

A full-page background image of a male miner with a mustache, wearing a white hard hat with a headlamp, safety glasses, and large yellow gloves. He is operating a large, silver and black pneumatic drill. The background is a dark, textured rock wall.

**MONTANA**

# MINING

WINTER/SPRING 2026

## Meeting the challenge

Montana Tech focuses on  
America's challenging issues in  
energy and critical materials

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## ► LETTER FROM THE MMA PRESIDENT

# Protecting and promoting responsible mining

**T**his is definitely the most exciting time for mining that I have experienced in my 30-year career. We have record prices for gold, silver, and copper, we have a renewed and sustained interest in domestic resource develop-



**Mark  
Thompson**

ment, and the federal and state governments are encouraging and investing in a sustainable domestic industrial supply chain. There is huge excitement around domestic development of critical materials including rare earth elements, and Montana, “the Treasure State,” has an abundance of these resources.

However, as history has taught us, these prosperous times also lead to some less than reputable “developers” looking to profit from investors. We’ve all seen developers with little to no mining experience making outrageous claims about their projects and causing unnecessary and irresponsible controversy in communities and the state. It is unfortunate, but a reality, that our industry is painted with a single brush and all our members are harmed when these situations occur. MMA and its membership must distance themselves from these types of developers, while at the same time protecting the resource that is being falsely marketed. This is a fine line that the association must walk, but it is something that needs to be perfected.

With the mission of protecting and promoting responsible mining, the Montana Mining Association is uniquely poised to champion this boom. Whether it’s our funding arrangements with Army Research Laboratory, our close relationship with Montana Tech, our outreach to new mining companies coming to Montana, or our engagement with state and federal regulators to best define what responsible mining looks like, MMA is rising to the challenge! **M**

*Mark Thompson is the vice president of environmental affairs at Montana Resources and the president of the Montana Mining Association.*



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Cheers to the end of another successful year! As you will read on, a lot of great things happened for us in 2025. There is reason for even more excitement as we look ahead to what is in store for our industry, our association and our state in 2026.



**MATT VINCENT**

As we recount our past year's accomplishments and look to the good fortunes that await us in the coming months, we invite our membership to become more involved in our association and to help spread the word of the work we are doing within the organization – and more importantly within our

industry – to our local communities.

With the official advent of Montana Mining Day this year, we are going to be looking at new ways to engage our neighbors and friends who might not be lucky enough to work in mining so that they may better understand and appreciate the importance of our industry to the lives we all live.

According to this year's lunar new year, 2026 is the "Year of the Fire Horse." AI Overview tells me this symbolizes "energy, passion, freedom and strong leadership, a dynamic period for bold action and achieving goals." I don't normally pay too much attention to this – although Butte, America does have one heck of a Chinese New Year celebration – but with everything we have

planned for this new year, the Fire Horse is the absolute best symbol we could have!

## 2025 IN REVIEW

This past year was a whirlwind of activity that gave our association a ton of momentum coming into the new year. For starters, it was the 69th Montana legislative session in the state Capitol. It was a raucous and sometimes rancorous affair, but one in which the Montana Mining Association arguably accomplished more than it ever has. We were successful in supporting and passing a couple fistfuls of bills that resulted in improvements to our industry across the board, from permitting and state mineral leases to safe mining measures and common-sense adjustments to

**ON THE COVER:** Montana Tech's Underground Mine Education Center gives students the opportunity to get hands-on experience in underground mining right on campus. *Photo Lou Mason*

## MONTANA MINING

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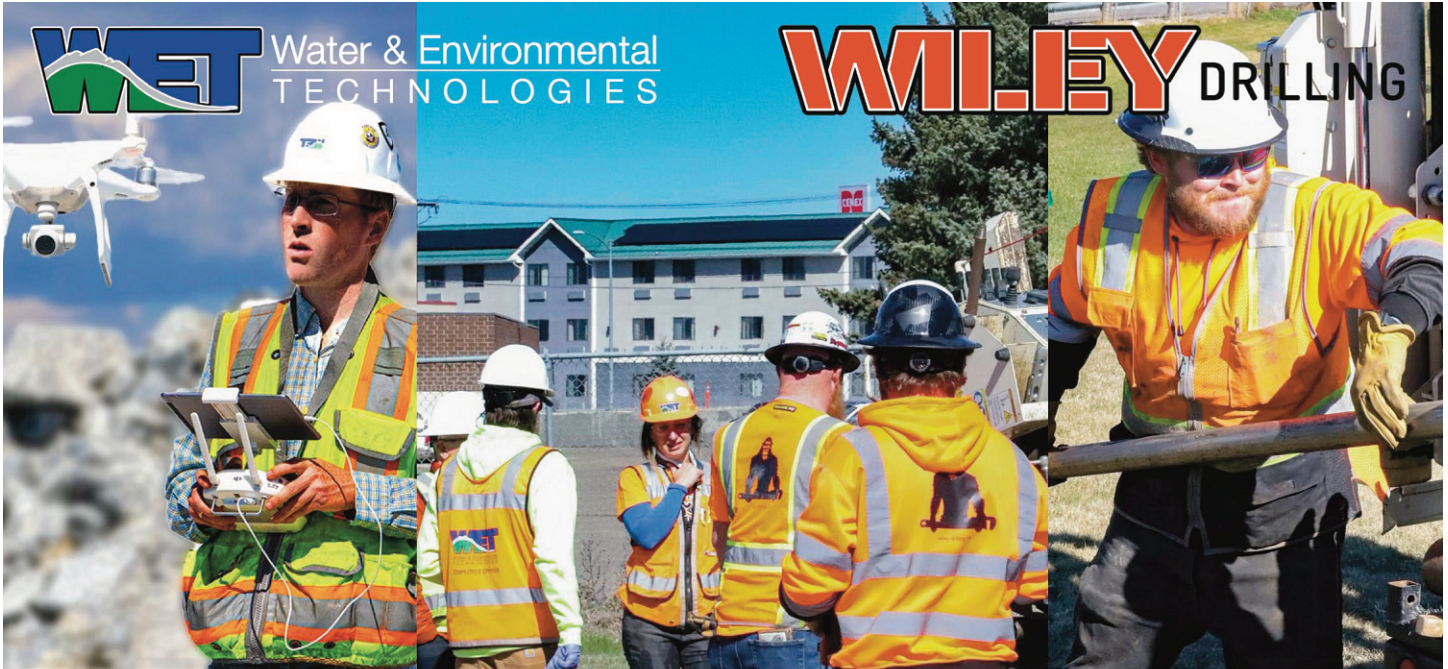
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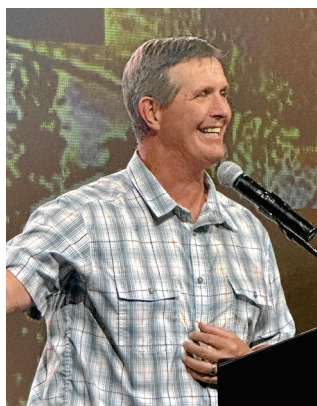


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A discussion during a tour of the Anaconda Smelter on July 14. The tour was one of the activities offered during the Montana Mining Association's Annual Meeting. The city of Anaconda is in the background.



**LEFT:** J.P. Gallagher, the chief executive of the city and county of Butte-Silver Bow, welcomes everyone to "The Mining City" during the opening night of the Montana Mining Association Annual Meeting on July 14. **MIDDLE:** Emily Arthun, the CEO of the American Coal Council, talks about the importance of coal during the Montana Mining Association Annual Meeting on July 15. **RIGHT:** Courtney Young, a mineral processing and extractive metallurgy professor at Montana Tech, talks about the history and future of critical minerals during the opening night of the Montana Mining Association Annual Meeting on July 14.

coal and hard rock operations.

At the same time, we were successful in defeating other bills that would have been harmful to business in Montana and our industry. Further, we got the governor to host us for a bill signing to create a Montana Mining Day, sponsored by House member Rep. Curtis Schomer.

Let us know if you'd like us to send you our full legislative report at [info@montana-mining.org](mailto:info@montana-mining.org) and we'll get it out to you.

## ANNUAL MEETING RECAP

The 2025 Annual Meeting was another roaring success and our biggest attendance yet. Over 400 individuals and 35 exhibitors gathered in Butte, aka "The Mining City," for an amazing slate of speakers and panels under the theme of "Securing America's Critical Minerals Supply Chains."

Keynotes included U.S. Forest Service Chief Tom Schultz, American Coal Council Executive Director Emily Arthun and EPA Region 8 Administrator Cyrus Western.

We also raised another \$10,000 at our

auction and golf and trap tournament calculations to go toward our Montana Tech Orediggers scholarship program and special support for members of our association in need.

## CRITICAL MINERALS

Along the lines of the 2025 annual meeting theme, MMA continued its program development and planning with priority projects to extract critical minerals from existing permitted operations and legacy waste sites. The initial priority projects on our list are the Berkeley Pit in Butte, the Anaconda Smelter slag and flue dust sites near Anaconda, the Contact Mill in Philipsburg (read the feature story on the Antonioli family), the slag from Sibanye Stillwater's metallurgical facility in Columbus, and research to see if extraction of additional critical minerals present in the Black Butte Copper Project's orebody is possible.

Congressman Troy Downing was successful in getting our program included in the U.S. House budget for \$10 million, but the budget still needs to be approved in the

Senate and above.

Montana's Environmental Quality Council voted 15-1 in December to send a letter of support for the priority projects above to Washington D.C. and to our Congressional delegation.

Meanwhile, MMA and its critical minerals partners continue to work with the Army Research Laboratory to advance key projects in Montana. Most recently, MMA is teaming with Montana Tech to produce tungsten and manganese from waste-sourced feedstocks.

## WESTERN STATES MINING COLLABORATIVE COUNCIL (WSMCC)

Montana hosted for the first time its cohorts from other western states for the annual meeting of the WSMCC. The WSMCC is an unofficial collaborative of the mining associations from the western U.S., which includes, in alphabetical order, Alaska, Arizona, Colorado, Idaho, Minnesota, Montana, Nevada, New Mexico, South Dakota, Utah and Wyoming. Additionally, the group includes the American Coal Council, American Exploration and Mining Association (AEMA), National Mining Association, Rocky Mountain Mining Institute and the Women's Mining Coalition.

Each year a different state hosts the group, and it goes in alphabetical order. Julie Lucas and her team at Mining Minnesota brought the group to Duluth and toured us throughout the Iron Range last year, which was outstanding.

MMA hosted this year's event in September in Butte and focused the two days on, again, you guessed it ... critical minerals!

In addition to touring the group to three of the five priority sites that MMA has been working on (Berkeley Pit, Anaconda and the Contact Mill) participants also toured the Montana Resources Continental Pit operations in Butte, Montana Tech's Underground Mining Education Center at the Orphan Boy Mine, and the Mineral Museum.

Each of the western states contributes both historically and presently to America's mineral security. MMA wanted to share its approach and convene a discussion amongst its peers to being a collaborative of critical minerals projects where the sum of the western states' mineral resources becomes greater than the individual parts – a Western States Critical Minerals Network that can increase and secure America's domestic supply chain.



The event has already resulted in next steps of collaboration between Montana and at least three of its partner states, and we look forward to the 2026 event to be hosted by the Nevada Mining Association!

## ASSOCIATION GROWTH AND A NEW HOME TO GROW INTO!

Many things continued to change and grow with the association in 2025. We are nearing 200 members at the end of the year. We welcomed in the first coal producer in the history of the association with Westmoreland Mining and will see much more to come with the pending dissolution of the Montana Coal Council. But no change was more significant than this: Montana Mining Association bought its first home!

October 17 at Flying S Title marked the official closing on a 4,300-square-foot office building in Helena located at 1 South Dakota



During the Western States Mining Collaborative Council which was hosted by the Montana Mining Association in September, participants had the opportunity to go on a variety of tours – to the Berkeley Pit, Anaconda, the Contact Mill, the Montana Resources Continental Pit operations in Butte, Montana Tech's Underground Mining Education Center, and the Mineral Museum. This group toured the Underground Mining Education Center.

# Navajo Transitional Energy Company's Spring Creek Mine



Navajo Transitional Energy Company, LLC (NTEC) is a Navajo Nation owned Limited Liability Company. It was formed in 2013 to purchase the Navajo Mine in New Mexico and for the benefit of the Navajo people.

NTEC expanded through the acquisition of three operating mines in the Powder River Basin — Antelope, Cordero, and Spring Creek in 2019.

NTEC has a diversified investment portfolio that includes NTEC helium, lithium, and rare earth element projects. NTEC is also pursuing several alternative and renewable energy projects, primarily on the Navajo Nation.

NTEC has approximately 1,265 employees spread across four states — Wyoming, Montana, Colorado, and New Mexico. NTEC is the third largest U.S. coal producer, shipping nearly 46 million tons of coal in 2025.

The Spring Creek Mine (SCM) is a surface coal mining operation in Big Horn County, Montana. Located near Decker in southeast Montana about 23 miles north of Sheridan, Wyoming, SCM has been continuously producing high quality 9,350 BTU/lb. thermal coal for electrical power production and



A view of the Spring Creek Mine facilities.

industrial heating applications since 1980.

The mine has about 261 full-time employees.

SCM utilizes two large draglines, three electric rope shovels, and fleets of CAT D-11 dozers and Komatsu 830E diesel/electric trucks to uncover and ship coal from its 80-foot-thick Anderson-Dietz coal seam. Shipments are unit train lots via the BNSF railroad.

