Mining Our Own Business: The Critical Mineral Supply Chain and the General Mining Law of 1872

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INTRODUCTION

Sustainability, broadly defined, is the capacity to meet a present population's needs "without compromising the ability of future generations to meet their needs."[1] Providing enough resources for people today while preserving resources for the future is something that most consumers support,[2] at least in theory. In practice, however, achieving sustainability is complicated, and competing sustainability goals may sometimes come into conflict with one another.

One such conflict is emerging right now, as the explosion of renewable energy technology drives a commensurate explosion in demand for critical minerals.[3] On the one hand, a transition to renewable energy could solve an important long-term sustainability goal: stopping the emission of planet-

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1. 36 C.F.R. § 219.19 (2023).

2. Sherry Frey et al., *Consumers Care About Sustainability—and Back It Up with Their Wallets*, MCKINSEY & CO. (Feb. 6, 2023), https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/consumers-care-about-sustainability-and-back-it-up-with-their-wallets [https://perma.cc/A8XY-G7HR] ("78 percent of US consumers say that a sustainable lifestyle is important to them."); FIRST INSIGHT & BAKER RETAILING CTR. AT THE WHARTON SCH. OF THE UNIV. OF PA., THE SUSTAINABILITY DISCONNECT BETWEEN CONSUMERS & RETAIL EXECUTIVES (2022) (finding that "[o]ver two-thirds of the consumers say that they are willing to pay more" for sustainable products, and that "consumers clearly want more than performative measures from retailers and brands when it comes to ESG priorities"). *But see* David Gelles, *How Environmentally Conscious Investing Became a Target of Conservatives*, N.Y. TIMES (Mar. 1, 2023), https://www.nytimes.com/2023/02/28/climate/esg-climate-backlash.html ("Republicans have launched an assault on [ESG,] a philosophy that says that companies should be concerned with not just profits but also how their businesses affect the environment and society.").

3. Lylla Younes, *How a Clean Energy Future Is Colliding with Mining's Dark Past*, GRIST (Sept. 22, 2022), https://grist.org/climate-energy/how-clean-energy-future-colliding-with-minings-dark-past/ [https://perma.cc/6DML-FR46].

warming greenhouse gases ("GHGs").[4] But on the other, it also means mining an enormous amount of metal—an industry with a long history of unsustainable environmental damage.[5]

Can these two competing interests be balanced? This Comment argues that we can take a substantial step toward achieving balance through a thoughtful update to a 150-year-old federal mining law. With demand for critical minerals rapidly accelerating, Congress should seize this unique moment to pass a reform that rights the mining industry's past wrongs while encouraging a responsible increase in mining for the future.

A revolution in the energy sector is underway.[6] Automakers are rolling out electric vehicles ("EVs") and setting ambitious goals for carbon neutrality.[7] Solar power is projected to generate up to 40% of U.S. electricity by 2035.[8] And after years of lagging behind Europe, offshore wind may soon produce huge amounts of power for coastal populations in the United States.[9] This switch has the potential to increase U.S. energy independence, reduce GHG emissions, and protect the economy from volatile fossil fuel prices.[10]

But there's a catch. All these technologies—EVs, solar panels, and wind turbines—require more minerals to manufacture than the fossil fuel-based technologies they replace.[11] For instance, EV batteries require lithium, nickel,

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4. *See* YASMINA ABDELILAH ET AL., INT'L ENERGY AGENCY, RENEWABLES 2021: ANALYSIS AND FORECAST TO 2026, at 3 (2021).

5. Younes, *supra* note 3.

6. *See* ABDELILAH ET AL., *supra* note 4, at 14–16; *Renewable Electricity Growth Is Accelerating Faster than Ever Worldwide, Supporting the Emergence of the New Global Energy Economy*, INT'L ENERGY ASS'N (Dec. 1, 2021), https://www.iea.org/news/renewable-electricity-growth-is-accelerating-faster-than-ever-worldwide-supporting-the-emergence-of-the-new-global-energy-economy [https://perma.cc/J6ZM-T333].

7. *See* Jim Motavalli, *Every Automaker's EV Plans Through 2035 and Beyond*, FORBES WHEELS (Oct. 4, 2021), https://www.forbes.com/wheels/news/automaker-ev-plans/ [https://perma.cc/KSY3-ZCUY].

8. *See* OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, U.S. DEP'T OF ENERGY, SOLAR FUTURES STUDY, at ii (2021), https://www.energy.gov/sites/default/files/2021-09/Solar%20Futures%20Study.pdf [https://perma.cc/XTJ3-6A86].

9. Madeline Ruid, *Offshore Wind Power Industry Gaining Momentum*, GLOB. X (Jan. 23, 2023), https://www.globalxetfs.com/offshore-wind-power-industry-gaining-momentum/ [https://perma.cc/6NAR-BVWD].

10. *Compare* Stephanie Kelly, *Oil Price Crashes into Negative Territory for the First Time in History amid Pandemic*, FIN. POST (Apr. 20, 2020), https://financialpost.com/pmn/business-pmn/oil-price-crashes-into-negative-territory-for-the-first-time-in-history-amid-pandemic [https://perma.cc/Q4H3-ZJ3Y], *with* Matina Stevis-Gridneff, *The E.U. Weighs a Russian Gas Price Cap and Other Measures To Rein in 'Astronomic' Energy Prices.*, N.Y. TIMES (Sept. 7, 2022), https://www.nytimes.com/2022/09/07/world/europe/eu-russia-gas-price-cap.html.

11. TAE-YOON KIM ET AL., INT'L ENERGY AGENCY, THE ROLE OF CRITICAL MINERALS IN CLEAN ENERGY TRANSITIONS 7 (2022).

cobalt, manganese, and graphite.[12] The permanent magnets in EV motors and wind turbines require rare earth elements.[13] Even the transmission infrastructure to connect these technologies will require enormous amounts of copper and aluminum.[14]

Because of their central role to the economy, these metals—and many others—have been designated "critical minerals."[15] A critical mineral is "(i) a non-fuel mineral . . . essential to the economic and national security of the United States, (ii) the supply chain of which is vulnerable to disruption, and (iii) that serves an essential function in the manufacturing of a product, the absence of which would have significant consequences for our economy or our national security."[16] In 2022, the Department of the Interior ("DOI")and the U.S. Geological Survey published a final list of fifty minerals that meet these criteria.[17]

The United States imports most of the critical minerals it consumes. In 2020, it imported over half its annual consumption for thirty-five critical minerals.[18] For fourteen of those, it was 100% dependent on foreign sources.[19]

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12. *Id.* at 5.

13. *Id.*; Carl A. Williams, *China Continues Dominance of Rare Earths Markets to 2030, Says Roskill*, MINING.COM (Feb. 26, 2021, 11:53 AM), https://www.mining.com/china-continues-dominance-of-rare-earths-markets-to-2030-says-roskill/ [https://perma.cc/2WTS-6H5E].

14. KIM ET AL., *supra* note 11, at 5.

15. Exec. Order No. 13,817, 82 Fed. Reg. 60835, 60835 (Dec. 26, 2017).

16. *Id.*; *see* KIM ET AL., *supra* note 11.

17. 2022 Final List of Critical Minerals, 87 Fed. Reg. 10381, 10381 (Feb. 24, 2022). While copper was not included on this list, some advocates argue that copper should be considered a critical mineral in its own right because it satisfies all three official criteria: (i) it is a non-fuel mineral crucial to the economy and national security, (ii) the supply chain is vulnerable because the U.S. mines and refines only a small portion of the copper it consumes, and (iii) it "plays a key role in energy technology, defense, consumer electronics, and other applications." Copper Dev. Ass'n, *Why Copper Is a Critical Mineral*, VISUAL CAPITALIST: ELEMENTS (Feb. 2, 2023), https://elements.visualcapitalist.com/why-copper-is-a-critical-mineral/ [https://perma.cc/2KL3-93BL]; *see also* Frank Fannon, *The United States and Canada Share Critical Minerals Goals, but Different Critical Minerals*, CTR. FOR STRATEGIC & INT'L STUD. (Nov. 18, 2022), https://www.csis.org/analysis/united-states-and-canada-share-critical-minerals-goals-different-critical-minerals [https://perma.cc/9XTJ-86P7] ("Unlike the United States, Canada included copper on its critical minerals list. . . . This could create a significant diplomatic challenge and a nasty trade dispute. . . . [S]uch a challenge would undermine the West's shared strategy to develop a secure, responsible clean energy supply chain."); Veronica Tuazon, *"Critical Minerals" List Snubs Copper, Sparks Discussion of Criticality*, EARTH MAG. (Nov. 8, 2018), https://www.earthmagazine.org/article/critical-minerals-list-snubs-copper-sparks-discussion-criticality/ [https://perma.cc/MUJ5-U3MK].

18. Exec. Order No. 13,953, 85 Fed. Reg. 62539 (Oct. 5, 2020).

19. *Id.*

Ceding control of the resources crucial to emerging technologies may have serious economic, national security, and ethical implications.[20]

Enter: The General Mining Law of 1872.[21] Much of this extraction will likely take place on federal public land,[22] which comprises more than 640 million acres, or about 28% of all land in the country.[23] The mining of hardrock[24] on these lands is still governed by the 150-year-old General Mining Law of 1872 ("Mining Law").[25]

A relic of Wild West-era expansionism, the Mining Law is remarkable by modern standards.[26] It effectively gives mining corporations unlimited publicly owned resources free of charge, and it lacks any environmental protection requirements.[27] Before Congress passed the environmental laws of the 1970s, the Mining Law left behind tens of thousands of abandoned legacy

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20. *See id.* ("[A] strong America cannot be dependent on imports from foreign adversaries for the critical minerals that are increasingly necessary to maintain our economic and military strength in the 21st century.").

21. General Mining Law of 1872, Sess. 2, ch. 152, 17 Stat. 91, 91–96 (codified as amended at 30 U.S.C. §§ 22–42 (2023)).

22. *See* BRANDON S. TRACY, CONG. RSCH. SERV., R46278, POLICY TOPICS AND BACKGROUND RELATED TO MINING ON FEDERAL LANDS 14–15 (2020) ("Some known critical mineral deposits lie on federal lands."). Federal agencies do not collect productivity data from mining operations on public domain land; thus, there is strikingly little information available on exactly what proportion of critical minerals lie on federal public land. *See Mining on Federal Lands After the Gold Rush*, U.S. GOV'T ACCOUNTABILITY OFF. (Sept. 15, 2020), https://www.gao.gov/blog/mining-federal-lands-after-gold-rush [https://perma.cc/AF3A-8EQD]. To remedy this, the United States Geological Survey established the Earth Mapping Resources Initiative ("Earth MRI") to "identify areas that may have the potential to contain critical-mineral resources." 88 Fed. Reg. 3755, 3756 (Jan. 20, 2023).

