech News in an email. "Our CRADA with US Critical Materials allows us to continue to develop our prowess and to expand our technological solutions to solve rare earth element challenges."

The Sheep Creek sample analysis that turned up the high-grade rare earth and gallium values was part of the analysis being carried out at the national lab.

The more important part of this preliminary analysis, when it comes to developing processing and separation technology, is gaining a better understanding of the mineralization to determine the best way to extract the critical minerals.

Moving forward, the research team at Idaho National Lab will further characterize the rare earths- and gallium-bearing minerals ahead of designing and testing a method of extracting these highly critical elements.

"Not only is our gallium high grade, but we are also confident that working together with Idaho National Laboratory, we will be able to create a proprietary separation process that will be environmentally respectful," said Hedrick.

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James Hedrick, President of US Critical Materials and former Rare Earths Commodity Specialist for the USGS

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