The Great Debate

Welcome to the Great Debate;
It’s time to decide who is the most important

I
n 3,000 B.C., the not-so-famous Roman geologist Sulphurius Emanaceous said, “Without geologists, there would be no civilization.” To which the equally unknown miner Ignominious Terriblus replied, “Pone pecuniam tuam ubique os tuum es” (Put your money where your mouth is.). This began a multimillennium-year debate about which sector of the mining industry is the most important to civilization. It is time to finish this debate!

Why, you ask? The mining industry is a fraternity of men and women dedicated to advancing society — and the U.S. National Mining Hall of Fame and Museum (NMHFM) is the penultimate organization that celebrates those miners who have made significant and lasting contributions to the industry. Its museum is a world-class educational venue for all ages with fun, interactive exhibits, such as walk-through mine replicas and a lunar exhibit, dioramas of mining techniques, historic maps, photographs and tools. The museum houses thousands of precious mineral, metal, and gem specimens. NMHFM educates the public on why the extraction of minerals and metals is necessary to support life in the 21st century and how modern mining has embraced responsible mining and ecological processes and is utilizing advanced technology to ensure the safety of its employees. It needs our collective support. One of the goals of the museum is to be able to present to the public some of the new, game-changing technology that has been developed. In order to do so, the museum needs significant funding.

Our industry is also a business where lifelong friendships are forged through the nature of what we do — and we like to have fun. So why not integrate fun with fundraising? This debate, sponsored by SME and NMHFM and published in the pages of Mining Engineering, will support this vital organization telling mining’s national story while also allowing us to share a smile or two.

Enter the Great Debate, where teams of the world’s leading braggarts from seven different mining sectors have been enlisted to brag, roast, cajole and otherwise humorously make their case. Each month in 2020, Mining Engineering will publish a sector’s position statement on why it is the most important. In return, we ask you to prove the value of your sector by making donations in any amount, and as often as you can, on the National Mining Hall of Fame and Museum website. The winning sector will be determined based on the number of donors (points) and the amounts raised by the sector (dollars). Develop teams to enhance your sector’s chances of winning, challenge your colleagues in other sectors to match or exceed your donation, utilize your employer matching gift programs to double your impact and ensure your sector wins perpetual bragging rights. You will make a difference no matter how much you send in.

Team Sector Leaders include:

- Douglas Silver: Representing geoscientists, geologists, geochemists and geophysicists (dugag@aol.com).
- Tim Arnold: Representing miners, engineers and equipment operators (midasminer@gmail.com).
- Marc LeVier: Representing metallurgists and processing people (marc.levier@comcast.net).
- Ruby Barickman: Representing emerging leaders — those under 40 (ruby.barickman@gmail.com).
- Ann Carpenter and Kelly Ward: Representing women in the mining industry (ann.carpenter57@gmail.com and kward@haleyaldrich.com).
- William Lipps: Representing environmental, safety and governance professionals (welipps@shimadzu.com).

We encourage you to get involved and send your best ideas to these thought leaders to fortify your sector’s position. Challenge your friends (even those outside the industry) to

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Great Debate: Your vote counts in this age-old mining debate

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donate. Watch for periodic updates in Mining Engineering and check the museum’s website (mininghalloffame.org) frequently for updates during the challenge to keep abreast of sector rankings. The two finalists will hold a final smackdown debate at the National Mining Hall of Fame Induction Banquet in Las Vegas on Sept. 26, 2020, during MineExpo, where the winner will be announced. “The National Mining Hall of Fame and Museum invites members of the mining industry’s sectors to have fun writing persuasive, inspiring and even humorous arguments about why their sector is the most important,” coaxed NMHFM executive director Stephen Whittington.

Visit the NMHFM website at https://mininghalloffame.org/page/great-debate for more information on the 33rd Annual National Mining Hall of Fame Induction Banquet where tickets are still available for this Las Vegas phenomenon.
The Roman geologist Sulphurius Emanaceous was absolutely correct. Without geoscientists, there wouldn’t be ore bodies. Without ore bodies, there wouldn’t be mines. Without mines, there wouldn’t be a need for mining or processing engineers (the latter are also known as metallurgists). Without engineers, there wouldn’t be environmental issues and the need for original equipment manufacturers (OEMs) and most vendors. Could it possibly be any simpler? I know that some of you are engineers, so do you need me to slowly walk you through this logic?