In 2025 SCM produced a total of 10.4 million tons of coal. To date SCM has shipped more than 478 million tons of coal to its customers, which include both U.S. domestic and international export destinations.

SCM has recoverable reserves totaling about 130 million tons. The mine plans to produce about 9 to 11 million tons annually, depending on the market.





Coal conveyors at Signal Peak Energy's Bull Mountains Mine.

# Signal Peak Energy's Bull Mountains Mine



Signal Peak Energy, LLC operates the Bull Mountains Mine No. 1 in Musselshell and Yellowstone counties in eastern Montana. Bull Mountains is the only underground coal mine in Montana. The company is jointly owned by the Boich Companies and The Gunvor Group.

The Mammoth Seam is the primary coal seam at the mine and is one of the largest contiguous coal seams in North America. The company anticipates mining 8 to 11 million raw tons of coal per year through the life of the mine.

The owners of Signal Peak Energy also formed a separate entity, Global Rail Group, LLC, that operates a 36-mile rail spur to handle transportation of the coal to Broadview connecting with the BNSF mainline railroad.

Signal Peak is the largest single exporter of thermal coal in the U.S. Ninety-eight percent of the coal production is exported through Westshore terminal in Vancouver, British Columbia.

The contributions that Signal Peak Energy and Global Rail Group make to the counties and the state of Montana include:

- Currently provides roughly 240 full-time jobs, with about 180 of those being hourly employees earning, on average, \$150,000 per year in wages and benefits
- Non-union workforce
- Real and personal property tax base in excess of \$450 million

• During 2023 the companies accrued the following taxes and royalties for the state and/or counties:

- \$52,300,000 for gross proceeds, severance and resource indemnity trust taxes
- \$2,900,000 in real and personal property taxes
- \$5,100,000 in payroll taxes
- \$84,000 in state unemployment taxes
- \$1,900,000 in mineral royalty withholding tax
- \$34,340,000 in mineral royalties to the state of Montana. Taxes and royalties vary annually subject to changes in market conditions.
- Transactions in excess of \$50 million annually with vendors located in Montana
- Signal Peak Energy was the lead donor for a \$17 million community project in Billings to build a state-of-the-art ice arena on land owned by the City of Billings.
- Donates \$400,000 annually to the Signal Peak Community Foundation in Roundup, Montana
- Provided \$100,000 to fund the Roundup Main Street Improvement Initiative
- Operates the state's only state-of-the-art underground coal mine
- Highest producing longwall mine in 2021 to 2025 (clean tons per man hour)



The Anaconda Smelter

Street. MMA purchased the building and everything in it from the Montana High School Association (MHSA) for \$850,000. The building is located less than two blocks from the state Capitol and has furnished offices, a board room, a kitchenette, three bathrooms, a large work area and off-street parking.

MMA moved into the space on December 15 and is already hosting meetings and events in its new facility. The building represents a stable presence for the association in line of sight with the Capitol.

It will also diversify the association's revenue stream, as MMA is preparing to offer offices for lease in the coming months. Contact us for more information if you are interested in learning more! [info@montana-mining.org](mailto:info@montana-mining.org)

All this growth and change has facilitated an opportunity for reorganization. MMA kicked off a strategic reorganization process in November with a goal to increase the association's reach to better serve all mining interests in Montana with a more efficient structure that can be effective well into the future.



## 2026: A LOOK AHEAD

At the risk of being redundant, the association has big plans for change and growth in 2026! We have new membership in our coal producing partners and are off and running planning how to best reorganize the association's structure so that we can better serve the industry in the years ahead.

"How are we doing that?" you might ask.

We have formed an inclusive ad-hoc committee made up of board members, management, producers, exploration, suppliers and associates. We are reaching out to partner organizations for input and information. And we will be test-driving and vetting how structures and procedures work, all before bringing the final product before the membership at our annual meeting for review and approval.

We are confident the final product will be effective and more engaging with our membership so that more members can find a way to get involved with protecting, promoting and responsibly growing the industry.

## COAL MINING IS MONTANA MINING!

At its annual Suppliers Meeting in Billings



Montana Mining Association Executive Director Matt Vincent and MMA President Mark Thompson at the closing for the association's new headquarters building at 1 South Dakota Street in Helena.

this past November, the Montana Coal Council made the difficult announcement that it was suspending operations at the end of 2025 and dissolving in 2026. Not that any of us in the industry have had it easy, but coal has been under attack in the regulatory, litigation and market arenas for many years, resulting

in only three coal producers remaining in Montana. For over 50 years the Coal Council has served its industry with pride and vigor.

Westmoreland Mining joined the MMA in late 2024 and has been a valuable contributor to the association in its first year of membership and on the board of directors.

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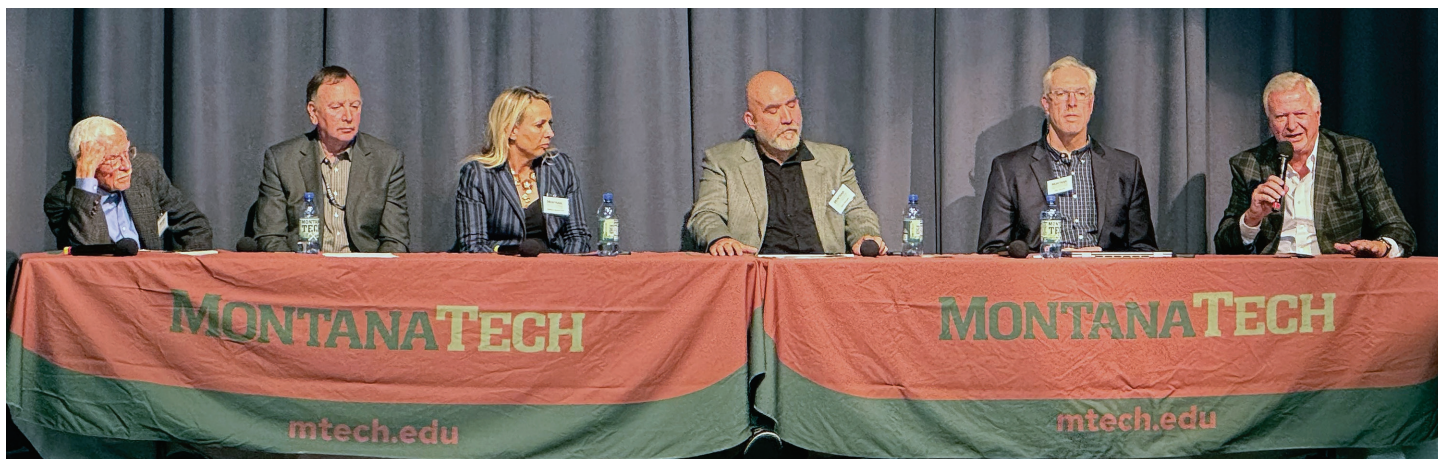
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The 2025 Energy and Critical Materials Summit was held at Montana Tech Oct. 8-10. The people participating in this panel discussion on primary production with an emphasis on Montana were, from left, moderator Terence McNulty of T.P. McNulty & Associates, Montana Tech Executive Director of Critical Materials Initiatives John Metesh, Sibanye Stillwater Vice President for Legal and External Affairs Heather McDowell, Montana Mining Association Executive Director Matt Vincent, Montana Resources Vice President Dan Janney, and U.S. Antimony Corp. CEO Gary Evans.

Now Navajo Transitional Energy Company's (NTEC) Spring Creek Mine – Montana's largest coal mine, and Signal Peak Energy's Bull Mountains Mine, the state's only underground coal mine (see sidebar briefs on both mines) are soon to join the MMA ranks.

MMA wants to extend its sincerest thanks to the Coal Council for proudly serving coal in the Treasure State for the past half a century. We also want to extend an invitation to all the council members to come join our ranks. We are here to protect and promote

all responsible mining in our great state, and your numbers are welcome as we build strength to amplify our mission.

### 2026 ANNUAL MEETING

We are already in gear preparing for another "can't miss" annual meeting and expo event in Butte, so PLEASE SAVE THE DATES: July 13, 14 and 15. This year's theme is "Defining Responsible Mining in Montana."

With the association's mission "to protect

and promote responsible mining in Montana" it's imperative we discuss and clearly define what that means – even more so in these exciting times where metals prices and demands are at all-time highs, and so is investment and interest in our state.

In Montana, we take great pride and responsibility in balancing a multi-billion-dollar mining economy with a multi-billion-dollar outdoor recreation and tourism economy. We know we can have both, and that is where the discussion begins.

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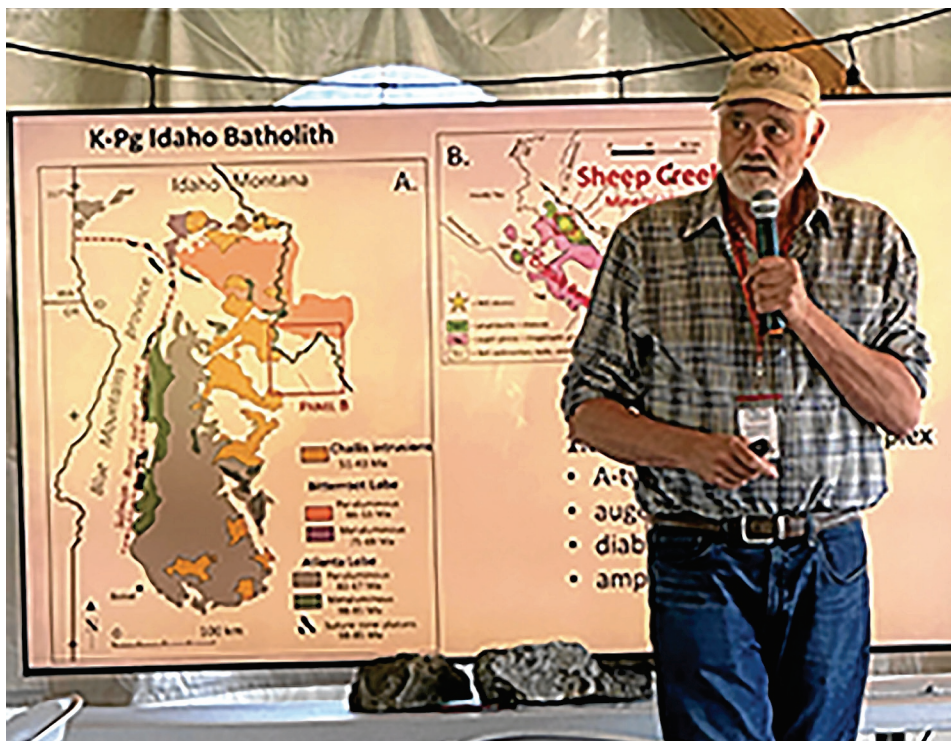
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Chris Gammons, a professor in the Geological Engineering Department at Montana Tech, talks at the Montana Bureau of Mines and Geology's 2025 Mining and Minerals Symposium in Butte in September. Gammons' research focuses on aqueous geochemistry at high and low temperatures, economic geology, acid mine drainage, and stable isotopes.

Please consider being a sponsor of this year's event – we can't do it without you! Don't hesitate to get in touch with us if you have any questions or ideas. We will open

registration in April, so stay tuned and be fast – space will be limited with the growth we are projecting. **M**



The Orphan Girl headframe in Butte

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# Montana Mining Day

A new celebration of the Treasure State's flagship industry

MATT VINCENT

February 9, 2026, officially marks the inaugural celebration of Montana Mining Day. Thanks to Representative Curtis Schomer for sponsoring and to Governor Greg Gianforte for signing the bill into law, this date will be a day to commemorate Montana's mining heritage and to celebrate and promote what the industry means to our Treasure State and our nation today and the opportunities ahead.

The specific date was chosen because it was on this day of the calendar in 1865 that our state, which was only a territory at the time, adopted its "Oro y Plata" motto (Spanish for Gold & Silver) and the miner's pick and shovel depicted on the state seal in tribute to its astounding mineral resources.

Here is an interesting note: many people have questioned why the "gold and silver" motto is in Spanish and not English. The answer that makes the most sense is that the state's name itself, Montana, derives from the Spanish word for mountain, "montaña."

For the Montana Mining Association, one day a year to celebrate our industry and what it means to our state is a great start. And by that, we mean to redouble our efforts in the years ahead to get the word out further and wider to the public promoting the vital role that responsible mining plays in our world today.

This year, starting with a statewide media blitz in partnership with Lee Enterprises, Montana Mining Day will be a day not just to celebrate but a launch pad for bigger and broader initiatives the association and its partners plan



Governor Greg Gianforte held a signing ceremony in his office on February 27, 2025 for HB 203 declaring February 9 as Montana Mining Day. From left are bill sponsor Rep. Curtis Schomer; Heather McDowell, Sibanye-Stillwater; Nancy Schlepp, Sandfire Resources, Black Butte Copper Project; Matt Vincent, Montana Mining Association executive director; Gov. Greg Gianforte; and George Harris, Montana Coal Council executive director.



to bring over the next year and in the years to come.