23. CAROL HARDY VINCENT ET AL., CONG. RSCH. SERV., R42346, FEDERAL LAND OWNERSHIP: OVERVIEW AND DATA 1 (2020).

24. Hardrock minerals are essentially all minerals not specifically covered by other statutes: "Leasable minerals are defined by the Mineral Leasing Act of 1920, and include minerals such as coal, phosphate, potassium, and sodium. . . . Salable minerals . . . are defined by the Materials Act of 1947, and include low-value, common minerals and materials . . . such as sand, gravel, and pumice." TRACY, *supra* note 22, at 2. Hardrock includes "gold, silver, copper, uranium, lithium, and nearly all critical minerals." *Interior Department Launches Interagency Working Group on Mining Reform*, U.S. DEP'T INTERIOR (Feb. 22, 2022), https://www.doi.gov/pressreleases/interior-department-launches-interagency-working-group-mining-reform [https://perma.cc/ZV93-LD88].

25. MARC HUMPHRIES, CONG. RSCH. SERV., RL33908, MINING ON FEDERAL LANDS: HARDROCK MINERALS 1 (2009).

26. *See generally* CHARLES F. WILKINSON, CROSSING THE NEXT MERIDIAN 17, 37–42 (1992).

27. *Id.* at 43–50; HUMPHRIES, *supra* note 25, at 1–2.

mines[28] that continue to pollute western watersheds, disproportionately affecting Native communities and potentially costing taxpayers billions to clean up.[29]

Now is the time to reform the General Mining Law of 1872. As the United States ramps up domestic critical mineral production, it must consider whether failing to reform this antiquated law will leave future generations with even more polluted water and a larger cleanup bill. A reformed law should aim to correct the Mining Law's toxic legacy by imposing royalties and applying those proceeds to abandoned mine reclamation.[30] At the same time, it should ease regulatory burdens where appropriate to allow for a rapid, but responsible, increase in the production of critical minerals.[31]

Part I of this Comment gives an overview of what critical minerals are, where they come from, and why they play such an important role in the nation's economic and national security. Part II explores the legal history of the Mining Law and offers a summary of the modern environmental laws that affect the mining industry. Part III evaluates the current state of mining regulation on federal public land. Part IV proposes a reformed Mining Law that balances environmental justice considerations and the economic realities of the critical mineral mining industry.

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28. *See AML Inventory*, BUREAU LAND MGMT., https://www.blm.gov/programs/public-safety-and-fire/abandoned-mine-lands/blm-aml-inventory [https://web.archive.org/web/20230204051230/https:/www.blm.gov/programs/public-safety-and-fire/abandoned-mine-lands/blm-aml-inventory].

29. Megan Glatzel & Bea Gordon, *The West's Sleeping Giant: Abandoned Mines and the Role of the Good Samaritan*, STAN.: WATER W. (June 7, 2018), https://waterinthewest.stanford.edu/news-events/news-insights/wests-sleeping-giant-abandoned-mines-and-role-good-samaritan [https://perma.cc/T8VD-JJGK]; Johnnye Lewis et al., *Mining and Environmental Health Disparities in Native American Communities*, 4 CURRENT ENV'T HEALTH REP. 130, 130 (2017); House Nat. Res. Comm. Democrats, *Reforming the Mining Law of 1872*, YOUTUBE, at 42:27 (May 12, 2022), https://youtu.be/03dKgUiDZqE?t=2547 [https://perma.cc/W6E9-KWGU] ("In terms of costs, we've seen estimates as high as fifty billion dollars or more.").

30. *See* WILKINSON, *supra* note 26, at 17 (noting that the development of Western natural resources "ought to be balanced and prudent, with precautions taken to ensure sustainability, to protect health, to recognize environmental values, to fulfill community values, and to provide a fair return to the public").

31. *Id.*

I. CONTEXT

The United States has declared securing a domestic critical mineral supply chain a top priority.[32] In June 2021, the White House issued a report assessing the vulnerability of the U.S.'s critical mineral supply chain, which recommended increasing domestic production while maintaining a commitment to environmental justice and establishing an interagency team to "[c]reate 21st century standards for the extraction and processing of critical minerals."[33] To better understand the urgency surrounding critical minerals, the following discussion will explore (A) what critical minerals are, (B) why they are in such high demand, and (C) where they come from.

A. What Are Critical Minerals?

Simply put, critical minerals are non-fuel minerals "that are essential to the economy and whose supply may be disrupted."[34] Because the term is open-ended, exactly which minerals are considered "critical" changes over time as technologies evolve and availability of supplies shift.[35] For example, table salt was once considered a critical mineral for its use as a food preservative, cooking ingredient, and antiseptic.[36] Today, critical minerals are metals essential for manufacturing modern technologies like smartphones, solar panels, wind turbines, and EVs.[37]

Securing a supply chain for critical minerals is a surprisingly bipartisan issue. In 2017, President Trump issued an executive order announcing

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32. *See, e.g.*, Exec. Order No. 13,817, 82 Fed. Reg. 60835 (Dec. 26, 2017); Exec. Order No. 13,953, 85 Fed. Reg. 62539 (Oct. 5, 2020); Exec. Order No. 14,008, 86 Fed. Reg. 7619 (Feb. 1, 2021); Exec. Order No. 14,017, 86 Fed. Reg. 11849 (Mar. 1, 2021).

33. THE WHITE HOUSE, BUILDING RESILIENT SUPPLY CHAINS, REVITALIZING AMERICAN MANUFACTURING, AND FOSTERING BROAD-BASED GROWTH 14–15, 194–200 (2021) https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf [https://perma.cc/46HD-PJ58]; *see also Fact Sheet: Securing a Made in America Supply Chain for Critical Minerals*, WHITE HOUSE: BRIEFING ROOM (Feb. 22, 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/22/fact-sheet-securing-a-made-in-america-supply-chain-for-critical-minerals/ [https://perma.cc/A5RD-QY6H].

34. *Critical Mineral Basics*, AM. GEOSCIENCES INST., https://www.americangeosciences.org/critical-issues/critical-mineral-basics [https://perma.cc/P5F7-HKL5]. For a more technical definition, see *supra* note 17 and accompanying text. For examples of potential disruptions to the supply chain, see *infra* Section I.C.

35. *See Critical Mineral Basics*, *supra* note 34.

36. *Id.*; *A Brief History of Salt*, TIME (Mar. 15, 1982), https://time.com/3957460/a-brief-history-of-salt/ [https://perma.cc/G3TY-QUPY].

37. *Critical Mineral Basics*, *supra* note 34.

strategic plans to secure a reliable supply chain of critical minerals.[38] The order defined critical minerals and required the Secretary of the Interior to compile a list of minerals of concern to national security.[39] Just three years later—in the midst of global supply chain issues caused by the COVID-19 pandemic—Trump issued a second executive order on the topic.[40] Executive Order 13,953 declared "a national emergency to address inconsistent access to critical minerals and the corollary threats to national security, foreign policy, and the U.S. economy."[41]

The Biden administration picked up where Trump left off, at least as far as critical minerals are concerned.[42] Soon after taking office, Biden issued a series of executive orders reaffirming the government's commitment to securing critical mineral supply chains while adding an emphasis on investment in renewable energy infrastructure.[43]

B. Why Is There So Much Demand for Critical Minerals?

The shift to green energy is driving a rapid growth in demand for critical minerals. Until recently, the energy sector was a relatively small part of global demand.[44] Since the mid-2010s, however, renewable energy has become a major driving force behind demand, representing the fastest-growing pressure on the minerals market.[45]

EVs offer an excellent example of this dynamic at work: in 2021, fully electric cars made up 3.2% of all vehicles sold in the United States—a year

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38. Exec. Order No. 13,817, 82 Fed. Reg. 60835 (Dec. 26, 2017).

39. *Id.*

40. Stacey Bosshardt et al., *Biden Administration Secures Supply Chains of Strategic and Critical Minerals for Clean Energy Economy*, PERKINS COIE (Apr. 11, 2022), https://www.perkinscoie.com/en/news-insights/biden-administration-secures-supply-chains-of-strategic-and-critical-minerals-for-clean-energy-economy.html [https://perma.cc/E5BK-SP7]; *see* Exec. Order No. 13,953, 85 Fed. Reg. 62539 (Oct. 5, 2020).

41. Bosshardt et al., *supra* note 40; *see* Exec. Order 13,953, 85 Fed. Reg. 62539 (Oct. 5, 2020).

42. Bosshardt et al., *supra* note 40 (noting that "E.O. 13817 and 13953 were two of the few Biden did not immediately rescind").

43. *Id.*; Exec. Order No. 14,008, 86 Fed. Reg. 7619 (Feb. 1, 2021); Exec. Order No. 14,017, 86 Fed. Reg. 11849 (Mar. 1, 2021).

44. KIM ET AL., *supra* note 11, at 5.

45. *Id.*; *see, e.g.*, Ivan Penn & Eric Lipton, *The Lithium Gold Rush: Inside the Race To Power Electric Vehicles*, N.Y. TIMES (May 6, 2021), https://www.nytimes.com/2021/05/06/business/lithium-mining-race.html.

later, they represented 5.8% of market share.[46] This rapid growth places strains on the critical mineral supply chain because the average EV requires 53.2 kilograms of copper, 24.5 kilograms of manganese, 66.3 kilograms of graphite, 39.9 kilograms of nickel, 13.3 kilograms of cobalt, 8.9 kilograms of lithium, and 0.3 kilograms of "others".[47] Compare that to the 22.3 kilograms of copper, 11.2 kilograms of manganese, and 0.3 kilograms of "others" in the average conventional car.[48]

Recent policy decisions on the state and federal level have only added to this market-driven demand. On the federal level, the Biden administration pledged to reduce national GHG emissions by 50% by 2030, with a goal of net-zero emissions by 2050.[49] The Inflation Reduction Act of 2022 ("IRA") represents a major step toward achieving this decarbonization goal.[50]

The IRA will invest $370 billion over the next decade in wind, solar, and nuclear power.[51] It will also offer a consumer tax credit for EVs, but only if at least 40% of their battery components were sourced "in the United States or countries with which the U.S. has a free trade agreement."[52] Starting in 2024, that requirement increases to 50%, then 80% in 2027 and 100% by 2029.[53] The IRA also includes a 10% manufacturing production credit to

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46. Mike Colias, *U.S. EV Sales Jolted Higher in 2022 as Newcomers Target Tesla*, WALL ST. J. (Jan. 6, 2023, 5:30 AM), https://www.wsj.com/articles/u-s-ev-sales-jolted-higher-in-2022-as-newcomers-target-tesla-11672981834 [https://archive.ph/YkJXH].