The three pillars of mining — geology, mining and processing — become one big pillar with two stubby pillars.

Geoscientists carry a heavy burden with mankind being so dependent on our superhuman skills. But we also know that our genius makes the world a better place. Without our successes, humans would still live in caves (miners’ home turf). It gives us indescribable pleasure knowing that our hard work and ability to decipher nature’s secrets creates thousands of jobs for those less fortunate — people who would otherwise be using their college and graduate degrees working at fast-food restaurants.

But we are also humble and live normal lives despite being surrounded by the immense adulations of others. Mac Davis summed it up perfectly, “Oh Lord, it’s hard to be humble when you are perfect in every way.” This mantra guides us through every day.

However, we have an awesome obligation to mentor others in the mining industry. For instance, in this new age of environmental awareness, we have had to teach engineers that the best way to prevent forest fires is by not strip mining. Processing engineers must learn that the froth on a float cell is not a milkshake and that optimizing a flow sheet does not mean coloring within the lines. While most of you take your jobs for granite, we actually know what a granite is.

OEMs owe us twice. They get to use our newly discovered metals to build their toys for boys and then sell them to unsuspecting engineers.

Given our elite status in the world of mining, we would like to offer the following advice to our engineering brethren:

• If they are yawning at your presentation, it is not because they didn’t get enough sleep.
• You should not have more friends on the internet than in real life.
• Buying flowers for your girlfriend or upgrading your RAM is not a moral dilemma.
• You can write on paper that does not have both vertical and horizontal lines.

Seriously, everyone is important in the mining industry. We geoscientists are just more important. For instance, there is no god named Engin. There is one named Geos. Just saying.

So geoscientists unite! Let’s prove once and for all that we are the masters of the universe. Please vote with your wallet to help us win our self-ordained supremacy.
Let me start this discussion by reminding everyone that we are raising funds. Funds for a very worthy cause, the National Mining Hall of Fame and Museum (NMHFM). I am calling your attention to the name: The National MINING Hall of Fame. Not the geoscientist hall of fame. Not the metallurgist hall of fame. The mining hall of fame. Geologists don’t need a hall of fame; their names already adorn every “do not serve” list in nearly every bar in America.

When Doug Silver asked me to write an article about the supremacy of miners, I was hesitant. Picking on metallurgists and geologists is always fun, but punching down always makes you feel a little dirty afterward. Like the way LeBron James probably feels when he plays a pickup game … with middle schoolers.

Since miners can be silver-tongued without needing to lick rocks, allow me to expound the virtues of our profession. While geoscientists are trained to play with crayons, and metallurgists play with bubbles, miners are experts at using complex modeling procedures, explosives and massive machines. Miners (like the rest of the world) recognize that an “IP anomaly” is a urinary tract infection, not another way to burn (pun intended) through cash. Miners also know that “unconformity” is the social behavior of a geologist when not in field camp. Don’t get me started on how badly they screwed up the word cleavage (my apologies to the women miners for that one).

Miners can be proud that Herbert Hoover (FYI to the emerging leaders, he was also the 31st president of the United States) was a miner that translated Agricola’s *De Re Metallica* from Latin to English. Hoover and Agricola are in the NMHFM, along with Hoover’s wife Lou, who partnered with him on the translation. A little-known fact from that translation is that the ratio 16:1 is not derived from precious metal prices. It was stated in *De Re Metallica* thusly: “XVI to I—Ratio autem a speciminibus geologists mineralibus suum sub ubi.” Herbert and Lou did not have the heart to include it in the translation, but it is time that the world knows the truth. The translation roughly states: “16 to 1 — the ratio of a geologist’s mineral specimens to his underwear.”

While metallurgists will wax on and on about how nothing happens without them, they do seem to ignore the fact that without miners, nothing is delivered to them. In actuality, though, if we delivered nothing, they would not be able to lose all the value held within the rock.