These exciting announcements include but won't be limited to:

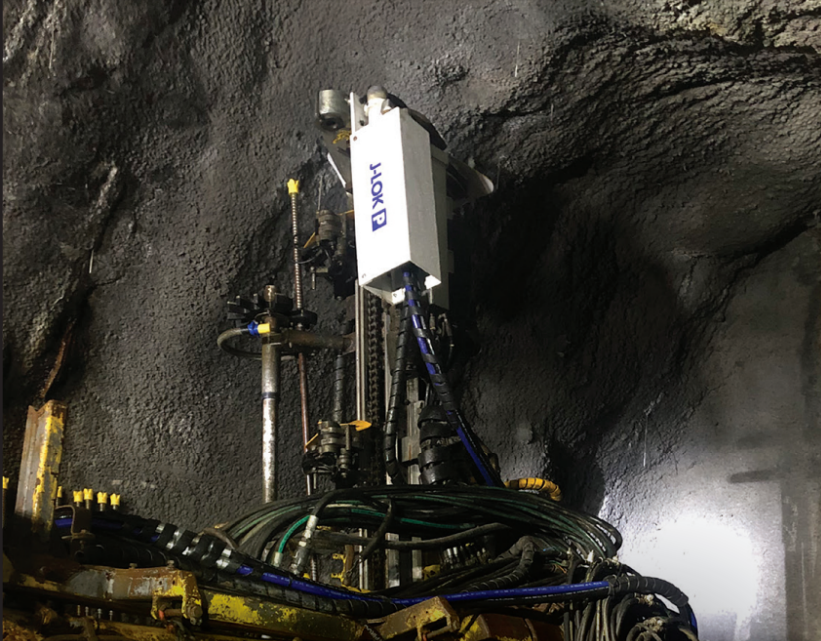
- An artistic competition with prizes for young artists to design the logo for an annual t-shirt design. The t-shirts will be sold to raise funds for the Montana Mining Day activities and mining education programs

- An open house and ribbon-cutting at the Mining Association's new office in Helena.

In case you haven't heard, the Montana Mining Association has

The commemorative t-shirt designs for the inaugural Montana Mining Day, which will be available on the Montana Mining Association website to raise funds for next year's Montana Mining Day events. In the future there will be artistic competitions with prizes for young artists to design the logo for annual T-shirt designs.





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a new home: 1 South Dakota Street in Helena – just over one block away from the State Capitol! We will be hosting an open house and ribbon cutting for anyone wishing to stop by. Invitations have been sent to Helena’s mayor and city council, state legislators, the governor’s office, the secretary of state, attorney general, state auditor and superintendent of schools, so who knows who might show up?

- Virtual mine tours of Westmoreland’s Rosebud coal mine in Colstrip and Montana Resources’ Continental copper and molybdenum mine in Butte, produced by Jess Scanlan and MineLife Media.

Most schools don’t have easy

access to an operating mine to tour, so we are bringing the mine into the classroom. These two awesome operations were planned as the first of many. The eventual goal is to have virtual tours available for all our operating mines in Montana, as well as for exploration projects, recycling and reclamation. The more we can open our youth and our citizens’ eyes to how mining is conducted, the better we can expect them to understand how necessary and responsible our industry is for our great state.

Once we get these first two completed, we will make sure anyone interested in seeing them knows where to find them and how to get them.

- A public speaker series

where the association will host a mining-centered speaker in a different town and venue and stream these to the web for broader viewing and circulation.

- A Montana Mining Hall of Fame is something that the association and one of its partners, the World Museum of Mining, have envisioned for a while. Starting on Montana Mining Day 2026 it will all begin to happen. Learn how to be part of the selection committee and how to nominate an individual you feel is worthy of induction to the Treasure State’s mining shrine!

- Montana Mining Day proclamations across the state are encouraged by city and town leadership and county commissions. Whether or not your

community is close to a mining operation, mining has played an integral part in our state’s heritage and continues to support our economies and way of life today and into the future.

- Celebrate mining! Please let us know how you celebrated or commemorated Montana Mining Day this year and we will be sure to feature your input in our social media, webpage and in an upcoming publication of Montana Mining magazine.

Please don’t hesitate to get in touch with me at [mvincent@montanamining.org](mailto:mvincent@montanamining.org) if you have ideas, want to get involved or can contribute to making Montana Mining Day a fun and educational success in our state for years to come! **M**

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# An Act Providing for Montana Mining Day

Here is the text of Montana House Bill 203 establishing Montana Mining Day. Gov. Greg Gianforte signed the bill into law on February 27, 2025, saying, “Thank you to miners across the state for your work to keep Montana’s rich mining heritage alive and thriving.”

WHEREAS, the state motto of Montana, adopted on February 9, 1865, is “oro y plata,” which is Spanish for “gold and silver”, and reflects our mining heritage and vast mineral wealth; and

WHEREAS, the Great Seal of the state of Montana is a vivid symbol of all that is special about our state and includes the state motto and a miner’s pick and shovel; and

WHEREAS, the nickname of Montana is “the Treasure State,” which was chosen because of the state’s vast mineral resources; and

WHEREAS, gold was first discovered in Montana in the 1850s, leading to major finds at Bannack, Virginia City, Silver Bow Creek, and Prickly Pear Creek; and

WHEREAS, these major finds brought many of the first settlers and developers to Montana, leading to its early economic and societal growth and the discovery and development of many other deposits of metals and minerals, including coal, silver, and copper; and

WHEREAS, mining in Montana subsequently grew and supplied the nation with much of its mineral resource needs, including copper from Butte that was smelted in Anaconda and refined in Great Falls, and which powered the electrification of America and fueled the country’s victorious efforts in both World Wars; and

WHEREAS, the mining of lignite and bituminous coal from eastern Montana coal beds heated homes and fired steam-powered locomotives in the early 20th century and continues to provide the largest share of Montana’s electricity generation; and

WHEREAS, Montana’s placer, underground, and surface mining

employed thousands at hundreds of mines, producing billions in wealth; and

WHEREAS, the mining industry continues to contribute billions of dollars to Montana’s economy, creating thousands of permanent jobs and millions of dollars in tax revenues to the state and local communities each year; and

WHEREAS, there have been thousands of miners who died in the early days of Montana mining, but whose deaths have led to world-leading safety and labor standards for workers today; and

WHEREAS, there have been historic environmental and social impacts from mining in Montana that have led to world-leading environmental regulations and financial assurances for the protection of our environment and communities; and

WHEREAS, the Montana Legislature authorized in 1893 the creation of the Montana State School of Mines in Butte, now known as Montana Technological

University (Montana Tech), which continues to be one of the nation’s leading schools in the science, technology, engineering, and math (STEM) and mining of natural resources today; and

WHEREAS, Montana continues to hold significant deposits of minerals, including those critical for our nation’s current and future defense, economic and technological advancement, and energy transition and security; and

WHEREAS, our state is proud of its heritage, its present, and its future in mining and mineral processing and believes it is vital to promote and educate the public about the costs and benefits of responsible mining in Montana sufficiently and accurately.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA:

There is established a mining day for the state of Montana. The Montana mining day is February 9 of each year to commemorate when the territorial government adopted the state motto. **M**



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D6T LGP	D8T LGP	D9T	D10T	D11T
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938	950	966M/744K	844K/980K/M	988H/K - WA900	992/922G
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20-47 Ton HEX	65-90 Ton HEX	120-200 Ton HEX	EX2600	EX3600	EX5500/ EX5600/PC5500	PC7000	PC8000
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16M	24M - 24
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The Antonioli's Contact Mill near Philipsburg.

# When it comes to mining in Montana, “a” is for Antonioli

MATT VINCENT

If there were a Montana mining alphabet, you'd get little argument the first, big letter “A” would belong to the great and powerful Anaconda Copper Company. After all, “the Company,” as they were unaffectionately known, was the world's and America's largest producer of copper and other materials many times over its corporate life spanning from its beginnings in the 1880s to its final chapter under the Atlantic Richfield Company (ARCO), which closed the company in 1982. The 585-foot tall Washoe Smelter stack and the big, whitewashed letter “A” on a hill overlooking the town of its namesake are imposing testaments.

If there were an “a” in that alphabet designated to a lower case – and certainly not without as convincing a case to prove – the Antonioli family would carry the day. They've been doing it since the family's patriarch, Pietro,

came to America in 1879. After short stops in Nevada and California, the elder Antonioli brought his young wife Teresa to Butte, known as “The Richest Hill on Earth” because of its mineral wealth and development activity.

Together they had and raised 10 children; one of those was Peter Vincent Antonioli. While Pietro only “dabbled in mining,” as his family described it, Peter dug in deep, and hence began the Antonioli mining legacy.

Starting with the Mayflower Mine located in the Tobacco Root Mountains across the Continental Divide east from Butte, Peter ended up turning his attention west, buying the Scratch All Mine in Philipsburg – one of Montana's other prolific producing mining districts – in the 1950s. This in turn led to the acquisition of other claims, some of which were leased to other miners wanting to take a chance, while the family worked others, including the Take All and Hope.

Peter had three sons of his own, Frank, Bill and Pete, and while they did many things, all of them worked and/or had kids who worked in some capacity or another in the mining business.

In the early 1980s, Frank, who had stayed closest and truest to mining, working the family's claims as the markets would allow, saw an opportunity. As his nephew, Bill, explains it, “Uncle Frank called me and said, ‘Metal prices are up, and I've always wanted to build a mill. Are you in?’”

Bill was teaching school in Florence, Montana, at the time.

Next thing, the Antonioli family, along with the help of friends and acquaintances from the industry and with know-how, were building a commercial facility – the Contact Mill – in Philipsburg.

Under Frank's daily guidance, and without the benefit of a set of engineering plans,



Frank and Bill, along with many of the next generation of Antonioli, dedicated themselves to the great project. A lot of the family members worked weekends and vacations to help construct and bring the mill online in less than one year.

Initially, the mill was planned for a throughput of 500 tons per day to process silver-rich ores from one of the family mines, plus some gold and silver-bearing tails and dump materials from previously mined properties in the nearby ghost town of Granite, which the family also owned.

Because of the burgeoning market, the Black Pine Mine, also in the Philipsburg district, was ramping up production. Owned by Inspiration Copper, the mine needed a mill, and having heard about the Antonioli's endeavor, the company reached out.

The family agreed to a contract to process Inspiration's Black Pine ores, which called for the facility to be doubled in capacity to 1,000 tons per day. The project broke ground in the spring of 1981 and was running its first feedstock by Christmas of that year. A crusher was added and brought online in 1982, at which point the mill ran 24/7 on the Black Pine ores.



Frank Antonioli walks by super sacks of concentrate processed at the Contact Mill sitting outside the mill, ready for shipment to a smelter.

A good number of the Antonioli family have worked in the mill as operators, millwrights and managers, and have been involved in many administrative roles, as well.

Eventually, the family did run some of its own materials through the mill, which also served as a hub to process feedstocks from many other mines in Montana and beyond.

Over its life the mill produced concentrates

for a gamut of metals – gold, silver, copper, zinc, tungsten, lead, and molybdenum – which were sent to many places, from the smelter in East Helena to Trail, British Columbia. But with the prices of metals in a downward flux and the regulatory environment making it harder and harder to permit new mines of any size, the Contact Mill was idled in 2015.

“Metal prices were down, and concentrates

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Inside the Contact Mill.

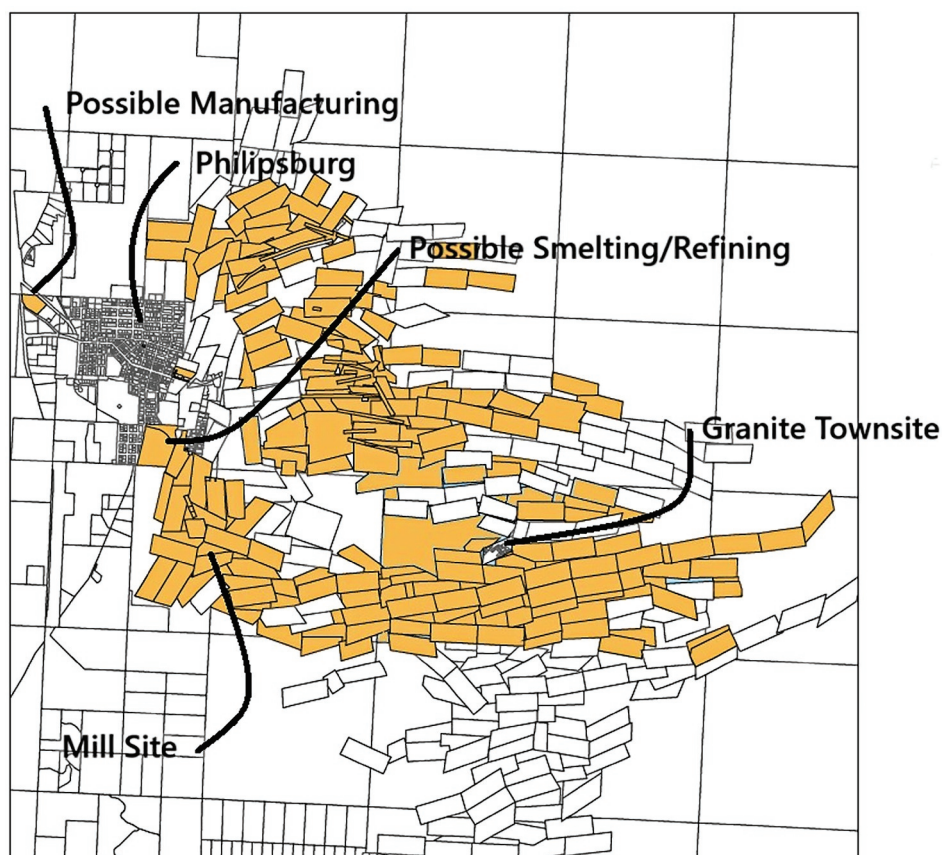
were being shipped to other continents, so it just didn't make sense," said Bill of the circumstances at the time of closure. "But we held onto it, and while it might have seemed like pouring money down a rathole at times, the mill has been maintained and is ready to run."