47. *Minerals Used in Electric Cars Compared to Conventional Cars*, INT'L ENERGY AGENCY, https://www.iea.org/data-and-statistics/charts/minerals-used-in-electric-cars-compared-to-conventional-cars [https://perma.cc/RP4C-5X82] (May 5, 2021). This statistic excludes steel and aluminum. *Id.*

48. *Id.*

49. *Fact Sheet: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies*, WHITE HOUSE: BRIEFING ROOM (Apr. 22, 2021) [hereinafter *Fact Sheet*], https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/ [https://perma.cc/E4XH-YV3K].

50. *See* Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818.

51. *See* THE WHITE HOUSE, BUILDING A CLEAN ENERGY ECONOMY: A GUIDEBOOK TO THE INFLATION REDUCTION ACT'S INVESTMENTS IN CLEAN ENERGY AND CLIMATE ACTION 5 (2023), https://www.whitehouse.gov/wp-content/uploads/2022/12/Inflation-Reduction-Act-Guidebook.pdf [https://perma.cc/6QW9-78RG].

52. Katie Pyzyk, *How the Inflation Reduction Act Is Heating Up an Already Active Market for Critical Metals in EV Batteries*, WASTEDIVE (Sept. 22, 2022), https://www.wastedive.com/news/battery-recycling-metals-lithium-copper-inflation-reduction-act/631769/ [https://perma.cc/3A9E-JZFB]; 26 U.S.C. § 30D (as amended by Pub. L. No. 117-169, 136 Stat. 1818).

53. 26 U.S.C. § 30D(e)(2)(B); Pyzyk, *supra* note 52.

mining companies for the production and sale of certain minerals on U.S. soil.[54]

State governments are playing a role in driving the demand for critical minerals, too. For instance, in 2022, California regulators announced that by 2035 all new passenger cars and light trucks sold in the state must be emission-free.[55] Less than a week later, California passed legislation requiring the state to cut its GHG emissions by 85% by 2045.[56] As the fifth-largest economy in the world, California's policies will likely have a major impact on the demand for critical minerals.[57] Over a dozen states are predicted to follow suit, as they have in the past by matching California's previous auto emission standards.[58]

C. Where Do Critical Minerals Come From?

Before a critical mineral begins its long journey to the inside of a wind turbine, it must first be mined and processed.[59] Critical mineral production is more geographically concentrated in a few countries than fossil fuel production is, and most of this takes place overseas.[60] For instance, the U.S. lags far behind in cobalt, nickel, and copper extraction, where "the world's

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54. 26 U.S.C. § 45X(b)(1)(M) (as amended by Pub. L. No. 117-169, 136 Stat. 1971).

55. *See, e.g.*, Coral Davenport et al., *California To Ban the Sale of New Gasoline Cars*, N.Y. TIMES (Aug. 24, 2022), https://www.nytimes.com/2022/08/24/climate/california-gas-cars-emissions.html; *see also California Moves To Accelerate to 100% New Zero-Emission Vehicle Sales by 2035*, CAL. AIR RES. BD. (Aug. 25, 2022), https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035 [https://perma.cc/9JX2-J4TP].

56. Brad Plumer, *California Approves a Wave of Aggressive New Climate Measures*, N.Y. TIMES (Sept. 29, 2022), https://www.nytimes.com/2022/09/01/climate/california-lawmakers-climate-legislation.html.

57. *See id.*

58. *See* Davenport et al., *supra* note 55; *States That Have Adopted California's Vehicle Standards Under Section 177 of the Federal Clean Air Act*, CAL. AIR RES. BD. (Dec. 6, 2021), https://ww2.arb.ca.gov/sites/default/files/2022-01/177_states_12062021_nada_sales.pdf [https://perma.cc/9SWV-3L25]. *See generally* Lia Cattaneo, *EPA's Revived Clean Cars Waiver for California*, ENV'T & ENERGY L. PROGRAM (Apr. 6, 2022), https://eelp.law.harvard.edu/2022/04/epas-revived-clean-cars-waiver-for-california/ [https://perma.cc/LT4W-EAUP] (explaining the California Waiver provision of the Clean Air Act).

59. However, critical minerals are highly recyclable once extracted. Although recycling is an important aspect of the critical minerals supply chain, it is beyond the scope of this Comment. For further discussion of critical mineral recycling and seafloor mining, see Christina Jovanovic, *Precious and Few: Solving Renewable Energy's Critical Minerals Problem*, 9 LA. ST. U. J. ENERGY L. & RES. 21, 45–56 (2021).

60. *See* Eric Lipton & Dionne Searcey, *How the U.S. Lost Ground to China in the Contest for Clean Energy*, N.Y. TIMES, https://www.nytimes.com/2021/11/21/world/us-china-energy.html (Dec. 7, 2021); KIM ET AL., *supra* note 11, at 13.

top three producing nations control well over three-quarters of global output."[61]

China in particular has emerged as the dominant force in the global critical minerals market,[62] controlling 60% of the world's extraction for rare earth elements.[63] And as for processing, China dominates "across the board."[64] Its share of processing and refinement accounts for "around 35% for nickel, 50–70% for lithium and cobalt, and nearly 90% for rare earth elements."[65]

The fact that so much of the supply chain takes place overseas is significant for several reasons: (1) it exposes the U.S. to economic disruptions by unforeseen events like pandemics and armed conflicts; (2) it compromises national security; and (3) it imposes severe environmental and social costs on resource-rich developing nations.

1. Economic Disruptions

The critical mineral supply chain is complex, and recent events have demonstrated how that makes the U.S. vulnerable to economic disruption from a variety of sources. These disruptions directly affect the cost and availability of critical minerals and the wide range of products and services that rely on them. And because the supply chain is so intricately interconnected, all it takes is a well-timed cyber-attack or severe weather event to create a cascade of economic fallout.[66]

The COVID-19 pandemic had a profound economic impact around the world, transforming the term "supply chain" from obscure jargon to one of 2021's "words of the year."[67] It disrupted supply chains by halting

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61. KIM ET AL., *supra* note 11, at 11–12.

62. Lipton & Searcey, *supra* note 60; JANE NAKANO, CTR. FOR STRATEGIC & INT'L STUD., THE GEOPOLITICS OF CRITICAL MINERALS SUPPLY CHAINS 4–6 (2021); Williams, *supra* note 13.

63. KIM ET AL., *supra* note 11, at 13.

64. *Id.* at 12.

65. *Id.*

66. *See* DEP'T OF DEF., SECURING DEFENSE-CRITICAL SUPPLY CHAINS 54–55 (2022), https://media.defense.gov/2022/feb/24/2002944158/-1/-1/1/dod-eo-14017-report-securing-defense-critical-supply-chains.pdf [https://perma.cc/VF2K-6GLJ]; Jacques Leslie, *How Climate Change Is Disrupting the Global Supply Chain*, YALE ENV'T 360 (Mar. 10, 2022), https://e360.yale.edu/features/how-climate-change-is-disrupting-the-global-supply-chain [https://perma.cc/M7C4-DG7F].

67. *All of the Words of the Year, 1990 to Present*, AM. DIALECT SOC'Y, https://www.americandialect.org/woty/all-of-the-words-of-the-year-1990-to-present#2021 [https://perma.cc/FN8B-X5KL] (listing "supply chain" as the 2021 "Financial/Economic Word of the Year"); Valerie Fridland, *Which Word Takes Top Prize as Word of the Year?*, PSYCH. TODAY (Jan. 9, 2022), https://www.psychologytoday.com/us/blog/language-in-the-

production, restricting travel, and delaying shipping.[68] This impacted consumers, dramatically increasing prices for lumber, automobiles, and semiconductors.[69] The same was true for critical minerals: severe pandemic-related impacts to mineral supplies led to production slowdowns and doubling of some raw material costs for EVs.[70]

Similarly, armed conflicts may cause economic consequences when they threaten to disrupt supply chains. Russia is a major producer of lithium, nickel, titanium, aluminum, and several other critical minerals.[71] But when Russia invaded Ukraine in February 2022, the U.S. and its allies restricted Russian imports to stymie Russia's war effort.[72] Russia, in turn, responded by announcing that it would withhold certain exports to "unfriendly countries."[73]

Despite banning Russian oil and gas since the onset of the war, the West actually increased imports of nickel and aluminum during that same time.[74] However, concerns that Russia might restrict exports caused critical mineral

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wild/202201/which-word-takes-top-prize-as-word-of-the-year ("[S]upply chain, something that certainly would not have been a household word a few years ago, won the majority vote, carrying the newly prominent meaning of a disruption to the supply chain affecting daily life.").

68. *See* Susan Helper & Evan Soltas, *Why the Pandemic Has Disrupted Supply Chains*, WHITE HOUSE: BLOG (June 17, 2021), https://www.whitehouse.gov/cea/written-materials/2021/06/17/why-the-pandemic-has-disrupted-supply-chains/ [https://perma.cc/U25Z-ZH6U].

69. *Id.*

70. Michael Wayland, *Raw Material Costs for Electric Vehicles Have Doubled During the Pandemic*, CNBC (June 22, 2022, 2:40 PM), https://www.cnbc.com/2022/06/22/electric-vehicle-raw-material-costs-doubled-during-pandemic.html [https://perma.cc/4492-7Z3P]; *see The Impacts of COVID-19 on Mineral Supply Chains, the Role of Those Supply Chains in Economic and National Security, and Challenges and Opportunities To Rebuild America's Supply Chains: Hearing Before the S. Comm. on Energy & Nat. Res.*, 116th Cong. (2020).