Now is the time for miners to come to the forefront and show their mettle (FYI to the emerging leaders, I didn’t misspell that word). We know we are the backbone of the industry. Miners don’t need to pat themselves on the back for a job well done, unlike our brethren who celebrate every time one of the 10,000 holes hit a little grade, or they pour an ounce of gold (after sending pounds of it to the tailings facility). Miners humbly accept that our job is to be the jack of all trades in the industry and guide and mentor the others. If the industry were the Beatles, McCartney, Lennon and Harrison would all be miners. The rest of you are Ringo.

So, I encourage you to donate today and often to the National Mining Hall of Fame and Museum. Stand proud for your industry by putting your wallet to work. Geologists outnumber the miners 10 to 1, so we need a concerted effort. Do not let the fact that a huge percentage of those geologists are waiting tables in coffee shops deter you. Make us proud. More importantly, make us win!

To donate go to bit.ly/Gr8Deb8 to make your vote count.
I was humbled and honored to be asked to represent metallurgical/process engineers in this Great Debate by one of mining society’s all-time great braggard, boaster and roaster, Doug Silver. The Great Debate is posed on the question, “Which mining industry discipline has made the greatest contributions to civilization?”

All engineers involved in the development and operation of mines know that the key to a successful mine is the process engineer. We are required to tell the geologists how to sample, how to assay (yes, our group also includes analytical chemists), how to interpret the data, and ultimately how to set cut-off grades in order to keep the mine profitable. Geos (a STEM degree without knowledge of math), as everyone knows, fall in love with rocks, they lick rocks, they examine them with a hand lens (they forget that mineralogists have high-powered and high-resolution devices called microscopes and SEMs … oh yes, mineralogists are part of our crowd as well … welcome, mineralogy brothers and sisters). As such, they would drill to the other side of the planet, “Just another 3 meters!” The process engineer must tell the geo to stop drilling and find another target. (A vice president of exploration once told the head of process that the geos had found enough resource to last the company for 100 years. The process engineer replied, “Well a bit of grade would help. Is this rock from your mountain estate driveway?”)

Process engineers are the innovators of our society. We make gold from no grade; we make high-grade concentrate with no penalty elements, high recovery and maximum profitability. If the mine fails, it’s always about the metallurgy. We produce value from nothing. We innovate and mines are created. Meanwhile, the mining engineers keep plodding along, just looking for more rocks to blow up. And then they ship anything and everything as “ore.” (Musical score playing in the background, “Hi-Ho, Hi-Ho, it’s off to work we go, blowing stuff up.”) Their motto is “We blow stuff up.” That’s it. They have nothing else to offer. Boom, muck, truck; boom muck, truck. Boring!

When environmental cleanup became the law, who did the company look to for design, operation and compliance? The process engineers, that’s who. Why? Because the process engineers have chemistry in their DNA, and are always up for a challenge. Long before the environmental engineer was invented, process engineers led the way in reclamation and restoration. Again, all the marbles fall on the shoulders of the metallurgical engineer. In a Star Wars-like analogy of mining, the geologist is Darth Vader — always secretive, plotting and shielded. The process engineer is Luke Skywalker — shedding real light and truth on the deposit. The mining engineer is the unshaven Wookie just along for the ride. AHHHRRRRRR!

In the end, it’s the metallurgist, the plant operator, who made the design efficient and economical. We are the crew under the microscope of scrutiny. If we fail, there is no mine. As President Harry Truman said, “The buck stops here.” We seek no glory and receive little recognition, while other braggarts and boosters grab the spotlight.

The advancement of civilization is witnessed by the production of steel, alloys, aluminum, base metals, precious metals, PGMs, coal and uranium for energy, and industrial minerals in all aspects of our life. If it isn’t grown, it must be mined and processed. Society’s lifestyle today is testimony to the success of the mining industry, ergo the process engineer. Meanwhile, our “friends” continue to blow stuff up and lick rocks. The other disciplines can only stand and watch as the ore is placed in the most responsible hands in the industry, the cradle of innovation, the true Deus Omnium Opes, Creator of All Wealth, metallurgical/process engineers. (If you are a student in any discipline but metallurgical engineering, rethink your future NOW!)

