



ARIZONA  
MINING ASSOCIATION

# Hard Rock Mining Facts

Arizona Mining Association

If you have turned on a light, entered a building, driven on a road, made a phone call, used a computer, or visited a doctor, then mining is an important part of your life.

We are dedicated to the people in our industry, the communities in which we live and the environment that nurtures us all. Mining provides the resources for a better future.





# Resources For Arizona's Infrastructure



Arizona's miners and mining companies play an indispensable role in powering and building our state and nation. From foundations to roofs, power plants to wind farms, roads and bridges - Arizona's infrastructure projects begin with mining.

With Arizona as one of the fastest growing states in recent years, mined products are in need now more than ever. Roads, railways, office buildings, grocery stores, and airports are all supported by steel - a material dependent on mining. Even structures using concrete employ steel for reinforcements. That means Arizona's new home developments, which are so desperately needed, rely on the success of these mining materials.

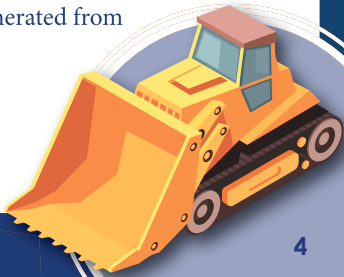
Copper's flexibility, conformity, thermal and electrical conductivity, and resistance to corrosion, make it an ideal metal. Copper also has biostatic and anti-microbial properties that make it an excellent ally in the fight against disease and germs. Molybdenum is used in steel alloys to make construction equipment, gas transmission pipes, and municipal water supply pipes.

# Resources That Power our Lives



A mix of domestic coal, natural gas, nuclear power, oil, and renewable sources, ensures that U.S. households and businesses can minimize market disruptions and reduce reliance on foreign energy sources. Electric power generators use large stators and rotors that are wound in copper. Wind energy is produced by turbines that contain copper and molybdenum alloy steels. Uranium, molybdenum, and copper, are all used in the production of nuclear power.

- 4th U.S. ranking in total world copper production, 2020.
- 72% Amount of copper output for the United States that is mined in Arizona.
- 4th U.S. ranking in total world copper reserves, 2020.
- 29 is the number of minerals it takes to deliver electricity to our homes and businesses.
- 34% Portion of Arizona's electricity that comes from coal.
- 29% Portion of Arizona's electricity generated from nuclear energy powered by uranium.



# Resources For A Better Future



**T**echnologies made possible through mined minerals are empowering innovations for the future and providing the necessary resources for a better life.

**66** Different types of minerals used in the average computer including copper.

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**5 Pounds** of copper cylinders in the atomic clock at U.S. Naval Observatory which is accurate to one part.

**<90%** Reduction in bacteria on hospital surfaces coated in antimicrobial copper.

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**50** Pounds of copper in a typical gasoline powered vehicle.

**165** Pounds of copper, on average, in an electric vehicle.

**0.5** Ounces of copper in a mobile phone, which makes up 12% of the phone's total weight.

# Uranium in Arizona

**29%** Portion of Arizona energy generated by nuclear power using Uranium.

**173,875**

Pounds of Uranium produced in the U.S. in 2020.

**60%** Portion of emissionfree energy in the U.S. produced from nuclear power.

**94%** Portion of Uranium purchased for U.S. Nuclear reactors from foreign countries.

**1st** Ranking of U.S. in world uranium consumption.

**0.65%**

Grade of Uranium ore in Arizona Strip, 5 times higher than anywhere else in the U.S.

**5** Number of states producing uranium concentrate - Wyoming, Nebraska, Utah, Colorado, and Arizona.

**375 mil**

Pounds of Uranium reserves in Arizona Strip.





# Caring for Our People

*Ensuring the safety and health of our valued employees is a core value of the mining industry.*

**T**he goal? Zero fatalities and injuries. To achieve our shared goal, we employ safety measures beyond what are required by state and federal regulations.

To accelerate the pace of mine safety improvement, the U.S. mining industry has taken voluntary steps to implement best practices that encourage a culture of safety.

By identifying and eliminating potential hazards and deploying state-of-the-art technology, the Arizona Mining Association, its members, and respected industry safety and health professionals are dedicated to bringing miners home safely after every shift, giving mining a lower nonfatal injury and illness record than manufacturing, construction or private industry.



# 2019

Safest year in U.S. mining history due to continuous improvement.