Bill and his siblings and cousins are part of the fourth generation of Antonioli and are getting into their sixties and seventies, albeit not without a ton of energy still left in them. That energy and eagerness to share what they know is the perfect fit for the next generation.

Enter Stefanie Hill. Stefanie is the oldest of the fifth generation and the daughter of Jim and Nancy Antonioli Hill. She and her husband John moved back to Montana from California after the pandemic, and she has jumped right into the family business, which, given the current markets and circumstances, seems ready to launch into its next orbit.

"I figured it was time to learn this stuff, understand what we have, learn the history," she said, sitting alongside her mother at the family camp in Philipsburg. "With the current geopolitical context and increased need for minerals critical for energy and defense, these guys were really ahead of their time when they built this. It's highly configurable."

Adding to the previously included list of metals concentrates the Contact Mill has historically produced, the Antonioli believe the mill can produce as many as 30 of the elements on the USGS's most recent critical list. In addition to crushing, flotation and gravity circuits, the



A map of the Antonioli family's mining claims in the Philipsburg area. The Contact Mining Company says the 240 patented mining claims cover a total of around 2,500 acres, and the likely or confirmed minerals in the claims include gold, silver, copper, zinc, manganese, molybdenum, rhenium, tungsten, arsenic, germanium, sphalerite, and gallium.

mill also comes with its own analytical laboratory, including fire assay.

"We are perfectly suited for this time," Hill said. "Now we just need to see if we can get the

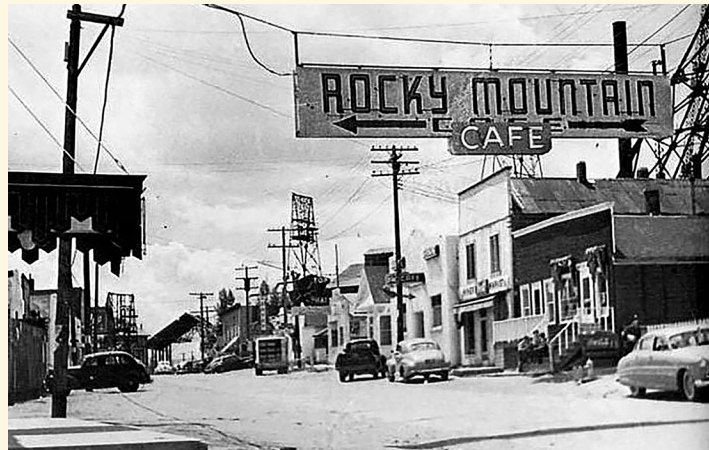
need, the will and the economics to converge."

For the past two years, the Antonioli have been working collaboratively with Montana Tech, the Montana Bureau of Mines and





Frank, Peter and Bill Antonioli



Peter V. Antonioli was one of the original founders of the famous Rocky Mountain Café in the Butte neighborhood of Meaderville.

# Notes on the Antonioli family

## PROVIDED BY THE ANTONIOLI FAMILY

Pietro Fortunato Antonioli (1855-1909) was born in northern Italy. He came to the United States in 1879 and traveled from the east coast to Butte, where he started a dairy and ranching business. He became a U.S. citizen in 1894. He and his wife, Teresa, had 10 children, including Peter V. Antonioli (1893-1959).



Peter V. Antonioli



Pietro Antonioli

Peter V. Antonioli had a great many interests, ranging from restaurants (he was one of the original founders of the famous Rocky Mountain Café in the Butte neighborhood of Meaderville), Butte's famous M&M Cigar Store, the Wintergarden Dance Hall (also in Butte), a national traveling big band group (Antonioli's Musical Musketeers), oil wells in Montana and Wyoming, mining properties across the state, manufacturing and selling moonshine at speakeasies he operated during prohibition, and a dairy farm outside of Butte, which was likely a front for his moonshine production. His wife, Susan, tells the tale that she spent her honeymoon working a still!

Peter acquired a lease and then purchased the Scratch All Mine in Philipsburg in the early 1950s, and a couple of years later purchased a good portion of the Granite Bimetallic properties, hence establishing the Antonioli name into the Montana mining annals.

Peter had three sons, Peter, William and Frank. William was a highly respected physician in Butte, and Peter and Frank had successful lifelong careers in mining. All three remained closely tied to their father and his various mining interests.

Although other mines ceased to produce, the Antonioli family has remained deeply rooted in Philipsburg, affectionately known as "the Camp."

At least 17 Antoniolis are alumni of the Montana School of Mines / Montana Technological University in Butte, where they studied mining and engineering.

Frank Antonioli was the first of the family to attend the university, which was then named the Montana School of Mines. He received a Bachelor of Science degree in 1950 in mineral dressing and a Master of Science degree in 1951. In 1974, he received an Honorary Professional degree.

Frank's connection with Montana Tech continued through the remainder of his life. He remained an active alumnus and a passionate advocate for the



TIM BURMEISTER

Frank Antonioli was instrumental in the birth and development of the World Museum of Mining in Butte.

high quality education provided by Tech.

He worked largely behind the scenes, except for one instance that still shines brightly above all else in Butte. Frank was responsible for lighting up the Montana Tech "M" on Big Butte. Frank's lights still shine to this day, usually in their "M" format, but sometimes — maybe not as often as he would have liked — without the two vertical legs, presenting instead the "V" for victory any time an Orediggers sports team wins an important game.

Frank was also instrumental in the birth and development of the World Museum of Mining, which still operates today from its location next to the Montana Tech campus. His donation of sapphires to the museum store provided one of the more popular profit-making enterprises in the gift shop.



TIM BURMEISTER

One of Peter V. Antonioli's business interests in Butte was the famous M&M, which was a "cigar store" during prohibition and for many years was a saloon, eatery and gambling house that never closed as it catered to miners every hour of the day and night.





Businesses along Broadway in Philipsburg.

Geology, the Montana Mining Association and an array of prospective partners from the private and federal sectors to bring the mill to bear on helping America meet its challenging critical minerals and material needs.

The initial focus has been on secondary extraction from wastes, both those within the Philipsburg district and beyond. But Nancy Hill emphasizes that pulling valuable elements from historic waste streams is just one facet.

“It’s important to note that the geology we have (in Philipsburg) is polymetallic. There’s a tremendous potential for new ores, not just waste.”

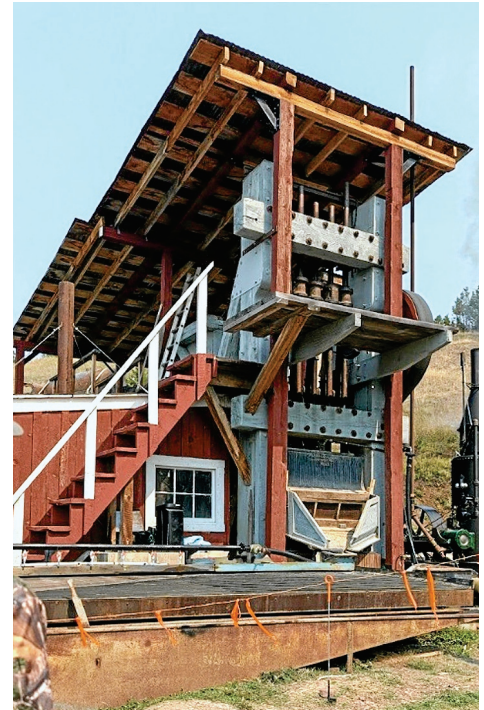
And Bill is quick to add, “The mining of

today is not the same as it used to be,” alluding to the largely unregulated era of mining back in the 1970s and ‘80s that created environmental legacies with which we are still dealing.

They all claim there is a lot of excitement and interest in the local community for the good-paying jobs a renaissance of the mill and adjacent claims could bring to the area.

“Who knows,” ponders Bill. “We may end up with some chickens to count.”

And with that seeming more and more likely, there just may be room for a sixth generation of mining Antoniolis to make further family contributions to the Treasure State’s flagship industry. **M**



The Antoniolli family and community volunteers built a re-creation of the Hope Stamp Mill. The Hope Stamp Mill in Philipsburg was a significant silver mining operation, designed by Philip Deidesheimer, that helped establish Philipsburg as a regional hub. Philipsburg was named for Philip Deidesheimer.

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### **Tuesday, July 14 2026**

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The Montana Tech archway on Park Street.

# Preparing the next generation of STEM leaders

*Montana Tech focuses on America's challenging issues in energy and critical materials*

TIM BURMEISTER

When the Montana State School of Mines opened its doors for its first classes 125 years ago, on Sept. 11, 1900, it was an auspicious beginning for the new school located in the mining mecca of Butte, America.

"An event of historical interest was the formal opening in Butte yesterday of the Montana State School of Mines," the Butte Miner reported the next day. "The Montana

School of Mines is destined to rank as one of the foremost technical institutions of the country. Happily, it is located in the greatest mining district the world has yet known."

A few days later the Anaconda Standard said, "It was last Tuesday that Butte woke up and found itself famous for being the home of one of the best mining schools in the world."

The Montana School of Mines started with just 21 students and offered two degrees:

mining engineering and electrical engineering. That was the start of the school's now 125-year history of providing the people and the expertise to help meet the needs of a growing and changing nation.

Johnny MacLean, who became the 13th chancellor of the college – now named Montana Technological University – on June 1, 2025, says the school is ready to continue playing an important role in the rapidly changing world.





Montana Tech Chancellor Johnny MacLean



During a recent conversation, MacLean said that when the Montana School of Mines started out focused primarily on mining engineering, “we were rising to meet America’s need during the Industrial Revolution for electricity.”

“And Butte, with the great copper resources here, was a perfect place for a school like Montana Tech and a mining engineering program.

“We like to say we electrified the world in 1900.”

MacLean said that throughout Montana Tech’s history, “each time America faced a new, really big challenge, Montana Tech was there to provide support and to rise to meet that challenge.”

“We provided resources and officer training during both world wars,” MacLean said. “And then after World War II, during globalization, we started our petroleum engineering program to fuel America’s journey to become a world leader.

“Then during the ‘70s, we began to address America’s environmental challenges as we began to reckon with the environmental damage of our early resource extraction practices.

“And then over the last few decades, we’ve been growing our health programs, and now our nursing program is actually the biggest individual program on our campus.”

MacLean said this history shows that each time America has faced a new challenge, “Montana Tech was there, and we rose to that challenge.”

“And now we’re facing some really significant challenges in our country,” MacLean said.

“With the emergence of AI, we know that America is going to have incredibly quickly growing energy demands. So we are currently focused on trying to meet those energy demands, both with our petroleum engineering program, and we’re also starting to build out nuclear energy programs here to provide the workforce necessary for a future that is going to involve more nuclear energy.”

To meet the needs of new artificial intelligence centers and other new technologies, and to meet national defense needs, America also needs to put more of a focus on producing and processing more critical minerals.

“Montana Tech has been focused on critical materials for 125 years,” MacLean said, “and we are refocusing now on the kinds of materials that are going into these high demand technical spaces — rare earth elements and related materials.”

With the start of the 2025 fall semester, Montana Tech had an enrollment of 2,516 students, an increase of nearly 4% from the previous fall, and the third consecutive year of enrollment growth.

The fall semester student body included students from 52 of Montana’s 56 counties, as well as 45 states and territories and 19 countries.

“People are clearly getting behind Montana Tech’s purpose of rising to meet America’s emerging needs,” MacLean said as the fall semester started. “Our country needs STEM leaders now more than ever, and these enrollment numbers are evidence of Montana Tech’s rising momentum.”

The majors offered at Montana Tech now include mining engineering, metallurgical &

materials engineering, petroleum engineering, electrical engineering, environmental engineering, geological engineering, mechanical engineering, civil engineering, occupational safety and health, business, chemistry, computer science, and more.

For students interested in mining, Montana Tech offers an educational opportunity that MacLean says is very unique — an Underground Mine Education Center where students get hands-on experience in underground workings by the campus. The UMEC is comprised of over 3,000 feet of underground workings — some of which were part of the historic Orphan Boy and Orphan Girl mines, along with new workings developed for specific training purposes.

Montana Tech developed the UMEC after acquiring land immediately west of the campus in 2010. The UMEC has been funded entirely by industry gifts and donations.

“We’re the only campus in the country with an active underground mine right on campus,” MacLean said.

MacLean described the course of Montana Tech going forward as a four-lane highway. Three of the lanes are infrastructure, health and well-being, and leadership and workforce development, and the first lane, which carries on the original mission of the university, is natural resources. The natural resources lane includes energy, critical materials, and the environment.

Montana Tech is recognized as Montana’s STEM (science, technology, engineering and mathematics) university, and a leading STEM university in the country.





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“Our purpose is to rise to meet America’s emerging needs by preparing the next generation of STEM leaders, and we’re doing it along the four-lane highway,” MacLean said.

To help fulfill its mission, the university has created some positions and brought in some new people, including MacLean with his background in geology, and Bob Morris as the Lance Energy Chair, and John Metesh as the executive director of Critical Minerals Initiatives.

“Bob and John are now leading our efforts in energy and critical materials here to make sure that we are poised to meet America’s most challenging issues in energy and critical materials,” MacLean said.

## JOHNNY MACLEAN

MacLean’s educational background gives him a good foundation for leading a premier STEM university. Born and raised in Nashville, Tennessee, MacLean completed a B.S. in geology at Furman University in South Carolina in 2001, an M.S. in earth science at Syracuse University in New York in 2004, and a Ph.D. in geosciences at the University of Montana in 2007.

Montana Mining Association Executive Director Matt Vincent said he is excited about the new administrative leadership at Montana Tech.