DISCLAIMER: 1) No mining executives were harmed in producing this article, as they were never involved. No surprise here. 2) I have a brother who is a mining engineer: my colleague, Jim Arnold, who suffers from the same malady, MBIME, and we pay for therapy for our family members.
The epic smackdown of industry thought leaders has reached the midterms. Before this all began, I guessed that the best analogy at this point would be a heavyweight title fight from the days when boxing was king, but this knockdown, drag-out fight is something far less civilized than the sport of kings. This is not a title fight; this has become more like a political campaign with each side taking swipes.

The first real body blow was landed by the geoscientists who were allowed to throw the first punch, and landed it did: “Without geoscientists, there wouldn’t be ore bodies. Without ore bodies there wouldn’t be mines. Without mines, there wouldn’t be a need for mining or processing engineers (the latter are also known as metallurgists). Without engineers there wouldn’t be environmental issues and the need for original equipment manufacturers (OEMs) and most vendors. Could it possibly be any simpler? I know that some of you are engineers, so do you need me to slowly walk you through this logic?”

Game on!

The miners countered by stating the obvious that this noble fundraiser that began in January with the aim of raising money for the National Mining Hall of Fame and Museum in Leadville, CO is for “The MINING hall of fame. Not the geoscientist hall of fame. Not the metallurgist hall of fame. The mining hall of fame.”

And then it got personal: “Picking on metallurgists and geologists is always fun, but punching down always makes you feel a little dirty afterward. Like the way LeBron James probably feels when he plays a pickup game … with middle schoolers.”

Ouch.

Meanwhile, the metallurgists, who were grouped with miners as “two stubby pillars” by the geoscientists, were drawn into the fray by the miners, who noted, “They (metallurgists) do seem to ignore the fact that without miners, nothing is delivered to them. In actuality though, if we delivered nothing they would not be able to lose all the value held within the rock.”

It was a tough shot, but there was no need to worry about the metallurgists. It’s as if they had been waiting for this moment for a long time. “All engineers involved in the development and operation of mines know that the key to a successful mine is the process engineer. We are required to tell the geologists how to sample, how to assay (yes, our group also includes analytical chemists), how to interpret the data and ultimately how to set cut-off grades in order to keep the mine profitable. Geos, as everyone knows, fall in love with rocks, they lick rocks, they examine them with a hand lens.”

And for their brethren working as operators and miners, “Meanwhile, the mining engineers keep plodding along, just looking for more rocks to blow up. (Musical score playing in the background, “Hi-Ho, Hi-Ho, it’s off to work we go, blowing stuff up.”). Their motto is “We blow stuff up.” That’s it. They have nothing else to offer. Boom, muck, truck; Boom, muck, truck. Boring.”

Even the emerging leaders, a group we haven’t even heard from yet, were not spared in the first half of the Great Debate — which is not surprising as it seems everyone wants to pick on millennials for, well, being millennials.

“Miners can be proud of Herbert Hoover (FYI to the emerging leaders, he was also the 31st President of the United States).”

So the geoscientists, the miners and the metallurgists have had their say, but the debate is not over, not by a long shot. In the coming months, emerging leaders, women in mining and the environmental health and safety group will be making their cases on these pages.

And you can make your voice heard as well by joining The Great Debate at https://me.smenet.org/greatdebate/. Chime in, and keep the discussion going. But as they say, money talks and the best way to make the case for your sector is to vote and donate at bit.ly/Gr8Deb8, early and often. And stay tuned for the second half of The Great Debate.
Let’s start this debate by examining an actual email from my boss this week:

“How do I get my phone to allow me to look at things in landscape? I turn the phone but nothing happens. Thx.”

Case. In. Point.

I could end it there, but for the sake of the 600 words required for this article, let’s dig a little deeper. We are impatient, lazy and entitled. We take selfies and care more about our online image than anything IRL (that stands for “In Real Life” for those in the cheap seats in the back.) We order avocado toast at our bottomless mimosa brunches instead of saving for a house or working hard or doing anything remotely productive. We are the group you love to hate; but, could you actually imagine a world without us in it?