**12th** Ranking of mining industry among 17 NAICS industry categories for the lowest injury and illness rates. According to the Bureau of Labor Statistics Mining safety incident rates are lower than education and retail.

**56%** Rate by which injuries in U.S. mines have been reduced over the last 15 years.

**63%** Rate by which fatalities in U.S. mines have been reduced over the last 15 years.

**0** Number of fatal injuries at active mines in Arizona in 2019 and 2018.

**1.3** Hours of lost time due to injuries per 200,000 hours worked by Arizona miners.





# Caring for the Environment

*Natural resources are at the heart of mining and environmental stewardship is imperative.*

Today's mining projects begin with extensive environmental and engineering studies, public involvement in major decision making, and compliance with scores of state and federal laws and regulations governing every facet of the environment. From wildlife habitat protection, to water quality monitoring, mining projects end with land reclamation that converts these sites for recreation, wildlife habitats, and other local community needs.

Building on the extraordinary environmental progress made in recent decades, the industry is committed to advancing technologies that make efficient use of our resources.

**75%** Water recycled at Arizona copper mines.

**1.4%** Amount of total water used by mining in Arizona.

2.9 million      \$10B+

Acres of mined land that have been restored by U.S. mining companies.

Amount the U.S. mining industry has paid to reclaim abandoned mines.

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## Resources For Our Economy

*Mining provides essential power and materials for nearly every industry and consumer product, and supplies low-cost reliable fuel for homes and businesses across the country.*



**T**he mining industry is supported by hundreds of thousands of hardworking Americans. In Arizona, the mining industry provided 47,262 direct and indirect jobs in 2020. These professionals are deeply proud of the contributions they make to our country each day, fueling America and supplying the essential materials that make our high quality of life possible. These contributions help make America a global leader in innovation.





# Resources For Our National Security

*Metals and minerals are essential elements for safeguarding our nation.*

**O**ur Armed Forces rely on domestic metals and minerals for sophisticated weapons systems and safe transport of our troops. Access to domestic supply of metals and minerals minimize our reliance on foreign countries for these vital resources.

Rhenium is one of the world's rarest elements. The United States military depends on rhenium for certain high-temperature super alloys used in jet turbine engines, advanced electronic instrumentation, and as a catalyst in petroleum refining. Freeport-McMoRan's mine in Sierrita is the only domestic producer of rhenium.

# 175,000

Tons of minerals that are used by the U.S. Department of Defense each year in technologies that protect our troops.

# 8 Miles

Amount of copper wire in a Boeing Apache Helicopter produced in Mesa, Arizona.

# 6.5 lbs.

Amount by which lithium-ion batteries can lighten a U.S. soldier's pack, while providing three times the charge.

# 43

Number of key minerals on which the U.S. remains more than 50% reliant on imports, subjecting our supply chains to geopolitical instability and supply disruption.



# Arizona's Major Hard Rock Mines

## **Freeport-McMoRan Inc.:**

Bagdad – 1,020 Employees, CD 4, LD 1  
Miami – 830 Employees, CD 1, LD 8  
Morenci – 3,790 Employees, CD 1, LD 14  
Safford – 1,270 Employees, CD 1, LD 14  
Sierrita – 1,150 Employees, CD 2, LD 2  
Phoenix HQ & Other AZ – 1,210 Employees, CD 7, LD 24

## **ASARCO LLC:**

Tucson HQ – 35 Employees, CD 7, LD 23  
Hayden Operations – 105 Employees, CD 2, LD 7  
Mission – 584 Employees, CD 7, LD 23  
Silver Bell – 209 Employees, CD 7, LD 16  
Ray – 537 Employees, CD 2, LD 7  
Copper Basin – 29 Employees, CD 2, LD 7

## **Carlota Copper Co., A Subsidiary of KGHM International:**

Carlota – 62 Employees, CD 1, LD 8

## **Pinto Valley Mining Corp. A Subsidiary of Capstone Mining Corp:**

Pinto Valley – 619 Employees, CD 1, LD 8

## **Florence Copper Inc. – Taseko Mines Ltd.**

Florence – 36 Employees, CD 4, LD 8

## **Excelsior Mining Corp. – Johnson Camp/Gunnison**

Johnson Camp – 54 Employees, CD 2, LD 14

## **Golden Vertex Corp., Inc. – A Wholly-Owned Subsidiary or Northern Vertex Mining Corp.**

Moss Mine – 90 Employees, CD 4, LD 5

**CD = Congressional District; LD = Legislative District**

# Mines Under Development

A potential of more than 4,600 new direct mining jobs based on projected employment at full operation.\*