“Having a Ph.D. geologist in the position of chancellor at the former School of Mines is certainly a good thing for mining in Montana — everything from geologic mapping and workforce training to research and development for critical minerals and materials technology and innovations to mine better in the 21st century.”

Commissioner of Higher Education Clayton Christian said that “The depth of experience Dr. MacLean brings to Montana Tech as both an accomplished scientist and as a student-centered administrator will be of immense value to the university as he leads it into the next era of growth and expansion.

“His passion and vision for Tech’s STEM-focused mission makes him an excellent choice to continue Tech on its positive trajectory,” Christian said.

After graduating from the University of Montana, MacLean landed a job as a geologist for ConocoPhillips in Houston. He served on a development team which focused on Louisiana and existing oil fields.

Later, he worked with Morrison-Maierle Engineering on environmental consulting for hydroelectric dams along the Missouri River.



Montana Tech Chancellor Johnny MacLean



MacLean started his academic career in 2010 as an assistant professor of geology at Southern Utah University. He said that in this position he combined his passion for the outdoors and belief in teaching authentically by taking his students outside to learn from nature and to see scientific concepts come to life.

At SUU he rose to the position of associate provost.

“I had a great time in southern Utah, but I’ve always wanted to get back to Montana,” MacLean said.

He had the opportunity to come back to Montana in 2022 when he joined the University of Montana Western in Dillon as provost and vice chancellor for academic affairs.

This past summer MacLean was selected to be chancellor of Montana Tech and made the move to Butte, and he says he couldn’t be happier with his new city.

“It’s great, it’s an incredibly unique place.”

He said he and his wife Jayci are “so impressed by the vibrancy of Butte and the warmth folks have extended us.”

In a Thanksgiving opinion piece for the Montana Standard, MacLean wrote that “Butte’s people are defined by authentic pride, molded over generations through the highs and lows of the natural resource industry. That same pride echoes across the Montana Tech campus, too. I am honored to serve a university so deeply rooted in its history and so committed to its purpose.”





Lance Energy Chair Bob Morris

## BOB MORRIS

Bob Morris became the first-ever Lance Energy Chair at Montana Tech in March 2024.

He said the job description for his new position is to “enhance Tech’s prominence as a national energy leader.” And he said that in order to get the job done, it will be necessary to “punch above our weight.”

“As Orediggers, we welcome the challenge,” Morris said in an article about his role as Lance Energy Chair.

The position was created as part of a \$31 million donation to the Montana Tech Foundation from Ryan Lance and his wife Lisa in April 2023. Ryan Lance graduated from Montana Tech in 1984 with a degree in petroleum engineering.

Morris is a Butte native who earned a bachelor’s degree in geophysical engineering from Montana Tech in 1984 and a master’s in engineering science from Montana Tech in 1991.

He started his career in oil and gas exploration before pivoting into the electric power systems industry. He has now been involved with electric power for nearly 40 years.

“Working in the energy industry is intellectually stimulating, and very rewarding because



we are helping humanity improve the standard of living,” Morris said.

He said that four out of five people in the world, about six billion people, live in energy poverty and are working hard to lift standards of living.

“This takes energy – a lot of energy,” Morris said. “Our job as energy engineers is to use our training and creativity to deliver reliable,

economical, and sustainable energy.”

After retiring from the electric power industry about seven years ago, Morris became a power systems consultant specializing in energy and materials, collaborating with Montana Tech, mining companies, and tribal governments on projects involving carbon-free energy sources including wind, solar, and nuclear power.



Morris said that when the opportunity opened up to become the Lance Energy Chair at Montana Tech, “it was just a perfect fit for my background in oil and gas and electric power, and my familiarity with Butte.”

In a recent conversation Morris said a lot of his focus as Lance Energy Chair “is to strengthen partnerships with industry and trade organizations and national labs and state and federal agencies, and make sure that Tech is staying current on all the energy issues and that we’ve got a seat at the table.”

Morris commented that in interacting with all these different entities, it helps that he is with an academic institution.

“We’re in a position to be able to say things that others can’t or won’t,” Morris said. “I can do a research project, and because we’re independent, we can share facts without fear of what it’s going to mean to our shareholders or to different players. So I’m able to bridge some gaps between, say, different suppliers or state agencies.”

Morris said another big part of his role is public education.

“I do some teaching on energy and electrical engineering.”

When he got started as the Lance Energy



Chair, Morris said “I will work very hard to attract students into the important energy industry.”

In September 2025 Morris was appointed to Gov. Greg Gianforte’s Unleashing American-Made Energy Task Force. The task force held its first meeting on Sept. 22, and will produce a written report with recommendations and strategies by Sept. 15, 2026.

“Montana’s future and the prosperity of our people require access to affordable and reliable energy,” Gianforte said when the task force was announced. “Just as important, our nation’s security requires us to be not only


energy independent, but also energy dominant.”

“With our abundant energy resources and outstanding potential, Montana can and should play a key role in unleashing our American-made energy,” Gianforte said.

Morris said there are more than 20 people on the task force. He said they are looking at “what can we do in the state legislature or regulatory environment to either remove roadblocks or open up doors.”

MacLean commented that Morris is “the only person from higher education in the entire state of Montana on that task force.

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"I think that is a big statement about Montana Tech and about Butte, that the governor sees Montana Tech and Bob Morris in particular as a major player in the energy conversation," MacLean said.

Morris said that "the country, and Montana as well, is at an energy crossroads.

"Our energy consumption has been pretty much flat for the last 20 years, both nationally and in Montana, but with a lot of new reshoring of manufacturing, and a focus on domestic mining, and, of course, the expansion of



artificial intelligence and cloud computing, we're forecasting big increases in energy consumption and production."

As Lance Energy Chair, Morris participates with Northwestern Energy on their Integrated Resource Plan, which looks at how they will produce adequate energy to meet Montana's needs in the years ahead.

Energy and materials are essential parts of Tech's DNA, Morris said, making the university an ideal place for focusing on the energy transitions the future will bring.

"With our background in mining and electrical engineering, and also petroleum engineering and geology, we've pretty much got it all here for that focus on energy."



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"The state of Montana has been a net energy exporter for decades," Morris said. "We're blessed with a lot of natural resources."

However, currently about half of the energy in Montana comes from the Colstrip coal-fired power plant. The plan now is to shutter Colstrip as early as 2042, and maybe even earlier. And this proposal to shut down the source of half of Montana's power is happening while the power demands in the state and the country are expected to see big increases.

Morris said Colstrip can't be shut down until solid replacements are in place.

"We need to have some plans in place in the next five years for what we're going to do if indeed we retire Colstrip," Morris said. "So we've got some big decisions to make."

Along with Colstrip, the other major sources of power in Montana are hydroelectric, which provides about 25% or less of the power in the state, and wind, which can provide as much as 30% of the state's power, depending on the weather.

Nationwide, natural gas provides more than half of the country's electricity, Morris said, but in Montana only about 7% of the state's electricity comes from natural gas.

About half of the natural gas used in Montana is imported, most of it from Canada. Morris said with the phase-out of power from coal, the most likely immediate replacement will be natural gas. That means Montana would need a significant build-out of its natural gas transmission network, but Morris said that is doable.

Another potential future source of power in Montana is nuclear.

"We've never done nuclear energy in Montana," Morris said, but nuclear is now, "for the first time, on Northwestern Energy's Integrated Resource Plan."

If Montana does begin to develop nuclear power, "we're going to need workforce development for that," Morris said. "So that's a great place for Montana Tech to step in and develop some curricula to start training the next generation of nuclear energy engineers or operators."

"We're getting more involved in nuclear curriculum development and partnering with INL," Morris said.

The Idaho National Laboratory is the nation's nuclear energy laboratory and leads the country's advance nuclear energy research.

Another potential source of future power for Montana is geothermal, which produces electricity using hot water or steam that is under the surface of the earth. Research on



the potential for geothermal power is still progressing around the country, but Morris said there are several areas in Montana that have a high potential for producing geothermal power.

"And that's a perfect fit for Montana Tech," Morris said, "because tapping geothermal is a mix of applying the horizontal drilling and fracking technology that petroleum engineers here on campus are expert at, combined with the geology and then the electric power systems work that we also have here on campus. So it's a great project for us to collaborate on."

Morris said geothermal may be 10 or 15 years out from becoming a significant power producer in Montana, but now is a great time for Montana Tech to get involved in studying geothermal, "and it's right in our wheelhouse."

Butte actually has a potentially huge geothermal resource for heating, Morris pointed out. There are around 10,000 miles of old mining tunnels under Butte, and those tunnels are filled with lots of warm water. The water in the tunnels under the area around Montana Tech is around 78 degrees, Morris said, and the tunnel water under uptown Butte is around 88 degrees.

In 2009 Montana Tech's Geothermal Technologies Program was awarded an American Recovery & Reinvestment Act grant by the U.S. Department of Energy for a demonstration project to show the potential for using an innovative ground source heat pump to provide low-cost heating for the campus' new 55,000-square-foot Natural Resources Building. Construction began in 2011 on a heat pump system to heat the building using warm water from the Orphan Boy Mine about 900

feet away.

Morris said the university is now looking at the possibility of repurposing that geothermal heating system to heat some of the university buildings close to the Orphan Boy Mine.

In 2024 the U.S. General Services Administration announced funding for an improvement project for the Mansfield Courthouse in Butte which could include using geothermal to heat the building.

Several companies are looking at the possibility of building AI data centers in Montana, including one potential data center in the Butte area. There is a lot of controversy over whether these data centers will be bad or good for the areas where they are built.

"I'm convinced it's a very positive thing for the state of Montana, and can help improve our energy infrastructure and lower electric rates for our customers here in Montana," Morris said.

If the Butte area is selected for a data center, that would require transmission line and infrastructure upgrades to bring more power into the area. And Morris said that could help support the production of more critical minerals in Butte.

Research has been progressing for several years on the potential for extracting rare earth elements from tailings in the Butte area and from the Berkeley Pit.

"But that's going to take energy," Morris said. "And if we have more energy infrastructure here with lower energy costs, it starts to open up some doors."

Morris said promoting this type of energy development is one of the things he is looking at as the Lance Energy Chair.



"I'm collaborating with the utilities and the State Department of Environmental Quality and the data center companies to look at how do we do that."

## JOHN METESH

Johnny MacLean said that as part of the effort at Montana Tech to ensure that the university is poised to help meet America's most challenging issues in energy and critical materials, this past September they "coaxed" John Metesh from the Montana Bureau of Mines and Geology to take on a new position on campus called executive director of Critical Materials Initiatives.

In this new role Metesh is helping coordinate the efforts of many different people and entities to help focus and promote efforts to produce more critical minerals in the United States.

Metesh received his master's degree in geological engineering from Montana Tech and a Ph.D. in geology from the University of Montana. He was with the Montana Bureau of Mines and Geology for more than 30 years, and was the director and state geologist at the bureau for around a dozen years. Over the past 36 years he has published more than 50 reports, articles, and abstracts on hydrogeology and geochemistry.

The Montana Bureau of Mines and Geology, which is housed on the campus of Montana Tech, is the state's geological survey and addresses many topics including geologic mapping, energy development, groundwater, and earthquake monitoring.

Katie Hailer, the interim vice chancellor for research at Montana Tech, said that at the bureau, Metesh "directed major research efforts, secured competitive funding, and built effective partnerships with state and federal agencies. These skills align directly with the responsibilities of this new role, which include strategic planning, center coordination, and expanding Montana Tech's research portfolio in critical materials and energy.

"With his leadership, Montana Tech is well positioned to expand its role in critical materials research and contribute to the national conversation on rare earth elements and resource security," Hailer said.

MacLean said "Montana Tech and Butte are uniquely positioned to lead Montana in meeting America's critical materials needs, and this has become one of the university's top priorities." He said that Metesh's "decades of relevant experience, countless industry and governmental connections, and deep geological



John Metesh is the inaugural executive director of Critical Materials Initiatives at Montana Tech.



expertise will allow Montana Tech to take a huge step forward in this area."

Metesh will work alongside Morris to help expand Montana Tech's research portfolio in critical materials and energy systems.

"I'm excited to partner with John to strengthen Montana Tech's role in advancing energy and critical materials research and education," Morris said. "By aligning with national priorities and working closely with industry and government partners, Montana Tech is preparing the workforce and technologies needed for America's energy and critical materials independence."

Matt Vincent said the Montana Mining Association has been working closely with Metesh and his associates at the Montana Bureau of Mines and Geology "on critical minerals initiatives and other projects for years and will continue working with him in his new position."

"He is absolutely the right choice for this and is nothing short of 'aces' when it comes to knowing Montana's critical mineral resources," Vincent said.

Part of Metesh's role will be to provide

leadership and coordinate external engagement for two of Montana Tech's research centers: the Center for Advanced Materials Processing (CAMP) and the Center for Environmental Remediation and Assessment (CERA).

CAMP has been around for several decades, Metesh said, and has a long history of doing excellent work in working closely with mining companies on studying the extraction and processing of minerals, finding ways to tweak the process and improve efficiencies.

Over the last four or five years, Metesh said, CAMP has also stepped into the role of studying new processing methods to help meet the goals of producing more critical minerals from more sources.

Some of their studies have included processing rare earth elements, extracting minerals like zinc and antimony from lower-grade ores, and extracting minerals from legacy mining waste.

"The Center for Advanced Materials Processing is looking at new, innovative, emerging technologies for extraction," Metesh said. "The metallurgy has really taken a step forward."