71. Sharon E. Burke, Opinion, *Russia Is a Mineral Powerhouse—and Its War with Ukraine Could Affect Global Supplies*, BOS. GLOBE (Mar. 9, 2022, 12:10 PM), https://www.bostonglobe.com/2022/03/09/opinion/russia-is-mineral-powerhouse-its-war-with-ukraine-could-affect-global-supplies/ [https://perma.cc/LV87-PRYN].

72. *See* Miniami Funakoshi et al., *Tracking Sanctions Against Russia*, REUTERS (July 6, 2022), https://www.reuters.com/graphics/UKRAINE-CRISIS/SANCTIONS/byvrjenzmve/ [https://perma.cc/9YCW-NVGR].

73. Huileng Tan, *Putin Orders a Ban on Some Russian Exports amid Sweeping Western Sanctions and US Energy Import Restrictions*, BUS. INSIDER (Mar. 8, 2022, 11:27 PM), https://www.businessinsider.com/putin-orders-ban-some-russian-exports-western-sanctions-2022-3 [https://perma.cc/B75X-7EQK].

74. Eric Onstad, *EU, U.S. Step Up Russian Aluminium, Nickel Imports Since Ukraine War*, REUTERS (Sept. 6, 2022), https://www.reuters.com/markets/europe/exclusive-eu-us-step-up-russian-aluminium-nickel-imports-since-ukraine-war-2022-09-06/ [https://perma.cc/WN7V-SU8K]; *see also* Andrea Hotter, *Aluminium, Nickel Avoid Direct Sanctions*, FASTMARKETS (Feb. 26, 2024), https://www.fastmarkets.com/insights/aluminium-nickel-avoid-direct-sanctions-andrea-hotter/ [https://perma.cc/S72E-WVKM].

prices to skyrocket.[75] Just one month into the war, the price of nickel was up 9%, and palladium prices rose by 73%.[76] This demonstrates how U.S. dependence on imported critical minerals may directly affect consumers.

2. National Security

On March 31, 2022, President Biden invoked section 303 of the Defense Production Act to secure supply chains for materials necessary for the clean energy transition—all in the name of promoting the national defense.[77] Finding that a resource or technology shortfall "would severely impair the national defense capability," the memorandum ordered the Secretary of Defense to "create, maintain, protect, expand, or restore" domestic critical mineral production.[78] To understand how a mineral shortfall can hinder the nation's military capabilities, it is helpful to look to a historical example: antimony.

Although many people have never heard of it, antimony played a crucial role in the outcome of World War II.[79] During WWII, two of its most vital applications were in the manufacture of tungsten steel and hardened lead bullets.[80] Previously, the U.S. relied almost entirely on China for antimony, but when Japan cut off that trade route, the U.S. scrambled to find a new source to meet its dire need for steel and ammunition.[81]

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75. Emily Pickrell, *Russia-Ukraine War Helps Drive Nickel Prices, EV Headaches*, FORBES (Mar. 31, 2022, 4:00 PM), https://www.forbes.com/sites/uhenergy/2022/03/31/russia-ukraine-war-helps-drive-nickel-prices-ev-headaches/ [https://perma.cc/5XJW-E5LJ].

76. *Id.*

77. *See Memorandum on Presidential Determination Pursuant to Section 303 of the Defense Production Act of 1950, as Amended*, WHITE HOUSE: BRIEFING ROOM (Mar. 31, 2022), https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/31/memorandum-on-presidential-determination-pursuant-to-section-303-of-the-defense-production-act-of-1950-as-amended/ [https://perma.cc/4UYK-Y6T8].

78. *Id.*

79. David Blackmon, *Antimony: The Most Important Mineral You Never Heard Of*, FORBES (May 6, 2021, 8:48 AM), https://www.forbes.com/sites/davidblackmon/2021/05/06/antimony-the-most-important-mineral-you-never-heard-of/?sh=169130182b23 [https://perma.cc/9JZP-JB6G].

80. *Id.*

81. *Id.* A similar dynamic is playing out right now, as Europe struggles to wean itself off its reliance on Russian oil and natural gas. *See, e.g.*, Matina Stevis-Gridneff, *The E.U. Weighs a Russian Gas Price Cap and Other Measures To Rein In 'Astronomic' Energy Prices*, N.Y. TIMES (Sept. 7, 2022), https://www.nytimes.com/2022/09/07/world/europe/eu-russia-gas-price-cap.html (describing an "unprecedented energy crisis engulfing the region as Russia cuts its supply of natural gas to many E.U. member states, sending the gas and its linked electricity markets into a sharp spiral"); Debra W. Struhsacker, *There Can Be No 'Clean' Energy or Security*

Fortunately, the U.S. found a source at the Stibnite gold mine in central Idaho.[82] The Stibnite mine was able to make up for the lost Chinese imports, "producing fully 90% of America's demand for antimony for the duration of the War and . . . producing 40% of the tungsten steel needed for the military effort."[83] The Stibnite mine shut down in 1997, and now the U.S. is once again entirely dependent on other countries for antimony, particularly China and Russia.[84]

Today, antimony is as essential to national security as ever. Without it, the U.S. cannot manufacture a wide variety of military technologies.[85] Moreover, the Army, Navy, and Air Force have all announced plans to reduce GHG emissions by adopting EVs and renewable energy sources.[86] These technologies require antimony too: solar panels, wind turbines, and batteries all contain the rare metal.[87] This means that securing a reliable supply chain of antimony and other critical minerals will be important not just to the consumer economy, but also to national defense capabilities.[88]

3. Environmental and Social Costs

In addition to economic and national security consequences, relying on imported critical minerals may come with moral ramifications as well. Although the American mining industry has its own problematic environmental and social record to contend with,[89] mining practices in other countries are also a major cause for concern. In some cases, lax enforcement of environmental regulations abroad can lead to environmental disasters, and

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Without Mineral Independence, WASH. EXAM'R (Mar. 25, 2022, 4:02 AM), https://www.washingtonexaminer.com/opinion/1636064/there-can-be-no-clean-energy-or-security-without-mineral-independence/ [https://perma.cc/YH8N-D7FY].

82. Blackmon, *supra* note 79.

83. *Id.*

84. *Id.*; U.S. GEOLOGICAL SURV., MINERAL COMMODITY SUMMARIES 2022, at 25 (2022), https://pubs.usgs.gov/periodicals/mcs2022/mcs2022.pdf [https://perma.cc/NV6A-YSUH].

85. Blackmon, *supra* note 79.

86. DEP'T OF THE ARMY, UNITED STATES ARMY CLIMATE STRATEGY 5–8 (2022); DEP'T OF THE NAVY, DEPARTMENT OF THE NAVY CLIMATE ACTION 2030, at 13 (2022); DEP'T OF THE AIR FORCE, DEPARTMENT OF THE AIR FORCE CLIMATE ACTION PLAN 19 (2022).

87. Blackmon, *supra* note 79.

88. Morgan D. Bazilian et al., *America's Military Depends on Minerals That China Controls*, FOREIGN POL'Y (Mar. 16, 2023, 4:05 PM), https://foreignpolicy.com/2023/03/16/us-military-china-minerals-supply-chain/ [https://perma.cc/W4QT-D5TJ].

89. *See, e.g.*, Jack Healy & Mike Baker, *As Miners Chase Clean-Energy Minerals, Tribes Fear a Repeat of the Past*, N.Y. TIMES (Dec. 27, 2021), https://www.nytimes.com/2021/12/27/us/mining-clean-energy-antimony-tribes.html.

unethical labor practices in foreign mines exact a heavy human toll.[90] These attach a moral cost to the critical mineral-dependent products that American consumers enjoy.

The critical mineral industry may be vital to clean technologies, but it can be an incredibly dirty business. The Russian company Norilsk Nickel, the world's largest "producer of palladium and high-grade nickel and a top producer of platinum, cobalt and copper," represents a cautionary tale.[91] The nearby town of Norilsk is often considered one of the most polluted places on the planet.[92] Rivers run red from ruptured slurry pipes; smelters emit more sulfur dioxide than the entire country of France; and heavy metals fall from the sky, accumulating in black sludge up to five feet thick.[93] Russia has relatively stringent environmental laws that forbid these practices; nonetheless, its government has failed to hold the company accountable for its numerous violations.[94]

In addition to environmental damage, foreign mining can bring dangerous and unfair working conditions as well.[95] The Democratic Republic of Congo ("DRC") has the richest supply of cobalt in the world.[96] Every year, child

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90. *See, e.g.*, Evan Halper, *EV Makers' Use of Chinese Suppliers Raises Concerns About Forced Labor*, WASH. POST (Sept. 18, 2023, 5:00 PM), https://www.washingtonpost.com/business/interactive/2023/electric-vehicles-forced-labor-china/; Abigail Ng, *China's Electric Vehicle Battery Supply Chain Shows Signs of Forced Labor, Report Says*, CNBC, https://www.cnbc.com/2022/06/22/signs-of-forced-labor-found-in-chinas-ev-battery-supply-chain-report.html [https://perma.cc/EB7L-ATAH] (June 23, 2022, 8:39 PM); Nina Lakhani, *Revealed: How US Transition to Electric Cars Threatens Environmental Havoc*, GUARDIAN (Jan. 24, 2023, 3:30 PM), https://www.theguardian.com/us-news/2023/jan/24/us-electric-vehicles-lithium-consequences-research [https://perma.cc/T7T9-JRVG].

91. Marianne Lavelle, *'A Trash Heap for Our Children': How Norilsk, in the Russian Arctic, Became One of the Most Polluted Places on Earth*, INSIDE CLIMATE NEWS (Nov. 28, 2021), https://insideclimatenews.org/news/28112021/norilsk-nickel-russia-pollution/ [https://perma.cc/Y84T-3HLE]; *see* Andrew E. Kramer, *For One Business, Polluted Clouds Have Silvery Linings*, N.Y. TIMES (July 12, 2007), https://www.nytimes.com/2007/07/12/world/europe/12norilsk.html.

92. Lavelle, *supra* note 91; Kramer, *supra* note 91.

93. Andrew E. Kramer, *In Siberia, a 'Blood River' in a Dead Zone Twice the Size of Rhode Island*, N.Y. TIMES (Sept. 8, 2016), https://www.nytimes.com/2016/09/09/world/europe/russia-red-river-siberia-norilsk-nickel.html; Lavelle, *supra* note 91; Kramer, *supra* note 91.