## Rio Tinto Group/BHP Billiton Ltd. Resolution Copper Project

Copper, Est. 3,700 direct/indirect jobs, CD 1, LD 8

### Hudbay - Rosement

Copper, 450 Employees, CD 2, LD 14

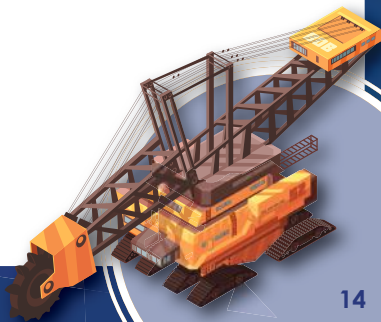
### Energy Fuels - Canyon Mine

Uranium, 60 Employees, CD1, LD 7

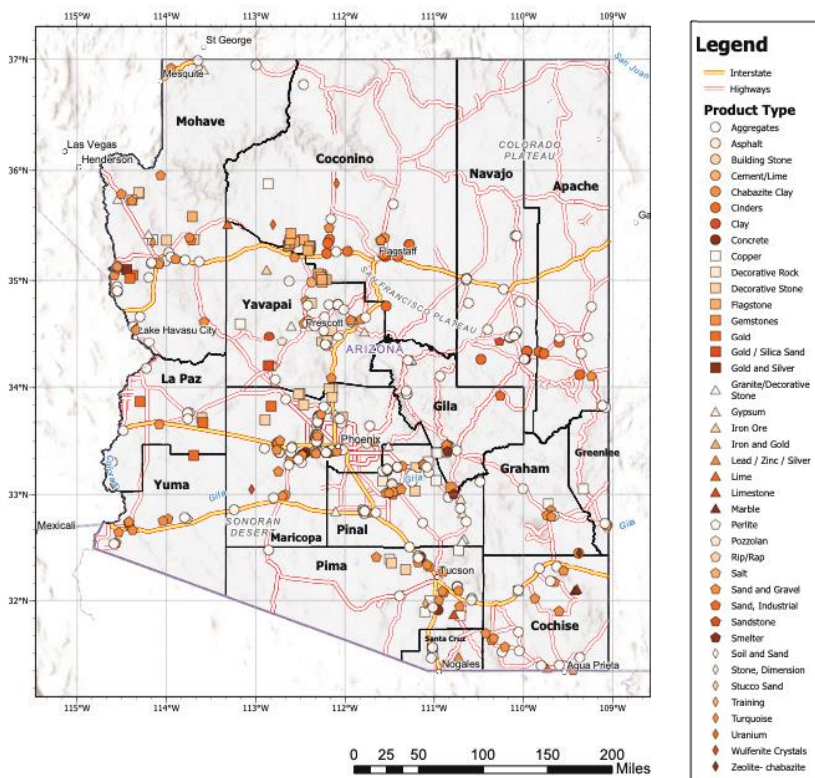
### Origin Mining Corp. - Mineral Park Mine

Copper, 16 employees, CD 4, LD 5

\* Employment/job numbers relate to projections based on current expectations and are subject to change.



# Location of Arizona's Major Hard Rock Mines





# Minerals by County

## Apache:

Peridot

## Gila:

Copper  
Peridot  
Perlite

## Navajo:

Gemstones

## Cochise:

Copper  
Lime  
Opal

## Coconino:

Uranium

## Graham:

Copper

## Maricopa:

Amethyst

## Pima:

Copper  
Molybdenum\*  
Rhenium\*

## Santa Cruz:

Copper  
Silver\*

## Mohave:

Copper  
Gold  
Turquoise

## Greenlee:

Copper,  
Molybdenum\*

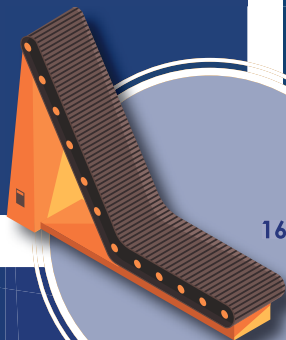
## Pinal:

Copper,  
Molybdenum\*  
Silver\*

## Yavapai:

Copper  
Lime

\* By-products of copper





# Copper is a Miner's Best Friend

*Mining has come a long way, we can use chemistry to extract the element.*

Copper has a new way of being mined. The small copper particles, mixed in with everything else, are extracted using chemicals. The mixture of dirt, gravel, and minerals are poured into a container of chemicals. The mixture is then frothed, and the copper rises to the top while everything else settles on the bottom. The floating copper is then sent to another tank where anodes attract the copper particles. Once the collected copper is hardened forming a solid copper sheet on the anode plate, the two pieces are sent through a roller. The copper sheet separates from the anode and the anode is sent back to the tank to collect more copper. The result is a copper sheet, called an cathode, that is 99.99% pure copper.