The Center for Environmental Remediation was reactivated about three years ago, Metesh said. Some of their focus now has been on looking at opportunities to reprocess historic waste piles to extract minerals before proceeding to a reclamation process.

Metesh said that over the past five or six years critical minerals have gone from "kind of a quiet consideration in the background" to a focus of critical concern as people have seen that we're going to need a lot of critical



minerals for energy development, defense, medical technology, data centers, and more.

“The demand for critical minerals has really skyrocketed,” Metesh said.

“Working with the Bureau of Mines and the U.S. Geological Survey and other state surveys, there has been increased funding and interest in developing new orebodies, doing exploration, and also looking at existing mines and operations for new sources of rare earth elements and things like that.”

There has also been a growing interest in looking at legacy mining waste as potential sources of critical minerals.

“The waste piles can be fairly large and complex,” Metesh said. “But even though a considerable amount of reclamation has been done, a lot of those waste piles are good sources for what was not important 20 years ago and are very important now, things like rare earth elements.”

“The United States has really not done much mineral development for the last 30, 40 years,” Metesh said. “A lot of the exploration hasn’t been done, and there hasn’t been that much in terms of the extraction. Mining has been fairly limited. So the whole system has to wake up again and gear up again for these



uncertain times.

“And that’s where Montana Tech is really right in the middle of it all,” Metesh said. “We have all these resources here at Montana Tech, all of these things that can be brought to bear to rebuild the mineral processing chain of 40 years ago.”

There is lot of work to be done. One of the

issues with getting the mineral supply chain rolling again is that the workforce shortages are “pretty severe” at this point, Metesh said.

“So my position is to kind of pick up where we left off 40 years ago and start coordinating between the resource development, and the engineering, and developing initiatives with workforce development.” **M**

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# JIM KILLOY:

## “A living archive of Butte’s mining history”

DUNCAN ADAMS, THE MONTANA STANDARD, BUTTE

*Note: Jim Killoy is a 2025 Butte Local Heroes honoree. Every year, The Montana Standard partners with community groups and organizations to identify and honor locals that go above and beyond for Butte Silver-Bow County. Members of the public nominate individuals, and The Montana Standard chooses honorees from the pool of candidates. Killoy was honored at the annual Butte Local Heroes event Dec. 2, 2025.*

Stopes. Drifts. Gallows frames. Labor strikes. Soup kitchens. Muckers.

Jim Killoy speaks mining. More specifically, he speaks Butte mining.

He is celebrated for the depth and breadth of his knowledge about the arduous underground quest for copper ore and for his generosity in sharing what he knows. He is especially renowned for his expertise cataloging photos of Butte’s hard-rock mining past.

His grandfather, Will Killoy, worked in the mines. As did his father, Edward. The Killoy family’s roots are in Ireland.

Killoy finished high school in 1958 and then went to work for the Butte, Anaconda & Pacific Railway as a “gandy dancer” — a slang term for the workers who laid and maintained railroad tracks in the years



Jim Killoy, a longtime volunteer at the World Museum of Mining in Butte, is known as an expert who readily shares his knowledge about Butte’s mining history. He stands here for a portrait near the museum, with the Highlands in the distance.



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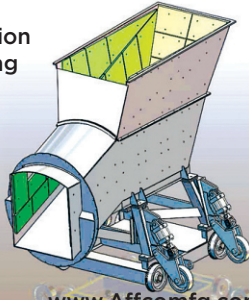


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before the work was done by machines.

He later became a diesel mechanic at the garage for the Berkeley Pit after a four-year apprenticeship.

He estimates he spent a total of several months underground in various roles.

Killoy, now 85, was still in high school when the history bug bit and it bit hard. His fascination with Butte's rough, rowdy and hard-toiling hard-rock culture grew over time and continues.

He first volunteered at the World Museum of Mining during the 1970s.

To what does Killoy attribute his passion for Butte history?

"I don't know," he said, smiling. "I can't explain it."

Photos with historical significance, many shot by famous Butte chronicler C. Owen Smithers, captured Killoy's imagination as a young man.

Today, he is respected for reviewing old photos and readily identifying headframes, mines and other unique features occupying the landscape of mining in Butte.

Johnathan Hoover is a mining engineer with Montana Resources. He spoke about Killoy's prowess in cataloging images.

"He can identify a headframe, usually in

seconds, just by looking at the picture," Hoover said. "He can then go on to tell you several stories about the mine."

Jeannette Kopf, director of the World Museum of Mining, says Killoy is "a living archive of Butte's mining history."

Logan Dudding, a project manager for the Montana Department of Environmental Quality, weighed in.

"Jim's knowledge of local mining history, especially headframes, is unmatched," Dudding said.

Aubrey Jaap is the director of the Butte-Silver Bow Public Archives. She said volunteers like Killoy are invaluable.

"In archives and museums, volunteers mean far more than an extra hand on projects — they lend their expertise, knowledge and lived experiences to the work they do," she said.

"In Jim's case, he has shared his considerable understanding of Butte's landscape — particularly the mines of the Butte Hill — to help identify thousands of photographs," Jaap said. "As time moves forward, this knowledge becomes increasingly irreplaceable, but through his volunteerism in Butte's cultural spaces, Jim is ensuring that his insights are preserved for future generations."

In October 2018, Killoy sat down for an interview with Jaap and Clark Grant as part of The Verdigris Project, an endeavor intended to help preserve an oral history of Butte.

Killoy said his father was 15 years old when he went to work in the mines.

"His dad died," Killoy recalled. "So, somebody had to go to work. He started at the Diamond Mine as a mucker."

Typically, a "mucker" is a laborer who shovels ore or rock into mine cars or onto a conveyor from which mine cars are loaded.

Edward Killoy tried being a boss for about six months.

His son recalled, "He says, 'I don't like worrying about the mine all day.'"

Edward suffered a broken leg working in the mines and other injuries. An accident severed a thumb.

"They sewed it back on, but it didn't work," Killoy said. "It was always just like white. Especially when he was cold."

The Killoy family lived on the 900 block of Copper Street. Mining was a close neighbor.

Killoy's primary focus at the World Museum of Mining is cataloguing photos. When he first tackled this task, the identification of a headframe or a mine could require something akin



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With years of experience in cataloging photos at the World Museum of Mining in Butte, Jim Killoy has a thorough knowledge of the landscape and has helped identify thousands of photographs.

to detective work.

No more.

"I look at them and I usually know what they are," he said, smiling.

Killoy, a husband to Ann and father of three daughters, said he admires the men who braved the hardships and hazards of mining for a day's pay on the Richest Hill on Earth.

He said he is grateful for the Local Hero honor.

"It's really something. I keep thinking, 'What the hell am I in there for?'" **M**

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PHOTO DUNCAN ADAMS, THE MONTANA STANDARD





Devin Castendyk says it is exciting to see the potential for a positive return on investment from recovering minerals such as copper from pit lakes.

# Growing the flow of critical minerals

*Researching the extraction of minerals from pit lakes is one of the many ways WSP engineers are working to advance modern mining*

**TIM BURMEISTER**

With advancing technologies demanding growing supplies of critical minerals and other mined materials, there are plenty of projects for engineers to work on. WSP, a global engineering and professional services firm with about 73,000 employees worldwide working on about 200,000 active projects, has about 5,200 mining professionals working with mining companies on every phase of the mining journey, from initial planning, geology, water, infrastructure, processing, and waste management on through the entire closure process.

Devin Castendyk is a vice president and a geochemistry technical fellow for WSP, and his specialty is mining pit lakes. He works out of the company's Lakewood, Colorado office, which is the home base for a lot of WSP mining professionals, but he analyzes and works on pit lakes around the world.



**Castendyk**

He gets involved with mining companies in the initial planning stages for a mine, analyzing and predicting what will happen with the site's future pit lakes, and when mines enter the closure phase,

he analyzes how to manage their pit lakes.

Almost 10 years ago, WSP started using aerial drones to collect pit lake water samples. More recently, Castendyk has been working on using artificial intelligence to synthesize and analyze all the data that can be collected on future and existing pit lakes. And now pit lakes specialists are taking a closer look at options for recovering metals from pit lakes.

The effort to find ways to extract metals from pit lakes fits in with the emphasis that a lot of mining companies as well as the U.S. government are now putting on recovering minerals from mine waste and wastewater.



## GOVERNMENT EFFORTS

On Nov. 21, 2024, the Advanced Research Projects Agency-Energy (ARPA-E), which identifies itself as “the disruption wing of the Department of Energy,” announced its Realize Energy-rich Compound Opportunities Valorizing Extraction from Refuse waters (RECOVER) program. The agency said “technologies supported by the RECOVER program will focus on developing new materials and processes to make extraction of ammonia and critical metals from wastewater energy-efficient, selective, and durable. ... The goal of the program is to replace 50% of domestic ammonia supplies, and 100% of key critical metal supplies, by recovery from wastewater sources.”

“RECOVER is an ambitious program focused on retrieving high-value materials from wastewater, a largely untapped resource,” ARPA-E Director Evelyn N. Wang said in the announcement of the start of the program. “RECOVER technologies will transform waste streams into critical materials sources that commoditize the vast volumes of wastewater flowing through our systems and strengthen our energy security.”

In October ARPA-E announced \$25 million in funding for 10 projects to develop technologies that recover critical minerals from U.S. wastewaters.

The U.S. Department of the Interior announced on July 24 that the agency was launching an effort to unlock critical minerals from mine waste. The Interior Department said it would “streamline federal regulations on the recovery of critical minerals from mine waste, while updating guidance to make mine waste recovery projects eligible for federal funding.” The agency said its new directive “also prioritizes review of plans to recover uranium and other minerals from abandoned mines and directs the U.S. Geological Survey, or USGS, to map and inventory federal mine waste sites.”

“By unlocking the potential of our mine waste, we are not only recovering valuable critical minerals essential for our economy and national security, but we are also leveraging groundbreaking research from the U.S. Geological Survey that identifies promising sources of these minerals,” Interior Secretary Doug Burgum said in a press release. “This initiative reflects our unwavering commitment to achieving mineral independence and ensuring that America leads the way in advanced technologies that power our future while turning environmental challenges into opportunities for growth and innovation.”

The Interior Department said it would work

to promote the recovery of critical minerals from “mine waste, coal refuse, tailings and abandoned uranium mines.” However, the list did not mention mine pit lakes.

## RECOVERING COPPER

Talking about his work with mine pit lakes, Castendyk said that recently when they collected water from a pit lake with an aerial drone, “we found high levels of copper in the water of one of these pit lakes. We mentioned it to our client, and they came back and said, ‘Oh yeah, we knew it was high, but gosh, that is really high.’”

The WSP engineers asked if they had considered recovering the copper, and the client responded, “Well, what would that look like?”

“So we went through a desk scale study looking at various costs of recovery and how much value was stored in the lake,” Castendyk said, “and we came up with a possible method that at the first level looked cost effective, and then we moved on to doing a bench scale study.”

“Then we had the data that said, it’s quite possible to get a positive return on investment after two or three years of recovery.”

“I got really excited about that,” Castendyk said.

A peer-reviewed paper which Castendyk authored was recently presented at the International Mine Water Association Conference in Portugal and shows how a tool developed by WSP was used to analyze copper recovery options for a pit lake in Spain. An analysis of the water showed the pit lake contained about \$22

million worth of copper in September 2024. The tool analyzed the return on investment over 15 years for four methods of recovering the copper – biological sulfide precipitation, chemical sulfide precipitation, solvent extraction and electro-winning, and copper cementation. It turned out that in this case, the copper cementation, which may be the simplest method of copper recovery, gave a positive return on investment. The tool showed the copper recovery would break even after about two years and would result in a total profit of about \$2.6 million after about five years.

“The returns are positive, but they’re not huge,” Castendyk said. “But when you consider the cost of care and maintenance for a lot of these sites, and the fact that you’re taking wastewater and recovering copper from it, those are pretty exciting attributes.”

“WSP now has this tool, and we’re looking at other mines and saying, ‘Hey, how much revenue could we capture out of that pit lake?’ And some would not generate a profit, but others are looking pretty interesting.”

The tool shows that the peak return on investment from extracting copper from the pit lake in Spain would come at about 5.3 years, and after that the amount of copper in the pit lake would be low enough that the cost of extracting the copper would be higher than the value of the copper recovered. If the company continued to extract copper from the pit lake they would be back to break even after a total of about 12 years, and they would be about \$3 million in the



WSP engineers use drones to collect pit lake water samples.



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Devin Castendyk talks about a graph which shows the return on investment over 15 years for four different methods of copper recovery from one of the pit lakes WSP has studied.

red after about 15 years.

Castendyk said that in some situations, companies might decide to continue recovering metals from the pit lake even when the operational costs exceed the profits.

“Maybe for some big clients break-even is really good enough,” Castendyk said. “They may find that it’s such a positive community relations boon that they say, ‘Let’s just keep it running.’”

Also, the numbers might change and more value might flow into the pit lake as time goes by, making it profitable to continue extracting copper for a longer time.

“Our analysis is conservative in that we’re only looking at the water stored in the lake,” Castendyk said. “But some of these open pit mines intersect an extensive network of historic tunnels and workings. If you’re pulling water from the pit, you’re also pulling water from a

‘mine aquifer’ that extends in various directions.”

That water coming into the pit could keep the copper concentration high.

## AI ANALYSIS

Analyzing existing pit lakes for metals recovery options comes after mine closure, but Castendyk is also involved in analyzing options for future pit lakes during the initial mine planning process. His team is developing an AI tool to analyze various data including the groundwater, geology and climate of an area to predict concentrations in a future pit lake. The AI tool has been fed lots of data from pit lakes and from published literature and surveys, and it uses all this data to crunch the numbers.