94. *See* Lavelle, *supra* note 91.

95. *See Sustainable and Responsible Development of Minerals*, INT'L ENERGY AGENCY https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/sustainable-and-responsible-development-of-minerals [https://perma.cc/HRQ6-JPJV]. *See generally* Siddharth Kara, *Is Your Phone Tainted by the Misery of the 35,000 Children in Congo's Mines?*, GUARDIAN (Oct. 12, 2018, 4:00 PM), https://www.theguardian.com/global-development/2018/oct/12/phone-misery-children-congo-cobalt-mines-drc [https://perma.cc/SSN4-SJUT].

96. Lipton & Searcey, *supra* note 60. However, China now controls a majority of the cobalt mines in the Congo. *Id.*

laborers in the DRC mine cobalt and copper that finds its way into the global supply chain.[97] The DOI estimates that between five and thirty-five thousand children work in artisanal cobalt mines.[98] Worse yet, children in the eastern part of the country are subjected to the forced mining of tin, tantalum, and tungsten.[99]

International demand for Congolese resources in the face of widespread human suffering is nothing new. One gruesome example of this began when, in 1885, King Leopold II of Belgium claimed what is now the DRC.[100] Driven by ravenous demand for rubber in industrializing Western nations, Leopold's colony saw rampant child labor, slavery, famine, and torture.[101] This "rubber terror" led to an estimated ten to thirteen million deaths in the Belgian Congo.[102] Today, a cobalt supply chain built on forced Congolese child labor for the benefit of Western consumers bears an unsavory resemblance to the colonial atrocities of the past.

Norilsk and the DRC are perhaps extreme examples of the environmental degradation and exploitative labor that can take place in foreign mines and smelters. But they also underscore the dangers of relying on critical minerals from places that are beyond the reach of U.S. regulators. American consumers may not be so eager to trade in GHG-emitting conventional cars

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97. BUREAU OF INT'L LAB. AFFS., U.S. DEP'T OF LAB., 2021 FINDINGS ON THE WORST FORMS OF CHILD LABOR: DEMOCRATIC REPUBLIC OF THE CONGO (DRC) 2, https://www.dol.gov/sites/dolgov/files/ILAB/child_labor_reports/tda2021/Congo-Democratic-Republic-of-the.pdf [https://perma.cc/7RQ3-JABQ].

98. *Id.* Artisanal mining "refers to mining by individuals, groups, families or cooperatives with minimal or no mechanization, often in the informal (illegal) sector of the market." THOMAS HENTSCHEL ET AL., INT'L INST. FOR ENV'T & DEV., ARTISANAL AND SMALL-SCALE MINING: CHALLENGES AND OPPORTUNITIES 5 (2003), https://www.iied.org/sites/default/files/pdfs/migrate/9268IIED.pdf [https://perma.cc/9X3K-BXPT].

99. BUREAU OF INT'L LAB. AFFS., *supra* note 97, at 2. Tin, tantalum, and tungsten are all critical minerals. 2022 Final List of Critical Minerals, *supra* note 17, at 10381.

100. *See* ADAM HOCHSCHILD, KING LEOPOLD'S GHOST: A STORY OF GREED, TERROR, AND HEROISM IN COLONIAL AFRICA 84, 86–87 (1999); Peter Preskar, *Leopold II and the Hidden Holocaust*, MEDIUM (June 18, 2020), https://medium.com/@peter.preskar/leopold-ii-9c0277a26710 [https://perma.cc/WXH9-7J54]; *see also* Marietta Korfiati, *Congolese Genocide: The Overlooked History of the Colonized Congo*, COLLECTOR (June 8, 2022), https://www.thecollector.com/congolese-genocide-colonized-congo/ [https://perma.cc/L36N-7UT4].

101. HOCHSCHILD, *supra* note 100, at 164–66, 203; Preskar, *supra* note 100.

102. HOCHSCHILD, *supra* note 100, at 314–15, 347.

for EVs if they knew they were built using forced Uyghur labor in western China, for instance.[103]

In summary, relying on imported critical minerals exposes the U.S. to economic disruptions, national security risks, and environmental and social concerns. The United States therefore has strong incentives to ramp up domestic production of critical minerals on its own soil. A responsible increase in production should strive to encourage domestic mining while simultaneously addressing environmental concerns and the interests of affected communities.[104] This Comment now turns to what that increased production might look like, and how it implicates the General Mining Law of 1872.

II. LEGAL BACKGROUND OF MINING ON FEDERAL LAND

The General Mining Law of 1872 was born in an era when Congress's top priorities were maximizing the exploitation of natural resources and settling the Western frontier. This Part explores (A) the historical context that shaped the law, (B) how the law works, (C) how the law continues to leave its mark on the American West today, and (D) the modern environmental legislation that now affects the mining industry.

A. Historical Context of the General Mining Law of 1872

In January 1848, gold was discovered in the Sierra Nevada mountains of California, a region which the United States would acquire just days later at the close of the Mexican-American War.[105] This fueled a population boom as "forty-niners" rushed to California in hope of striking it rich.[106] Similar discoveries soon followed in other regions throughout the West.[107] California became a state in 1850, as did Oregon and Nevada in the following two

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103. *See* Ana Swanson & Chris Buckley, *Red Flags for Forced Labor Found in China's Car Battery Supply Chain*, N.Y. TIMES (Nov. 4, 2022), https://www.nytimes.com/2022/06/20/business/economy/forced-labor-china-supply-chain.html; HUM. RTS. WATCH, ASLEEP AT THE WHEEL: CAR COMPANIES' COMPLICITY IN FORCED LABOR IN CHINA 1 (2024), https://www.hrw.org/sites/default/files/media_2024/01/china0224web_1.pdf [https://perma.cc/LN8N-LE5E].

104. *See infra* Part IV.

105. WILKINSON, *supra* note 26, at 34; *California Admission Day September 9, 1850*, CAL. DEP'T PARKS & RECREATION, https://www.parks.ca.gov/?page_id=23856 [https://perma.cc/ZYG4-YPBZ].

106. WILKINSON, *supra* note 26, at 35.

107. *Id.* at 35–37.

decades.[108] Because mining was so central to the nascent economies of these new states, each one passed laws governing hardrock mining on state and private land.[109] However, federal law remained silent as to mining on federal land.[110]

Miners were left frustrated and confused by the absence of any law governing federal lands.[111] By the 1860s, easily accessed ores were becoming rare, and mining increasingly involved extracting lode deposits from hardrock, a labor-intensive process that required deep tunnels and even deeper pockets.[112] Without a way to obtain title, miners could be ejected from federal lands as trespassers.[113]

Lawmakers in Washington, D.C. had starkly differing ideas about what a federal mining law ought to look like. To help pay off debt from the Civil War, legislators from Eastern states proposed a law that would generate revenue by selling off mineral lands and imposing taxes on mining operation profits.[114] Lawmakers from Western states, however, wanted a law that would reflect the priorities of Western miners, including permission to freely enter federal public lands in search of deposits and a mechanism for obtaining title to the land.[115]

Western lawmakers prevailed. The General Mining Law passed, effectively zoning a billion acres of the American West as "free and open to exploration and occupation by all citizens."[116]

The competing visions between Western and Eastern states demonstrate that, from the outset, disagreement surrounded mining policy on federal public land. Reforming this policy has been a perennial topic for nearly a century,[117] yet the Mining Law remains essentially unchanged since its

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108. *Order of States' Admission*, ARK. SEC'Y OF STATE, https://www.sos.arkansas.gov/education/arkansas-history/history-of-the-flag/order-of-states-admission [https://perma.cc/U583-9CX7].

109. *See* WILKINSON, *supra* note 26, at 38–40; *see also* Verne Blue, *Mining Laws of Jackson County, 1860–1876*, 23 Q. OR. HIST. SOC'Y 138, 141–42 (1922).

110. WILKINSON, *supra* note 26, at 40–41.

111. *Id.*

112. *See id.* at 40.

113. *Id.*

114. *Id.* at 42.

115. *Id.* at 41–43.

116. General Mining Law of 1872, Sess. 2, ch. 152, 17 Stat. 91, 91–96 (codified as amended at 30 U.S.C. §§ 22–42 (2023)); WILKINSON, *supra* note 26, at 42.

117. *See, e.g.*, HUMPHRIES, *supra* note 25, at 3 ("A strong push for an all-leasing system developed during the 1930s and 1940s, but no such legislation was enacted."); WILKINSON, *supra* note 26, at 67 (discussing proposals for a leasing system for hardrock minerals during the 1970s); *Efforts To Reform U.S. Mining Law Continue*, FORBES (Oct. 3, 2007),

adoption.[118] Thus, the United States carries on with a mining policy designed for the priorities of Wild West-era miners as it faces a novel, and distinctly modern, predicament: securing a sustainable domestic supply chain of critical minerals for the rapid transition to clean energy.

B. Description of the Mining Law

The Mining Law allows prospectors to freely enter any unwithdrawn[119] public domain lands to explore for mineral deposits.[120] Once a viable deposit has been located, this creates a vested property right in the form of an unpatented mining claim, granting the locator exclusive possessory interest in twenty acres of surface lands and the right to develop the subsurface minerals.[121] This possessory right allows any use of the property that is "reasonably incident to mining," which includes building access roads and even constructing housing, diverting water, grazing livestock, and harvesting timber.[122]

The holder of an unpatented claim has a near-absolute "right to mine," leaving federal agencies little discretion to deny mineral development projects.[123] If the federal government decides to put claimed land to another use by withdrawing the land, it "must compensate the claimant for the value of the minerals and the land."[124] Additionally, claimants pay no royalties for

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https://www.forbes.com/2007/10/02/mining-law-reform-cx_1003oxford.html [https://perma.cc/85F7-EN2D] (describing a 2007 house bill that would reform the Mining Law and observing that "[t]he reform effort had its origins during the administration of former President Bill Clinton").

118. By contrast, the extraction of non-hardrock minerals—including coal, oil and gas, certain fertilizer minerals, and common variety gravel, sand, and stone—evolved significantly during the twentieth century. All these minerals now operate on a leasing system, as opposed to the Mining Law's claim-patent system. *See* WILKINSON, *supra* note 26, at 43–44; HUMPHRIES, *supra* note 25, at 3.