# Climate Change Statement

Climate change has become a major issue, and the AMA is aware of the risks that it presents to the mining industry. With the United States re-committing to the Paris Agreement in 2021, the mining industry has an increased focus on reducing greenhouse gas emissions and taking actions to mitigate the adverse effects of human impacts on climate change.

The AMA is committed to working with elected officials, policymakers, and other key stakeholders in the development of domestic and international policies to address the global climate challenge.

We believe that policies to reduce global greenhouse gas emissions should support and recognize the responsible production of the mined commodities that are necessary to build green and resilient infrastructure, maintain the affordability and reliability of U.S. electricity generation, and secure our economic recovery.

The quality and quantity of water available for use by people and ecosystems across Arizona and the Nation are also being impacted by climate change. There are increasing risks and costs to agriculture, energy production, recreation, and mining that need to be considered. The AMA supports efforts to highlight water concerns and craft responsible policy solutions.

The AMA recognizes the effects of climate change on our members and their communities and encourages them to adopt strategies that will create sustained reductions in climate change risks.



# Environmental, Social, and Governance Principles

**T**he Arizona Mining Association (AMA) represents a diverse range of companies that comprise the mining industry in our state. From mining companies to consultants, we support our members' efforts in implementing safe, sustainable mining practices and encourage them to adopt Environmental, Social and Governance (ESG) principles throughout their operations.

The AMA strives to conduct our business in a socially responsible and ethical manner. We respect the law, support human rights and respect for indigenous people and support actions that are protective of the environment and benefit the communities in which our members operate.

We encourage our members to manage their environmental impact through continual investments in technology, energy conservation, efficiency programs and data collection to help measure and reduce their carbon footprint. The AMA understands that managing your environmental footprint often goes hand-in-hand with strategic priorities to operate efficiently, so we support our members efforts to minimize that impact as they operate.

Investments in the communities where our members operate provide long term benefits and value to the mining industry as a whole. The AMA encourages its members to embody the tenet of

people being the industry's greatest asset and to recognize that when our people and communities thrive, our companies thrive as well.

The AMA encourages our members to foster diversity and develop an inclusive work environment. We recognize that to be successful, leadership within each member company must be committed to championing these efforts and ensuring they are engrained in our industry's culture and business models.

The AMA is committed to ensure that our members implement risk management practices in both the field and their board rooms. We support the adoption of appropriate risk management programs and governance structures that can be utilized by management to mitigate risks. We try to be a model for our members by demonstrating appropriate corporate governance through the policies and practices set by our Board of Directors.

Mining plays a critical role in providing responsibly produced raw materials that make modern life possible and fuel America's economic growth. These products are vital to society, including its transition to a low-carbon future. The AMA appreciates the role our members can play in a more sustainable future and strives to help ensure that our members continue to operate in a responsible manner. We value the importance of ESG polices and will continue to highlight them with our members while remaining engaged in conversations in this evolving and maturing issue area.



# Key Mining Industry Terms:

**Alloy:** A substance with metallic qualities that is composed of two or more chemical elements, of which at least one is an elemental metal.

**Auger Mining:** Form of underground mining that uses an auger (rotary drill) to penetrate, break, and transport drilled material onto a waiting conveyor belt. Usually employed to recover remaining material in deep overburden areas that cannot be reached economically by further contour or area mining.

**Base Metals:** Non-precious metals, such as copper, lead, zinc, tin, aluminum, and magnesium.

**Bioleaching:** Addition of naturally occurring bacteria to extract or remove a soluble substance from ore.

**Financial Assurance:** A prerequisite for obtaining a mining permit, companies must post a reclamation bond to ensure sufficient funds to restore a site in the event a company fails to complete the reclamation plan approved by the permit.