In a mining world with no millennials:

• There would be no one in the office to act as IT support when the actual IT professionals are unavailable. Network issues? Put us in, coach.

• Specifically, there would be no one to set up the new printer in the office. Even though we have printed a combined total of less than 15 pages in our career thus far, we know that printing that 400-page feasibility study is very important to you. More so, who would teach you how to use the scanning function on the printer when you want to scan said feasibility study back to your computer so that you have a digital copy?

• There would also be no one for us to reverently ask about the form and function of office appliances from the days of yore. Fax machines, paper shredders and floppy disks ... oh my.

• There would be no one for you to tell your stories to that start with “Back in my day, when we used drafting tables ...” This is especially relevant when looking at a mine design in any CAD-based program — which, you wouldn’t be able to use ... because back in your day, you used drafting tables.

• There would be no one to explain bitcoin mining to you. Ok, fine. We don’t understand that one either. It is definitely not mining.

• There would be no one to complain to about your back ailments. You might have worked in an air-conditioned haul truck, but by the time these tales are told to us, you had spent years hand-mucking into a donkey-led cart … Oh, and you also were the donkey. In the snow. Uphill. Both ways. Us kids will just never appreciate a hard day’s work.

• Speaking of a hard day’s work, there would be no one to help you feel less guilty about sneaking out of the office early on a Friday afternoon. We’ve been gone since lunchtime on Wednesday. It is all about that work-life balance.

• There would be no one to look at old (and quite possibly failed) mining projects with fresh eyes. It might have broken many picks in the past, but that won’t stop us from rolling up our sleeves and seeing if we can make it work. Yes, we understand that you think it is “fundamentally uneconomic.” You call it naivety. We call it optimism.

So, there it is. You think you cannot stand us, but really, you cannot live without us “youngsters.” Our motto could be straight out of Annie Get Your Gun (more or less). Anything you can’t do, we can do better. But just to be clear, even if we do not win The Great Debate, we still get a participation trophy… right?

The Great Debate is intended to be a good-natured debate about the mining industry with a goal of raising funds for the U.S. National Mining Hall of Fame and Museum. The opinions expressed here are those of the author and not necessarily of SME or Mining Engineering. Each edition of the Great Debate will be available on Mining Engineering’s website. To get involved in the debate, visit https://me.smenet.org/greatdebate/.
Social and environmentally responsible mining and mineral processing are influential to national economies and to quality of life. Mines today must have closure plans started during early exploration and proceed throughout the life of the mine. It is no secret that rock chemistry and climate vary from mine to mine, but one thing they almost all have in common is water. Water is essential to life and usually also essential in the mining and processing on mineral ores. The processes that use water include, but are not limited to, solution mining, heap leaching, flotation, and chemical process leaching. Each of these may result in waste streams and tailings impoundments that must be treated or recycled responsibly.

The environmental and health and safety sector is a diverse bunch, an incohesive mixture of professions that include natural resource scientists, engineers and sociologists. Our daily jobs may focus on things such as concrete as, well, concrete, or as abstract as “the acid-neutralizing capacity is equivalent to alkalinity but in solids, not liquids.” Yes, us environmental wackos must think in terms of chemistry and in “guessing” about things such as the potential of acid drainage based on other assumptions. We deal in data. Lots of it. Lots of numbers and chemicals. Which ones react, which ones don’t react and how can I prevent these from reacting when I add those others?

We are geologists. The physical and mineralogical geology of the mine site dictate the extent of environmental contamination that may occur as a result of human activity. Water pollution is affected by the natural environment and geology, the availability of water and oxygen, the final placement of rock material that may encounter the water and the physical and chemical properties of the rock. Geology dictates the movement of groundwater. Environmental geologists work with mine engineers to develop structural controls that minimize the impact of mine influenced water lowering the risk of environmental pollution and litigation.