119. HUMPHRIES, *supra* note 25, at 7 ("[A] withdrawal is an action that restricts the use or disposition of public land. In some cases land is reserved for a specific use that may preclude locating mining claims and granting leases.").

120. *See* WILKINSON, *supra* note 26, at 44.

121. KEVIN L. SHAW & DANIEL P. WHITMORE, MINING IN THE UNITED STATES: OVERVIEW (2021), Westlaw W-019-3805; WILKINSON, *supra* note 26, at 45.

122. 43 C.F.R. § 3715.0-5 (2024); WILKINSON, *supra* note 26, at 45. However, a recent Ninth Circuit decision found that a mining company's valid claims did not necessarily give it the right to dump waste rock on National Forest land as "a 'use[] reasonably incident' to its operations at the mine pit." Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv., 33 F.4th 1202, 1207 (9th Cir. 2022). This is inconsistent with what other Circuits Courts have held, creating a circuit split in authority.

123. WILKINSON, *supra* note 26, at 48.

124. *Id.*

extracted minerals, and there is no limit to the number of claims a miner may own.[125] The Mining Law does not even require claimants to actually commence mineral production—claims may be held indefinitely.[126]

The fees required to establish and maintain a claim are surprisingly paltry. New claimants must pay $230 to record their fees with the Bureau of Land Management ("BLM"), and existing claimants must pay an annual $165 maintenance fee.[127] However, claimants owning ten or fewer claims may apply for a maintenance fee waiver by certifying that they expended "at least $100 per claim . . . for development, labor and improvements . . . for the assessment year."[128] The $100 assessment work standard remains unchanged since 1872.[129]

A holder of an unpatented mining claim who has put in $500 worth of assessment work in labor or improvements may then apply for a "patent," which grants fee simple absolute to the highly valuable surface and mineral estates for no more than $5 an acre.[130] Once a claimant has received legal title by obtaining a patent, they are relieved of having to pay annual fees.[131] However, Congress has prevented transferring away land by issuing one-year moratoria on mining patents every year since 1995.[132]

C. The Mining Law's Legacy

A product of its time, the Mining Law does not account for environmental degradation, and it does not provide for any system to evaluate, permit, or reclaim mines.[133] Unsustainable mining practices in the United States have

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125. HUMPHRIES, *supra* note 25, at 2.

126. *Id.* However, undeveloped claims may be subject to challenge. *Id.*

127. *Mining Claim Fees*, U.S. DEP'T INTERIOR BUREAU LAND MGMT., https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/locatable-minerals/mining-claims/fees [https://perma.cc/X5V5-9SM9].

128. *Affidavit of Annual Assessment Work*, U.S. DEP'T INTERIOR BUREAU LAND MGMT. (Jan. 2020), https://www.blm.gov/sites/default/files/3830-004_0.pdf [https://perma.cc/6JL9-L6GP]; 30 U.S.C. § 28f(d).

129. *See* HUMPHRIES, *supra* note 25, at 1; WILKINSON, *supra* note 26, at 47 ("In 1872, $100 worth of assessment work . . . called for nearly two months' solid labor. Today, of course, the $100 standard is laughable.").

130. *See* HUMPHRIES, *supra* note 25, at 1–2 ("These per-acre fees were substantial when the Mining Law was enacted—claimed land and minerals now far exceed these amounts in value.").

131. *Id.* at 2.

132. *Id.* For a recent example, see Consolidated Appropriations Act, 2022, H.R. 2471, 117th Cong. § 404(a) (2022).

133. *Reforming the Mining Law of 1872: Hearing on H.R. 7580 Before the H. Comm. on Nat. Res.*, 117th Cong. 1 (2022) (statement of Steve Feldgus, Deputy Assistant Secretary, Land and Minerals Management, U.S. Department of the Interior).

left a legacy of environmental damage, especially in the century prior to the introduction of the environmental laws of the 1960s and 70s.[134] There are over 500,000 abandoned mine sites on federal public lands, costing an estimated $50 billion or more to clean up.[135]

Irresponsible mining can damage waterways and aquifers in the form of acid mine drainage.[136] Common mining waste chemicals combine with rainfall to create sulfuric acid, which leaches heavy metals in mine tailings and flushes them downstream into rivers, lakes, and groundwater.[137] When mine drainage reaches a substantial level, "aquatic life virtually disappears and the river bottom becomes covered with a layer of reddish slime that . . . can be 20 to 300 times more acidic than acid rain."[138]

Occasionally, holding ponds for acid mine drainage spill over, causing fish kills once the spill reaches the nearest body of water.[139] One well-publicized example occurred at the abandoned Gold King mine in Colorado when a tailings dam breached in 2016.[140] The resulting spill released three million gallons of wastewater laden with heavy metals into the Animas River, turning it yellow.[141] The Animas river drains onto the Navajo Nation, making the incident yet another installment in a long history of mining pollution afflicting tribal lands.[142]

Historically, Native American communities have disproportionately borne the environmental impacts of hardrock mining pollution.[143] An estimated 600,000 Native Americans live within ten kilometers of abandoned mines, potentially leading to chronic exposure and serious health risks.[144] For example, the Zortman-Landusky mine is situated next to the Fort Belknap

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134. *See* HUMPHRIES, *supra* note 25, at 3, 7–8.

135. House Natural Resources Committee Democrats, *supra* note 29, at 42:27.

136. WILKINSON, *supra* note 26, at 49; *see also* Roger Flynn & Jeffrey C. Parsons, *The Right To Say No: Federal Authority over Hardrock Mining on Public Lands*, 16 J. ENV'T L. & LITIG. 249, 251–52 (2001).

137. WILKINSON, *supra* note 26, at 49.

138. *Id.*

139. *Id.* at 50.

140. Tom McGhee & Bruce Finley, *Animas Mine Disaster: Arsenic, Cadmium, Lead Broke Water Limits*, DENV. POST (Apr. 21, 2016, 10:19 PM), https://www.denverpost.com/2015/08/10/animas-mine-disaster-arsenic-cadmium-lead-broke-water-limits/ [https://perma.cc/2X4G-8H3N].

141. *Id.*

142. *See id.*; Healy & Baker, *supra* note 89.

143. *See* Lewis et al., *supra* note 29, at 130; Healy & Baker, *supra* note 89.

144. Lewis et al., *supra* note 29, at 131.

Indian Reservation,[145] on ancestral land that Congress pressured the tribes to cede when gold was discovered in the late 1880s.[146] The mine diverted streams away from the reservation and contaminated others that run onto the reservation, including waters that run across powwow grounds and other areas of cultural significance.[147]

The Zortman-Landusky mine closed in 2003 and declared bankruptcy, leaving behind a toxic mess that continues to affect drinking water, wildlife habitat, and agriculture.[148] Although the BLM eventually withdrew this land, a forty-eight-hour lapse in protection allowed another mining corporation, Blue Arc LLC, to stake ten claims.[149] That company now hopes to reopen mining in the area.[150] The Zortman-Landusky and Gold King mines illustrate how the Mining Law has failed to protect the environment and Native American communities from a legacy of devastating hardrock mining pollution.

D. Relevant Legislation After the Mining Law

Although there are no direct environmental requirements in the Mining Law, the mining industry is still subject to all generally applicable environmental laws, most of which passed in the 1960s and 70s.[151] For instance, the Clean Air Act regulates air emissions from the extraction process, including dust from mining and exhaust from machinery.[152] Likewise, the Clean Water Act ("CWA") regulates any pollutant discharges that drain into the waters of the United States, such as the runoff from the Gold King and Zortman-Landusky mines.[153] The Endangered Species Act ("ESA") ensures that mining projects will not jeopardize any threatened or

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145. Erik Klauk, *The Fort Belknap Reservation and Gold Mining*, IMPACTS OF RES. DEV. ON AM. INDIAN LANDS, https://serc.carleton.edu/research_education/nativelands/ftbelknap/index.html [https://perma.cc/7W9G-62ZX].

146. *Clean Energy Mineral Reform Act of 2022: Hearing on H.R. 7580 Before the H. Comm. on Nat. Res.*, 117th Cong. 1 (2022) (statement of Jeffrey Stiffarm, President, Fort Belknap Indian Community).

147. *Id.* at 2.

148. *Id.* at 1–3.

149. *Id.* at 2–4, 4 n.11.

150. House Natural Resources Committee Democrats, *supra* note 29, at 2:11:39; Darrell Ehrlick, *New Claims May Mean Gold Mining Again at Zortman Landusky*, MISSOULA CURRENT (Dec. 13, 2021), https://missoulacurrent.com/gold-zortman-landusky/ [https://perma.cc/NL3K-TYDF].

151. HUMPHRIES, *supra* note 25, at 3.

152. *See* Shaw & Whitmore, *supra* note 121; 42 U.S.C. §§ 7401–7431.

153. *See supra* Section II.C; Shaw & Whitmore, *supra* note 121; 33 U.S.C. § 1323(a).

endangered species or adversely affect critical habitat.[154] And when a potentially responsible party can be identified, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") imposes liability and cleanup obligations for the release of hazardous substances.[155]

Other environmental laws affect the mining industry indirectly by applying to federal agencies that permit and oversee mine development. Unless there is a "compelling government interest," the Religious Freedom Restoration Act ("RFRA") prevents governments from infringing on the free exercise of religion; approving a mine on sacred or ancestral tribal lands may therefore violate RFRA.[156] When the proposed site is on BLM lands, the Federal Land Policy and Management Act of 1976 ("FLPMA") requires the Secretary of the Interior to "prevent unnecessary or undue degradation" and to manage public lands "under [the] principles of multiple use and sustained yield."[157]

Lastly, the National Environmental Policy Act ("NEPA") requires federal agencies to prepare an Environmental Impact Statement ("EIS") for all "major Federal actions significantly affecting the quality of the human environment."[158] Modern mines are often massive operations, and because issuing a permit is a "federal action" within the meaning of NEPA, most mining proposals require agencies to prepare an EIS.[159]

Environmental Impact Statements are often enormous documents that take years to prepare;[160] any overlooked detail could subject the agency to litigation and add years to the mine approval process.[161] The lengthy NEPA process is the primary reason why it takes seven to ten years or more to

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154. Shaw & Whitmore, *supra* note 121; 16 U.S.C. §§ 1531–1544.

155. 42 U.S.C. §§ 9601–9675.

156. *See* Flynn & Parsons, *supra* note 136, at 273.

157. 43 U.S.C. § 1732(a)–(b).