The AI tool is still in development, Castendyk said, and in the future it is expected to get better and better at predicting details about pit lakes and the potential for metal recovery.

“The more data you have with an AI tool, the better the results. We’re gathering more data every day and adding it to the tool.”

As the AI grows its database and capabilities, it could soon get to the point where engineers will be able to sit down with clients and quickly provide quite accurate predictions about pit lakes

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The Lone Tree pit lake in Nevada's Humboldt County in 2015. Newmont's Lone Tree Mine began production in 1991, and after mine closure, dewatering was stopped in 2006 and the pit began filling with groundwater. Geochemical modeling at that time which predicted neutral pit lake chemistry turned out to be incorrect, and there has been analysis through the years of ways to neutralize the acidic water. It was predicted that the pit lake would reach about 90% of its maximum depth of 865 feet in 2026. With all its mining history, Nevada is home to many pit lakes.

in various locations and the costs of water treatment and the options for metal recovery.

"We're at the early stages, so any of this has to be checked and rechecked, until we validate that it's coming up with a real number, because sometimes AI can come up with a bogus answer," Castendyk said. "So we need to check that, but if we can get that down, I think this is going to be a really helpful approach for our clients."

One source of data that has been fed into the AI is the database of pit lakes from around the world that Castendyk and WSP have built and managed for the International Network for Acid Prevention, an organization which includes environmental leads from many of the major mining companies, and which publishes the Global Acid Rock Drainage best practices guide.

There is currently data from around 300 pit lakes in the INAP database. Castendyk said he looked through the data and found that about 140 of the pit lakes have copper values, and about a dozen of them, including at least one in the U.S., have copper concentrations which are similar to the pit lake in Spain which Castendyk found could return a profit through copper extraction.

"It's really interesting, looking at that data, to find 12 pit lakes that make you go, 'Hey, wait a minute, is anyone asking this question in the post-closure setting? Could we pull value out, and either make some revenue, or maybe offset some of our costs, or demonstrate that we're meeting corporate goals in terms of environmental social governance?"

"There are a whole bunch of wins that could come out of this. In some cases it might be driven by the revenue, and in other cases the



U.S. Geological Survey scientists examine mine waste at Tar Creek near Picher, Oklahoma. The USGS, in partnership with state geological surveys, is researching potential sources of strategic minerals like zinc, germanium, tellurium and rare earth elements in legacy and ongoing mining operations.

big driver is, 'We want to demonstrate to shareholders that we're using this resource and we're continuing to get value out of the post mining environment.'"

## DON'T OVERLOOK THE POTENTIAL OF PIT LAKES

Castendyk said that often when people think of extracting metals from mine waste, they think about tailings, but for a lot of people, extracting metals from pit lakes has been off their radar. He said he had recently talked with people at the U.S. Geological Survey about the opportunities for extracting metals from pit lakes, and they wanted to learn more.

"They have done a lot of critical minerals

research and looking at mine wastes, and they're just very excited to hear about this, as well."

Castendyk said it makes sense to work on extracting metals from tailings, since the tailings were placed there many years ago when the extraction technology wasn't as sophisticated as it is today, and there may be a lot of value left in those tailings. But people sometimes overlook the possibility of extracting metals from pit lakes, which might actually be easier than extracting metals from tailings.

With tailings, Castendyk said, "there's a lot more processing cost to excavating, hauling and processing solids as opposed to, we've already got this here in liquid form—what can we do to this liquid to pull out this metal?"

"That's something we've been thinking a lot about."

For now, Castendyk said, pit lakes at copper deposits are the "low hanging fruit," since those pit lakes tend to be acidic and have acid rock drainage which can fill the pit lake with metals to extract.

Nevada has a lot of pit lakes, but a lot of those are in Carlin-type trend areas, and the water is often quite neutral. There are some copper areas of the state, however, such as around Ely, where there could be pit lakes that could be good targets for metal extraction.

Castendyk said that as science advances and extracting metals from pit lakes at copper deposits becomes more common, they may move on to looking at the possibilities for pit lakes at other types of deposits.

In the Western United States, probably the most famous pit lake is the Berkeley Pit at Butte, Montana. The large lake that filled a copper mine open pit is filled with lots of metals, and over 5,000 gallons of acid mine drainage continues to flow into the Berkeley Pit every minute, so water continuously needs to be treated and discharged.

Montana Resources, which operates a copper mine next to the Berkeley Pit, has been extracting copper from the Berkeley Pit water for years. Since receiving funding from the U.S. Department of Defense in 2023, West Virginia University has been working with BP and Montana Resources on researching options for extracting rare earths from the pit lake. WSP has also been looking at options for extracting metals from the Berkeley Pit.

Castendyk said that although for most mine sites, looking at metal recovery from pit lakes and acid mine drainage is a relatively new idea, the copper mine in Butte has been a leader of the pack in this type of technology. He said that in



the early days of copper mining in Butte, acidic water flowed over old railroad ties underground, and the railroad ties extracted copper from the water, since a chemical reaction caused the copper in the water and the iron in the railroad ties to trade places. The mine didn't let this copper extracted from acid mine drainage go to waste—they had crews gather the copper-rich railroad ties to take them to the mill.

## THE NEED FOR MORE DOMESTIC MINERAL PRODUCTION

In Helena, Montana, Randal Huffsmith and Robert Kimball are two of the more than 1,000 WSP employees based in Montana and Idaho who are working on a wide range of projects. Huffsmith and Kimball are both WSP senior



Huffsmith



Kimball

vice presidents and are both involved in mining. Huffsmith is a U.S. mining sector leader for WSP and Kimball is an industrial process water sector leader.

As mining companies are working toward more domestic mining and processing of the critical minerals and other materials that the U.S. has not been focusing on for many years, Huffsmith, Kimball and others on the WSP mining team have been working with mining companies on developing the extraction and processing methods that are right for the geology at each mine site, as well as working on looking at options for extracting minerals from mine waste and pit lakes.

Kimball and Huffsmith wrote a short report for Global Business Reports on the work which WSP is doing toward recovering metals from pit lakes and mine waste in the Western U.S.

"Today, many mining companies are implementing processes for the extraction of energy transition elements like lithium, copper and cobalt from traditional acid mine drainage sources and from mine waste," Kimball and Huffsmith wrote. "In addition, REEs (rare earth elements), such as neodymium, a common metal used in mobile phones and wind turbines; lanthanum, used in lithium-ion batteries; praseodymium, used in EV magnets; and other critical minerals, are also being evaluated for removal from mine water and mine waste. This creates a domestic supply of these raw materials as well as a valuable revenue source."



Ted Duaime, senior hydrogeologist with the Montana Bureau of Mines and Geology, speaks to a group during a Critical Resource Summit in 2023 about the geochemistry and rare earth minerals potential of the Berkeley Pit in Butte. The pit holds over 50 billion gallons of metals-rich water. Montana Resources, which owns and operates an open pit copper mine next to the Berkeley Pit, has been extracting copper from the Berkeley Pit water, and West Virginia University has been working with BP and Montana Resources on researching options for extracting rare earths from the pit lake.

Talking about the need to develop more domestic sources for critical minerals, Huffsmith said, "I think we all understand that some of these strategic metals are in short supply in the U.S., and that's primarily supply chain driven. The other thing we're seeing a lot is a tendency for various countries to nationalize these metal mining projects and keep them close to home. And the result is this supply chain disruption, and it's a complex situation now with tariffs and with everything that's going on."

With some minerals, Huffsmith said, there has been market manipulation. With minerals such as lithium, cobalt and nickel, China or other countries have flooded the market.

"That drives the price down, and when it drives the price down, these new startup companies have a hard time making it, because they're dealing with these low prices."

## DEALING WITH CHALLENGES

Huffsmith said each of the minerals that we want to begin producing more of in the U.S. have been facing different kinds of supply chain issues and challenges. With rare earths, only a small percentage of the world's supply has been mined and processed in the U.S., and until recently rare earths mined in the U.S. were shipped to China for processing, and the U.S. imported magnets made with rare earths.

"The magnets are used in things like our radar systems and the screens for our fighter jets and all that sort of thing. And now calling China and asking them for magnets for our fighter jets is not working well," Huffsmith said.

Antimony, which is used in munitions made for the U.S. military, as well as in high tech materials and as an industrial fire retardant, has not been mined recently in the U.S., and now

China has cut off its antimony supply from being exported to the U.S. WSP has been working with United States Antimony Corporation, which Huffsmith said "is working very hard on a plan to increase their mining and processing so that they can create a more sustainable U.S. source of antimony."

On April 30 of last year US Antimony announced that it had executed a contract with WSP to complete engineering and construction services to significantly expand its smelting operations in Thompson Falls, Montana.

"This new working relationship for these services is complementary to USAC's existing internal antimony processing knowledge and experience," US Antimony said in its announcement. "Combined with WSP's overall metals processing and environmental experience, the company has put together a first-rate team."

US Antimony said the Thompson Falls smelter expansion will increase the smelter's production output from around 50 tons to 300 tons per month. Montana Gov. Greg Gianforte attended a groundbreaking celebration for the project on Sept. 25.

"We acknowledge the critical importance of enhancing production capacity while maintaining our industry standard of environmental compliance and operational efficiency," Huffsmith said in the announcement of the contract with US Antimony. "We are excited about this opportunity to partner with US Antimony on these expansion plans with our experienced Montana team."

Huffsmith said several of the top copper companies in the world are now looking into options for producing more copper by processing refractory and low-grade primary sulfide ores, notably chalcopyrite, which have been dismissed in the



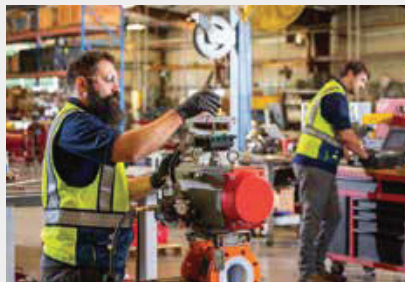
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past as not really economically viable.

"If you look at the world supply of copper, there's a huge amount that's in that category," Huffsmith said. "So, they're looking at new leaching and processing solutions to try to recover copper that can't be floated or leached easily or that they haven't been able to process economically. They're all working on technologies to get that copper out."

During MINExpo International in Las Vegas last September, Freeport-McMoRan presented their annual innovation award to the WSP mining and metals team. Huffsmith said on LinkedIn that this was "a real honor coming from one of the most innovative and progressive mining companies in the world!"

Huffsmith commented that the WSP mining team are "big fans" of Sandfire Resources' Black Butte Copper Project north of White Sulphur Springs, Montana.

"They're a great example of new technology being applied in the mining space for copper," Huffsmith said. "The types of technologies they're using, such as paste underground backfill, advanced water management, water treatment and tailings management, and numerous other environmentally protective measures they will implement, these are very robust and impressive environmental solutions."

## LITHIUM SOURCES

Lithium is a critical mineral that has been getting a lot of attention as many companies work toward developing mines in the United States to produce lithium for electric vehicle batteries. WSP is doing a lot of work with many companies in helping them look at ways to extract lithium and develop their mines.

Huffsmith said there are three potential sources of lithium. One is lithium brine, "and that's what classically has been the lithium production stream for a long time." The primary producing lithium mine in the U.S. is Albemarle's Silver Peak, which is a lithium brine operation. One of WSP's clients is Standard Lithium, which is developing the South West Arkansas Project and the Phase 1A Project to extract lithium from the Smackover Formation lithium brine resource.

"They're looking at building probably one of the very largest lithium projects in the U.S.," Huffsmith said.

Another source of lithium is the hard rock spodumene.

"That needs to be crushed and ground and it's got a very complex flow sheet to extract the lithium for battery grade material," Huffsmith said.



US Antimony has a contract with WSP for engineering and construction services to significantly expand its smelting operations in Thompson Falls, Montana. The expansion project is designed to increase the smelter's production output from around 50 tons to 300 tons per month.

There is also lithium in soft rock clay deposits.

"They leach those with an acid and then they take that acidified solution and they run it through various different types of water treatment to ultimately extract the battery grade lithium."

A lot of companies are working on developing Direct Lithium Extraction, which basically collects lithium onto something that it has an affinity for.

"There are probably a half dozen suppliers or more out there that have a DLE system," Huffsmith said. "And they're pushing on those systems and trying to refine them and hoping that they can be applied at a full scale, large facility."

Many brine operations use large ponds and evaporation to collect lithium, but Standard Lithium is working on a Direct Lithium Extraction process for its lithium brine project in Arkansas. The company says it is leading the way in DLE with North America's only large-scale, continuously operating DLE demonstration plant, which was commissioned in 2020.

A lot of companies are working on proprietary methods for extracting and processing lithium in a way that is optimal for their project location, and WSP is helping companies with this research and development.

"We're doing quite a bit of work in the lithium space," Huffsmith said.

Kimball said the WSP mining team gets to work on a lot of interesting challenges as they work on processes that really haven't been done before, such as extracting lithium from particular types of clays, or extracting particular minerals from pit lakes.

"These are different sources than your

conventional sources, and that's what makes it more challenging," Kimball said. "It's not that these technologies aren't around, it's just finding the right way to apply them to recover the metals that nobody's really done before."

"I would call it applied research – that's really what it is. We're using existing technologies, but we're implementing them in a way that nobody has really done before. We end up spending time doing the research in the lab to make it happen and to test and evaluate it."