We are engineers. Preventing the impact of mine-influenced water during planning and design and throughout operation is much more effective before rather than waiting for later. Data from site exploration and materials and geochemical testing assist in determination of proper design, methods of mining and other operational considerations to minimize issues that will need to be addressed during closure. In addition, we are regulatory experts navigating the myriad local, state and federal regulations in managing tailings, dust, water treatment, discharges and runoff to prevent the release of harmful chemicals that may contaminate the surrounding air, water and soil.

We are consultants. We provide integrated services throughout our global networks of scientific and technical expertise. We bring in an outside view for a fresh look at your operation, enabling us to improve the design and performance. We are experts at handling mine waste, at water treatment, and at mine closure and remediation. We review regulation and permitting guidance on projects at any stage, from baseline studies to implementation, expansion, all the way to reclamation. Environmental consultants specialize in understanding local, state, federal and international regulations and communities.

Most importantly, we work closely with mining and mineral processing to minimize the potential of environmental mishaps and releases of contaminants into the environment.

While you may find deposits, mine the deposit and process the ore, we are the ones that provide you a safe, environmentally responsible industry, so, you’re welcome.

To support those who support your environmental health and safety make your voice heard and donate at bit.ly/Gr8Deb8. Make your vote count.
Women are a crucial element of civilization, and without civilization there would be no need for mining. It all starts right here with women … birthing rights … there is no denying our lock on this little gem. We have been producing miners throughout time and are continually raising the next generation of miners. Until technology somehow surpasses our biology, the world — and mining — needs women.

Our natural multitasking abilities result in decisive and rapid responses to multiple simultaneous and diverse tasks or problems — a critical component to successful leadership in the mining industry. We know we look good in hats, so wearing many — work, home, play — is no big deal to us.

When comparing driving skills (yes, we are going there), women outpace men. On 14 different aspects of driving, women comfortably outscored men by 13 percent — 23.6 points (out of a possible 30) compared to 19.8. Mine managers have taken note—realizing lower equipment costs, better equipment performance and less maintenance with women equipment operators. As an added bonus, we’re not afraid to ask for those directions.

Experts across the country have recognized women as better listeners, mentors, problem solvers and multitaskers than their male counterparts, resulting in keen and unique leadership skills. In a recent Daily News article, management expert Jay Forte said, “… you need employees to be motivated. Women are better connectors than men and more astute about knowing how to activate passion in their employees.” Easy on the innuendos here, people.

Former President Obama said most of the world’s problems come from, “… old people, mostly men, holding onto power.” Because we are a compassionate group, we respectfully and humbly agree. We include here a list of unique women leaders through time, to continue to inspire you.

Saint Barbara, 3rd century: With her association with lightning (which killed her father after he had her beheaded for being a Christian; talk about a dysfunctional family) and explosions, she is the patron saint of miners and others who work with explosives. Clearly a force to reckon with.

Sacagawea: 1787-1812. As the interpreter for Lewis and Clark during the U.S. government’s first exploration of the Northwest, Sacagawea helped negotiate safe and peaceful passages, illustrating her ability to get along with many while asking for directions and guiding the men to safety.

Marie Curie: 1867-1934. This physicist was the first woman to win a Nobel Prize — she actually won it twice — and the first woman to earn a doctorate in Europe. Her investigations led to the discovery of radioactivity as well as the element radium.

Women have been trailblazing in the mining sector for a long time, including as prospectors in mining camps across the country in the early settlement of the United States. In the late 1800s, Mary Harris “Mother” Jones — the most recent female National Mining Hall of Fame inductee — devoted her life to the fight for workers’ rights, specifically advocating for miners. As a stellar and more modern example, Catherine McLeod-Seltzer is an international trailblazer, who in 1999 was honored by an industry publication as its “Mining Man of the Year.”

Women In Mining organizations worldwide have taken this to the next level, annually highlighting women leaders across the international mining spectrum, including publishing the 100 Global Inspirational Women in Mining list.

In this series of articles for the National Mining Hall of Fame, women are represented in all sectors, yet men are represented in all but one. We’ll let you stew on that one for a while.

Vote (with your donations) for the Women’s sector — obviously and clearly the most important sector in mining. Join our efforts to support the nation’s mining museum (use The Great Debate link … bit.ly/Gr8Deb8). Vote early and often!