158. 42 U.S.C. § 4332(c).

159. *Reforming the Mining Law of 1872: Hearing on H.R. 7580 Before the H. Comm. on Nat. Res.*, 117th Cong. 10 (2022) [hereinafter Struhsacker Statement] (statement of Debra Struhsacker, Director, Women's Mining Coalition), https://www.congress.gov/117/meeting/house/114700/witnesses/HHRG-117-II06-Wstate-StruhsackerD-20220512.pdf [https://perma.cc/LEV2-YX5T].

160. *See, e.g.*, U.S. FOREST SERV., PINTO VALLEY MINE FINAL ENVIRONMENTAL IMPACT STATEMENT (2021) (1,896 pages, including appendices); U.S. BUREAU OF LAND MGMT., THACKER PASS MINE PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT (2020) (2,721 pages, including appendices).

161. Struhsacker Statement, *supra* note 159, at 29 ("NEPA appeals and litigation create uncertainties that wreak havoc on businesses[] and cause massive cost overruns.").

approve U.S. mining projects, compared to just two to three years for similar projects in Canada and Australia.[162]

While the environmental laws passed in the 1960s and 70s pushed the U.S. mining industry to clean up its act compared to the preceding century of unregulated polluting,[163] they also added regulatory red tape that sometimes make the mining process more costly.[164] Considering the inhibitory effects of past environmental regulation on the domestic mining industry, future regulation should seek to address the environmental and social concerns of mining while simultaneously finding ways to relax unnecessary overregulation.[165]

III. ASSESSMENT OF CURRENT MINING LAW ON FEDERAL LAND

The Mining Law was passed in a particular historical context when the nation's top priorities included settling the frontier and encouraging the exploitation of resources. The United States of today, however, faces entirely different concerns, including mitigating climate change and securing domestic supply chains in a time of economic and geopolitical uncertainty. Given this incongruity, it is worth considering some of the following critiques of the Mining Law: (A) it gives mining corporations overly broad authority to access and exercise control over public land; (B) its lack of royalties constitutes a generous subsidy to the mining industry; and (C) it lacks any environmental protection or cleanup provisions.

A. Free Access to Land and the Right To Obtain a Patent

Since its inception, the Mining Law has protected the rights of prospectors to enter the public domain in search of mineral deposits.[166] This right to

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162. *Id.* at 29, 33. Section 40206 of the bipartisan Infrastructure Investment and Jobs Act attempts to address this issue by requiring the DOI and USDA to streamline mine permitting and requiring the departments to issue a one-year report by November 16, 2022, outlining how the agencies plan to implement the new requirements. Infrastructure Investment and Jobs Act, H.R. Con. Res. 3684, 117th Cong. (2021) (enacted). However, the DOI and USDA failed to issue a report by this key deadline. Press Release, Lisa Murkowski, Sen., Senators Call Out DOI, USDA Failure to Produce Permitting Report Required by Infrastructure Law (Nov. 15, 2022), https://www.murkowski.senate.gov/press/release/senators-call-out-doi-usda-failure-to-produce-permitting-report-required-by-infrastructure-law [https://perma.cc/4NXJ-FR72].

163. WILKINSON, *supra* note 26, at 57–58; *see also infra* Section III.C.

164. *See, e.g.*, *supra* text accompanying note 161.

165. *See infra* Part IV.

166. WILKINSON, *supra* note 26, at 42.

explore is emphatically supported by the mining industry because locating hardrock deposits is a slow and costly process.[167] Mining advocates argue that changes to the right to free access would curtail exploration, eventually leading to higher costs for materials and economic harm to the mining industry and the nation's economy.[168] Mining opponents argue for a leasing system, under which the government would have discretion to grant or deny access to prospectors.[169]

A holder of an unpatented mining claim has a constitutionally protected "right to mine"—one that can be held indefinitely even without development.[170] The mining industry argues that it does not always make economic sense to develop a claim; thus, claims should be allowed to lie idle until market conditions favor development of the deposit.[171] Moreover, the claim system offers miners security of tenure that makes it easier to finance a mine.[172] However, critics argue that this system is ripe for fraud and speculative use, both of which might be discouraged through switching to a leasing system.[173]

The Mining Law also allows claimants to apply for a patent, at which point they would take title to the entire surface and mineral estate and can use the land for non-mining purposes.[174] While the mining industry would support receiving free and clear title to land to help recoup investment costs,[175] Congress has renewed its one-year ban on mining patents annually for nearly three decades.[176] It is unlikely that, after a generation of consistent policy on this issue, Congress will reverse course and resume handing out real estate to mining corporations at virtually no cost. However, Congress has also stopped short of permanently banning mining patents.

B. Lack of Royalties

Minerals on federal lands are a publicly owned resource, but mining companies have been able to extract more than $300 billion since 1872

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167. HUMPHRIES, *supra* note 25, at 8; Struhsacker Statement, *supra* note 159, at 4.
168. HUMPHRIES, *supra* note 25, at 8.
169. *See id.* at 5.
170. WILKINSON, *supra* note 26, at 45–46, 48; HUMPHRIES, *supra* note 25, at 5.
171. HUMPHRIES, *supra* note 25, at 4.
172. *Id.*
173. *See id.*; WILKINSON, *supra* note 26, at 48.
174. *But see supra* note 132 and accompanying text.
175. HUMPHRIES, *supra* note 25, at 4.
176. *See supra* Section II.B.

without paying anything to the public for that resource.[177] State governments charge royalties for hardrock mining on state-owned land.[178] Likewise, the federal government charges royalties for extracting non-hardrock minerals on federal land.[179] Yet hardrock mining on federal land falls into a loophole. Allowing the extraction of valuable public resources at no cost amounts to a taxpayer-funded subsidy for mining corporations, including multinational conglomerates with no obligation to keep those resources in the United States.[180]

The mining industry opposes royalties on hardrock extraction in general, but they are particularly opposed to certain types, namely gross royalties and retroactively applied royalties.[181] Gross royalties are based solely on the quantity of raw minerals extracted, as opposed to net royalties, which allow deductions for processing expenses.[182]Unlike fossil fuels, which are subject to gross royalties, hardrock requires costly processing before it becomes marketable product.[183] Therefore, industry advocates argue, any royalty imposed on the hardrock industry should factor in the costs of smelting and refining ore.[184] Furthermore, the industry argues that royalties can apply only to future operations—a royalty imposed on existing claims would amount to a regulatory taking.[185]

Critics argue that the Mining Law's subsidies are inconsistent with other extractive industries and are an inappropriate giveaway of public resources.[186]

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177. Press Release, Martin Heinrich, Sen., Heinrich Introduces Legislation to Modernize Antiquated Mining Law (Apr. 26, 2022), https://www.heinrich.senate.gov/newsroom/press-releases/heinrich-introduces-legislation-to-modernize-antiquated-mining-law [https://perma.cc/8C4Y-GZVT].

178. House Nat. Res. Comm. Democrats, *supra* note 29, at 51:22.

179. HUMPHRIES, *supra* note 25, at 5.

180. *See id.*; Shaw & Whitmore, *supra* note 121 ("Although the General Mining Law . . . require[s] mine claimants . . . to be US citizens, a 'citizen' can include a US-incorporated entity that is wholly owned by non-US entities or corporations. Generally, there are no restrictions on foreign acquisition of these types of US mining rights through parent-subsidiary corporate structures.").

181. Struhsacker Statement, *supra* note 159, at 18–20.

182. *Id.* at 18.

183. *Id.* at 17.

184. *Id.* at 18–19.

185. *Id.* at 20. *See generally* CAROLYN L. MCINTOSH & JOSHUA B. COOK, AM. EXPL. & MINING ASS'N, MINING LAW FIFTH AMENDMENT TAKINGS ANALYSIS (Stephen Alfers ed., 2021).

186. *1872 Mining Law—Reform Requirements*, EARTHWORKS, https://earthworks.org/issues/1872-mining-law-reform-requirements/ [https://perma.cc/8EXV-X6E3].

This is exacerbated by the newly passed IRA, which offers an additional 10% production tax credit to mining companies for extracting critical minerals.[187]

Some proposed reforms would impose a gross royalty directly on extracted minerals while others would impose a net royalty.[188] For example, the proposed Clean Energy Minerals Reform Act of 2022 would have established a whopping 12.5% gross royalty on new mining operations and 8% on existing operations.[189]

By contrast, the proposed Hardrock Mining and Reclamation Act of 2007 included a much more modest 8% *net* royalty when it was introduced.[190] Lawmakers at the time were concerned that net royalties were "fraught with complexities and high administrative cost, thus minimizing the government take."[191] Thus, by the time the bill reached the Senate, it had been revised to include a gross royalty instead.[192] The takeaway from this complicated net vs. gross royalty debate: net royalties are perhaps too favorable to mining companies, but overly high gross royalties make it difficult for the industry to turn a profit.

C. Lack of Environmental Protection and Cleanup Provisions

Lawmakers in 1872 were not particularly concerned with protecting the environment or conserving resources. This is reflected in the Mining Law, which contains absolutely no provisions for environmental protection.[193] As late as the 1970s, "most hardrock mining went entirely unregulated."[194] This century of laissez-faire mining policy left behind abandoned mines that pollute 40% of the headwaters in the western United States, making metal mining the nation's number one polluting industry by a wide margin.[195]

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187. 26 U.S.C. § 45X(b)(1)(M) (as amended by Pub. L. No. 117-169, § 13502); *see also supra* Section I.B.

188. *See, e.g.*, HUMPHRIES, *supra* note 25, at 8.

189. Clean Energy Minerals Reform Act of 2022, H.R. 7580, 117th Cong. § 107 (2022).

190. Hardrock Mining and Reclamation Act of 2007, H.R. 2262, 110th Cong. § 102 (2007) (as introduced in House, May 10, 2007).

191. HUMPHRIES, *supra* note 25, at 10.

192. H.R. 2262 (as referred in Senate, Nov. 5, 2007).

193. WILKINSON, *supra* note 26, at 49.

194. *Id.* at 57.

195. *Comparing Industry Sectors*, U.S. ENV'T PROT. AGENCY (Mar. 2022), https://www.epa.gov/trinationalanalysis/comparing-industry-sectors [https://perma.cc/C9RX-83MJ] (choose "Releases Only" from the two bubbles appearing above the pie chart(s)) ("[Q]uantities of TRI chemicals disposed of or otherwise released: metal mining (44%), chemical manufacturing (16%), primary metals (8%), and electric utilities (7%).").