## PROMOTING MODERN MINING

The extensive research that goes into a mining project as it is being developed not only focuses on ways to extract and process minerals as efficiently as possible, but also focuses on how to make the whole process as protective of the environment as possible—and that is a story that Huffsmith says the mining world needs to do a better job of getting out to the public.

"I'd love to see our kids understand that mining is not the same as it was 70, 80, or 100 years ago," Huffsmith said. "The technologies we have to recover the metals and to provide much safer environmental controls and management are just orders of magnitude better than they used to be."

"You can't compare mining in 2025 to mining in 1825; it's completely different. It's like saying, 'I don't like to ride in a car because I rode in a Model T today and it was rough and it was noisy and didn't have air conditioning.'"

Modern mining, Huffsmith said, is like riding in a new Cadillac.

"The objective is the same, to get you from point A to point B, but the technology is completely different, and much safer and more environmentally protective." **M**



# Extracting critical minerals from legacy mine sites

## *EQC requests funding for Montana Mining Association's Rare Earth and Critical Minerals Extraction Demonstration project*

Researchers have been looking at options for extracting critical minerals from the Berkeley Pit by Butte. It has been estimated that extraction processes could produce 40 tons of rare earths annually from the Berkeley Pit water.

MICAH DREW  
DAILY MONTANAN

The Montana Environmental Quality Council at its Dec. 2 meeting approved a letter requesting federal funding for projects aimed at extracting rare earth and critical minerals from legacy mining sites in the state.

The letter, addressed to Secretary of Defense Pete Hegseth, asked for funding through the Army's Research, Development, Test and Evaluation account for the Montana Mining Association's Rare Earth and Critical Minerals Extraction Demonstration project.

While the letter was approved 14-1, some legislators sought to put limits on the projects included in the funding request.

As part of the federal push to secure domestic critical and rare earth mineral supply chains, the federal government has pushed to fund mining projects and technological advancements to maximize extraction in the U.S.

In Montana, a state built on a history of mining, there has been a recent push to revitalize old legacy mines to extract high-priority minerals from waste sites, including the iconic Berkeley Pit in Butte.

"There's billions of gallons of metals lying in the water in the Berkeley Pit and hundreds of millions of tons of smelter waste (near Anaconda) all bearing appreciable levels of metals with many of those being critical in those two sites," Montana Mining Association

director Matt Vincent said during a presentation at the EQC's October meeting.

Vincent highlighted some of the critical elements on the federal priority list, including zinc, germanium, copper, cobalt, tungsten, manganese, nickel, bismuth, antimony and others.

Recent studies by Montana Tech University and other geological research entities have focused on extracting rare earth elements from coal waste, mining wastewater, and specifically, the Berkeley Pit, where it's estimated extraction processes could produce 40 tons of rare earths annually.

The Montana Mining Association is working on extraction projects at existing mines and waste sites, including the Berkeley Pit, the Anaconda smelter waste complex, the Sibanye-Sillwater mine, Black Butte mine and Antonioli-Contact mine.

"The sites that we select are based on legacy sites and operating permit sites where they have conducted initial sampling that's identified what the critical elements are, that they're appreciable amounts that would lend themselves to being priority target sites," Vincent told the EQC.

Rep. Josh Seckinger, D-Bozeman, raised some concerns that the letter did not list the specific sites Vincent discussed, and leaving it open-ended could lead to misunderstandings as to what kinds of mining the EQC was supporting.

Several conservation organizations provided public comment at the meeting, and said while they supported projects repurposing existing mines, they also were concerned about any new mining operations.

"We too think that looking at critical minerals and rare earth elements in places such as the Berkeley Pit and the Anaconda smelter site makes sense," said Julia DalSoglio, representing the Montana

Sierra Club.

DalSoglio and a representative of the Montana Environmental Information Center did point to recent opposition to a new exploratory mining operation in the Bitterroot Valley that drew hundreds of members of the public in a meeting this week and led to Montana's federal delegation going on the record about not supporting a fast-tracked mining project.

"It's quite easy to leap to conclusions and by inference as to what sort of projects they might be pointing towards," Ben Catton with MEIC said. "Some of the language at the end of the letter talking about other shovel-ready projects. I'm really reassured hearing these comments about what this is actually targeting and fully support that, but think that the letter could be drafted in a way that's more specific."

The letter was ultimately approved with an added line listing out the five priority projects of the Montana Mining Association as well as "future legacy sites." **M**



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► GUEST VIEW

# Breaking China's grip on critical metals

RANDYN GREGG

China, rural America, mining, refining, and rare earth metals may sound unrelated, but together they reveal one of the greatest strategic threats facing our nation. Rare earth minerals are not truly rare.

They are difficult and costly to extract and refine, yet these materials power nearly everything modern life depends on, from smartphones and microchips to batteries and advanced military weapons.

Decades ago, Communist China recognized their immense value. Leader Deng Xiaoping declared, "The Middle East has oil; China has rare earths." With state backing, minimal environmental standards, and a clear long-term vision, China seized control. Today it dominates 70% of global mining, 90% of refining, and 93% of finished production. That monopoly gives Beijing the power to disrupt American industries and military supply chains whenever it chooses.

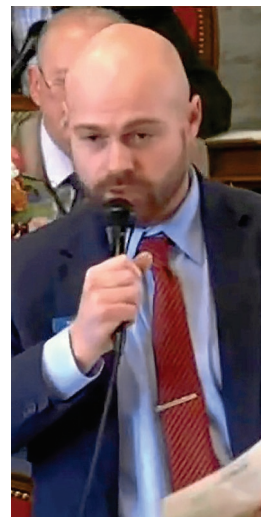
Breaking this control starts in rural America. The resources exist here, and so does the expertise. During the 2025 Montana

Legislative Session, I introduced House Resolution 2 urging President Trump and our congressional delegation to support exploration, development, refining, and recycling of critical minerals in Montana. This effort is not only about jobs. It is about securing the future strength and independence of the United States.

To compete, we must reform the National Environmental Policy Act of 1970. For decades, activists have used NEPA to delay or block projects vital to energy independence and national security. That is why I support Congressman Bruce Westerman's SPEED Act, which streamlines permitting, limits lawsuits, and restores NEPA to its original purpose while keeping strong environmental protections.

Unlike China's disregard for nature, the United States can mine and refine responsibly. With sensible reform, we can protect the environment, strengthen our defenses, and create thousands of high-paying American jobs.

To stay free and secure, we must regain control over the materials that power the



Randy Gregg talks in the Montana House of Representatives on Jan. 5, 2025, about House Resolution 2, which supports "the exploration, development, processing, refining, recycling, and reuse of critical minerals in Montana." The resolution was adopted on Feb. 5 with a vote of 93-7. Gregg said that "we can mine, process and refine faster and cleaner than any other nation on the planet. Let's utilize the resources of the Treasure State and provide great paying jobs that can support families!"

modern world. Breaking China's grip on rare earth metals will unlock the potential of rural America and ensure the future remains led by the United States, not the Chinese Communist Party. **M**

*Randy Gregg, R, of White Sulphur Springs, represents House District 78.*

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# Rare earths and globalization

We've heard a lot lately about China's global dominance in Rare Earth Elements (REEs) and what America must do.

From phones to fighter planes, our machines need REEs magnets. With REEs-rich mine waste in Butte and other Montana sites, it's a key issue for us. So how did China become dominant and what can/should America do?



**PAT  
MUNDAY**

China's strategic REEs dominance began in the early 1980s. Sensing the growing importance of REEs for powerful, lightweight magnets in American automotive manufacture and the emerging manufacture of computer hard drives, China began a deliberate long-term commitment to REEs processing/manufacture. As Deng Xiaoping, architect of China's new industrial economy famously said, "The Middle East has oil. China has rare earths."

By 1995, China's share of global REEs production was 60%. Today it is nearly 90%. We can't dismiss China's dominance with naive statements like, "Well, China doesn't care about pollution." Early on, REEs growth was partly fueled by China's tolerance for pollution. Since 2010, however, China has strictly regulated REEs production, shut down illegal and highly polluting mines, and tackled environmental cleanup.

If tolerance for environmental pollution does not explain China's dominance in REEs production, what does? Primarily, it's about federal investment. Early on, China replicated chemical extraction processes used at America's Mountain Pass mine. In the late 1990s, China funded research into advanced selective hydrometallurgical processes such as ion-exchange ammonia leaching. This investment has continued with the development of advanced electrokinetic processes.

America's Mountain Pass mine long used inefficient extraction methods and until 2024 shipped ore to China for processing.

- The U.S. Department of Defense has only recently funded domestic technical innovation and production of REEs.

- While the U.S. creates barriers to foreign cooperation, China has become a more committed to globalization, sourcing REEs-rich



The Mountain Pass Mine in California southwest of Las Vegas, Nevada, supplied the majority of the world's rare earths from 1965 to 1995, but after facing growing competition from China, the mine was idled in 2015. MP Materials rescued the mine from the brink of permanent closure in 2017. Mountain Pass is now the only mine in the country producing rare earths, and MP Materials is working on restoring the full rare earth supply chain in the United States.

ore from Tanzania to replace Mountain Pass ore.

- We now have a classic free-market failure because the tariff war allows China to cut off the REEs supply, crippling American domestic and military production.

What is the lesson here? Chinese culture excels at setting long-term goals while accepting short-term sacrifice. As a simple example, consider Chinese parents who save for children to buy a house and go to college even before the child's birth. At a national level, this translates as the close integration of government, industry, and universities working together as a single entity. Chinese government investment in REEs research and industrial mining/processing began in 1985, ramped up in the 2010s, and continues to this day. How often have you seen the U.S. commit to something like this and follow through for the next 40-plus years?

In the words of Canadian technology analyst Dan Wang, China is an engineering state whereas America is a lawyerly society. By this, Wang means that China achieves long-term pragmatic goals such as high-speed rail, solar power, and REEs extraction/processing.

Americans, on the other hand, weaponize law and politics, prioritize self-benefit over the public good, and change the goal posts every election. What a way to run a railroad!

Historically, America did commit to long-term engineering achievements such as the transcontinental railroad, Manhattan Project, rural electrification, and Apollo. Each relied on the integration of government, universities, and industry. Each transcended the winds of political change.

China's rare earth dominance is a testament to its long-term national strategy. To counter this, America — and Montana's federal elected officials in particular — must transcend short-term election cycles and political divisions.

They must foster a unified, multi-decade commitment to invest in domestic innovation, build a resilient supply chain, and leverage assets like the Berkeley Pit. Only through sustained, bipartisan effort can the U.S. secure our economic and military future. **M**

*Pat Munday is a professor of science & technology studies at Montana Tech. He has lived and taught four times in China at three different universities.*



# A mining policy breakthrough is within reach

**T**he misplaced idea that America's mineral weakness is due to a lack of resources should be put to bed. Our resource base is remarkable and only growing.

Consider just how vast our resources are. The U.S. may well be home to the world's



**RICH  
NOLAN**

largest lithium deposit in the McDermitt Caldera, which straddles the Nevada-Oregon border. The Thacker Pass mine is now under construction there. S&P Global recently estimated the U.S. has a copper endowment — the metal of electrification — comparable to Canada

and Australia combined. New, extraordinary mineral discoveries and project advances are happening at an astonishing pace. The recent discovery of a major deposit of 16 critical minerals in Utah is a case in point. Even our mine wastes are emerging as invaluable resources for many of the minerals we need but aren't yet producing.

Our great minerals challenge has never been geology. For decades, it has been policy — policies that have stymied industry, frozen capital flows into domestic mining and pushed investment and production overseas.

The Trump administration — much to its credit — is tackling our minerals crisis with the forcefulness and innovative thinking this moment requires. The momentum to break China's chokehold on global mineral supplies and rebuild secure, responsive domestic supply chains is real. But these efforts will fail to reach their full potential unless the Senate moves with equal determination.

At the close of 2025, the House passed two deeply important bills that address key obstacles standing in the way of getting more shovels in the ground to turn our minerals promise into productive capacity. We now need the Senate to put them on the president's desk.

The durable and lasting reforms in the bipartisan Standardizing Permitting and



Expediting Economic Development (SPEED) Act are not just a significant step forward in addressing the nation's mine-permitting challenges, but a leap.

The mine-permitting status quo is simply an outrage. It takes a stunning 29 years to bring a mine online in the U.S., longer than in all other countries but one.

An inefficient National Environmental Policy Act process is a primary contributor to the delays and uncertainty that have become such a specter for the industry. NEPA's use as a weaponized tool for litigation has allowed this well-intentioned law to stray far from its intended purpose and underlying text. The SPEED Act addresses these challenges head-on.

In addition, the Senate should follow the House and pass the bipartisan Mining Regulatory Clarity Act, which would rectify an egregious court decision, returning land-use interpretation to what it always has been under the General Mining Law. Doing so would provide much-needed regulatory certainty and clarity to miners and cut through red tape holding back investment and

production.

Together, these two bills could address some of the tallest self-imposed hurdles to realizing our mining potential and confronting the threat posed by Beijing's weaponization of global mineral supplies.

Our muscular industrial policy to counter China — robust loans, grants, incentives and even targeted tariffs — will be handcuffed if we can't permit mines and address glaring sources of uncertainty. As the administration works to mobilize capital, nothing will do more to get Wall Street engaged in mining and shovels in the ground than passing the permitting reform now within reach.

The resources, ingenuity and capital markets are all here. The opportunity before the Senate is tremendous. Now is the moment to turn the page on decades of inaction — on self-imposed mineral insecurity — and confront this crisis with the seriousness it demands. **M**

*Rich Nolan is president and CEO of the National Mining Association.*



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