**Bullion:** Mixture of gold and silver in cast bars. Also called doré.

**Concentrate:** The result of separating ore or metal from its containing rock or earth.

**Demonstrated Reserves:** Deposits that are potentially mineable on an economic basis, with existing technology.

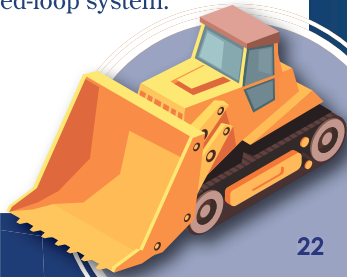
**Dragline:** A large excavation machine used in the surface mining process to remove overburden. The dragline has a large suspended bucket that is capable of scooping up huge amounts of overburden as it is dragged across the excavation area. The dragline is one of the largest land-based machines in the world.

**Excavator:** A large number of poweroperated digging and loading machines, used increasingly in open-pit mining and quarrying.

**General Mining Law:** The primary statute that governs the right to mine locatable minerals on unappropriated public domain lands. **Though enacted in 1872, it has been amended many times.**

**Hardrock Minerals:** Locatable minerals that are neither leasable minerals (coal, oil, phosphate, etc.) nor sealable, mineral materials (sand and gravel, etc.). Hardrock materials include copper, lead zinc, magnesium, nickel, tungsten, gold, silver, bentonite, arite, feldspar, fluorspar, and uranium.

**Leaching:** The action of percolating liquid in order to remove soluble parts. Ex. Sulfuric acid leaching of copper is a process where a weak solution is percolated through low-grade ore heaped on an impermeable liner. Copper is then extracted from the liquid in a closed-loop system.



**Locatable Minerals:** Minerals - primary metallic - that can be claimed and mined on public lands, under the General Mining Law of 1872; these do not include coal, oil, phosphate sodium, sulfur, or sand and gravel.

**Metallic Minerals:** Minerals with a high specific gravity and metallic luster, such as titanium, rutile, tungsten, uranium, tin, lead, and iron.

**Minerals:** Scientific - Naturally formed inorganic solids with a limited range in chemical composition and with orderly internal atomic arrangements that determine crystalline structure and physical properties.

**Minerals:** Legal - Substances occurring naturally with characteristics and economic uses that bring them within the purview of mineral laws; applicable laws from public substances that may be obtained under lands by purchase, lease, or claim.

**Mineral Claim:** That portion of the public mineral lands that a person may claim for mining purposes in accordance with the Mining Law of 1872, as amended. There are four types of mining claims: lode, placer, millsite and tunnel sites. Only tunnel sites may not be patented under current law.

**Non-Metallic Minerals:** Minerals that lack the properties of the metallic minerals, i.e. carbon, diamond, coal, bitumen, asphalt, boron, sulfur, and rock salt.

**Open Pit:** A mine or excavation open to the surface. Refers, primarily, to mines of metal ores; distinguished from coal surface mines.

**Ore:** Rock that contains important minerals, including metals.



**Overburden:** Layers of earth and rock covering a coal seam or mineral deposit.

**Patent:** A government deed; document that conveys legal title to public lands to patentee.

**Placer Deposit:** An alluvial marine or glacial deposit resulting from the crumbling and erosion of solid rocks, and often containing valuable minerals.

**Reclamation:** The restoration of the land and the environment after mining occurs.

**Reserves:** Known mineral resources from which a useable commodity can be technologically, economically, and legally extracted using current mining techniques.

**Scrubber:** Any of several forms of chemical/physical devices that remove sulfur compounds formed during coal combustion.

**Smelter:** A furnace in which raw materials are melted, and metal separated from impurities.

**Strategic Minerals:** Those minerals considered essential for a country's economic and defense needs, satellite communications, automobile parts, and medical instruments.

**Tailings:** The waste material left over after hardrock mining and milling processes have been completed.

**Underground Mine:** Also known as a deep mine. Usually located several hundred feet below the earth's surface, materials are removed and transferred to the surface.



# Arizona Mining Association

## Mission Statement:

To be the primary advocate of the Arizona mining industry through promoting sound public policy at all levels of government, educating the public about the benefits of mining and supporting the sustainability of a safe and responsible mining industry.

## Vision Statement:

We are a diversified mining association that is the unified voice of responsible, sustainable and safe mining in Arizona. We support educational programs that demonstrate the importance and benefits of mining to the economy and the quality of life. Our members benefit from productive relationships and alliances with government, business associations and natural resource industry groups. Through our advocacy, we help Arizona be the premier location for mining investment in the United States.



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