There is currently no program to address these hundreds of thousands of legacy hardrock mines, and the EPA estimates that it could cost over $50 billion to clean them up.[196] Compare this to abandoned coal mines, which are reclaimed using fees paid by the coal industry to the Abandoned Mine Reclamation Fund under the Surface Mining Control and Reclamation Act of 1977 ("SMCRA").[197]

In the 1960s and 70s, Congress created the Environmental Protection Agency and passed an "alphabet soup" of environmental laws: CWA, ESA, CERCLA, NEPA, RFRA, FLPMA, and the Clean Air Act, among others.

Industry advocates argue that, thanks to this slew of environmental laws, U.S. mines are now the "cleanest and safest mines in the world" and, ironically, liability provisions of the CWA and CERCLA actually prevent "Good Samaritans"[198] from remediating abandoned mines.[199] They argue that reducing liability exposure would allow companies to remine abandoned mines, simultaneously cleaning up polluted sites and unlocking a trove of critical mineral resources that are blocked by regulatory hurdles.[200]

Environmentalists argue that an updated mining law must contain provisions that expand the ability to deny mine proposals, add more stringent surface and groundwater quality protection, and give land managers authority to inspect mines and impose penalties for violations.[201] Switching to a leasing system might alleviate some of these concerns by offering land management agencies more direct oversight of operations and giving them more discretion to revoke leases for non-compliance.

Environmentalists also advocate for the establishment of a reclamation fund for abandoned mines modeled after the coal industry's.[202] Notably, both sides appear to agree that creating an abandoned hardrock mine reclamation

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196. House Nat. Res. Comm. Democrats, *supra* note 29, at 42:27.

197. LANCE N. LARSON, CONG. RSCH. SERV., IF11352, THE ABANDONED MINE RECLAMATION FUND: ISSUES AND LEGISLATION IN THE 117TH CONGRESS 1 (2022).

198. "Good Samaritan" refers to public or private entities with "no prior involvement or ownership interest" who voluntarily undertake to clean up an abandoned mine site. Struhsacker Statement, *supra* note 159, at 38, 23 & n.35.

199. *Id.* at 23; Glatzel & Gordon, *supra* note 29.

200. Struhsacker Statement, *supra* note 159, at 23.

201. *See, e.g.*, *1872 Mining Law—Reform Requirements*, *supra* note 186.

202. *Compare id.* (advocating for funding abandoned hardrock mine reclamation with mining royalties and fees), *with* 30 U.S.C. § 1231 (creating a fund for coal mine restoration which is partially supported by mining fees).

fund is a good idea, although they differ on where that funding ought to come from.[203]

IV. POLICY PROPOSAL

Legislators have talked of reforming the General Mining Law of 1872 for decades, but those reform efforts have failed to cross the finish line time and time again.[204] Why should now be any different? Reaching a 50% reduction of GHG emissions by 2030 and net-zero emissions by 2050[205] will require an unprecedented investment in renewable energy technology, and this is projected to send the demand for critical minerals skyrocketing.[206] The U.S. is on the cusp of another domestic mining boom akin to the gold and silver rushes that set the Mining Law in motion.[207] Now is therefore the time to finally update the law governing hardrock mining on federal public land with a modern solution that allows for greater environmental protection and remediation while reducing unnecessary overregulation.

Thus, in response to the age-old critiques of the Mining Law,[208] this reform should include: (A) a leasing system resembling other extractive industries; (B) a modest gross royalty on future hardrock mining operations that distinguishes between critical and non-critical minerals; and (C) the creation of an Abandoned Hardrock Mine Reclamation Fund, paid for by the newly instituted royalties. Because it is in the nation's best interest to incentivize critical mineral production rather than to discourage it with overregulation, the new law, in exchange for the above reforms, should also: (D) cautiously reduce liability under CWA and CERCLA to encourage "Good Samaritan"

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203. *Compare 1872 Mining Law—Reform Requirements*, *supra* note 186 (arguing that an abandoned mine land fund should be "paid for through mining royalties and fees"), *with* Struhsacker Statement, *supra* note 159, at 22 (suggesting that the service and holding fees currently "paid by mining claim holders . . . could be used for [abandoned mine lands] reclamation").

204. *See* sources cited *supra* note 117. A major mining reform almost passed in November 2021 via budget reconciliation as part of the Build Back Better Act. H.R. REP. NO. 117-130, pt. 2, at 1907–14 (2021), https://www.congress.gov/117/crpt/hrpt130/CRPT-117hrpt130-pt2.pdf [https://perma.cc/LNJ8-YAEC]. However, two senators from mining states—Nevada's Catherine Cortez Masto and West Virginia's Joe Manchin—killed the reform shortly before it could come to a vote. Cody Nelson, *Manchin and Cortez Masto Kill Chances of Reforming Outdated Hardrock Mining Law*, GRIST (Nov. 24, 2021), https://grist.org/energy/manchin-and-cortez-masto-kill-chances-of-reforming-outdated-hardrock-mining-law/ [https://perma.cc/6BDX-SQ84].

205. *See Fact Sheet, supra* note 49.

206. KIM ET AL., *supra* note 11, at 24–28.

207. *See* Penn & Lipton, *supra* note 45; *see also supra* Section II.A.

208. *See supra* Part III; *see also supra* notes 114–18 and accompanying text.

cleanup and remining of abandoned legacy mines and (E) speed up the cumbersome NEPA approval process.

A. Leasing System

The hardrock mining industry is vehemently opposed to instituting a leasing system on federal public lands—it would prefer to keep its largely unfettered freedom to explore for minerals and the "right to mine" that comes with an unpatented mining claim.[209] With these concerns in mind, a responsible solution should allow prospectors to freely obtain "exploration permits," which would allow prospecting to carry on relatively unimpeded. Once an economically viable deposit is discovered, mining could proceed after an administrative determination that mineral production at that site is in the best interest of the public.

This system could have several benefits. For instance, it would give the government a degree of discretionary control over development, preventing irresponsible operations that unnecessarily harm the environment and nearby communities.[210] Likewise, the government could deny an international conglomerate if it had a record of irresponsible or unethical mining practices in other countries. Permanently replacing the patent system with a leasing system would ensure that the public retains ownership of the surface and mineral estates once mining has concluded, and it would also allow the federal government to more easily impose royalties on hardrock production.

B. Gross Royalties on Hardrock Mining

The mining industry would prefer a net royalty over a gross royalty, but lawmakers have voiced concern that a net royalty would be difficult to administer in practice and would yield less revenue.[211] It is difficult to determine which royalty structure would be most economically efficient,[212] but a gross royalty has the advantages of being straightforward and based directly on a factor of production. Thus, a gross royalty could generate

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209. *See* WILKINSON, *supra* note 26, at 72–73; Struhsacker Statement, *supra* note 159, at 3–4; HUMPHRIES, *supra* note 25, at 5.

210. For example, this would allow the government to block operations like Blue Arc LLC from worsening already serious damage to a nearby Indian reservation. *See supra* notes 143–50 and accompanying text.

211. *See supra* notes 188–92 and accompanying text.

212. *See* SALVATORE LAZZARI, CONG. RSCH. SERV., RL34268, THE FEDERAL ROYALTY AND TAX TREATMENT OF THE HARDROCK MINERAL INDUSTRY: AN ECONOMIC ANALYSIS 17–19 (2008).

revenue to pay for environmental cleanup without causing too much confusion for miners or administrative burden for agencies. To avoid potential takings under the Fifth Amendment, royalties should apply only to new mining operations, not existing ones.

It is important to note that the Mining Law covers not just critical minerals, but a vast array of other minerals, including platinum, gold, silver, and gemstones. Some of these have high economic value but are not necessarily critical to a renewable energy transition. Others are relatively inexpensive but will be needed in great quantities for the nation's decarbonization goals. An update to the Mining Law, then, should include a gross royalty that varies depending on the strategic importance of the mineral being extracted.

A modest gross royalty of 1%–2% could be imposed on critical minerals such as lithium, cobalt, nickel, antimony, and rare earth elements. However, precious metals—platinum, gold, and silver—should carry a steeper gross royalty of 6%–7% because they are both lucrative to extract and not urgently needed by the public. This revenue should then be set aside for the explicit purpose of abandoned mine reclamation.

C. Creation of an Abandoned Hardrock Mine Reclamation Fund

Creating an Abandoned Hardrock Mine Reclamation Fund is perhaps the most important provision needed to right the historical wrongs of the Mining Law. An update should therefore include a reclamation fund modeled after the one created under the SMCRA.[213] This would finally address the century of unregulated mining that continues to leave its mark throughout the West, and it would begin to chip away at the estimated fifty billion dollars needed to clean up those mines.

Prior to the passage of the SMCRA in 1977, unregulated coal mining produced thousands of abandoned coal mines that posed serious public health, safety, and environmental risks.[214] Title IV of the SMCRA created the Abandoned Mine Reclamation Fund to address these sites by providing federal funding for remediation.[215] Regulators collect fees from coal mines based on volume of production;[216] this money is then paid into the Fund.[217] In

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213. *See supra* note 197 and accompanying text.

214. 30 U.S.C. § 1232; LANCE N. LARSON, CONG. RSCH. SERV., R46610, RECLAMATION OF COAL MINING OPERATIONS: SELECT ISSUES AND LEGISLATION 1 (2020).

215. LARSON, *supra* note 214, at 1.

216. *Id.*

217. *Id.*; *Grants and Funding Opportunities*, OFF. SURFACE MINING RECLAMATION & ENF'T, https://www.osmre.gov/resources/grants-resources [https://perma.cc/5M7K-2NAN].

2019, the Fund made over $291.2 million in grants available to states and tribes to reclaim abandoned coal mines.[218]

An update to the Mining Law should work much the same. Congress should create an Abandoned Hardrock Mine Reclamation Fund. Regulators would collect gross royalties on hardrock mine production and pay that into the newly created fund; this money, in turn, would be distributed to state and tribal governments who seek to remediate abandoned hardrock mines on nearby federal public lands. Such an arrangement might have mitigated the damage that the Zortman-Landusky caused to the Mine Fort Belknap Indian Reservation, for example.[219]

With the United States poised to dramatically ramp up critical mineral production in the coming years, creating a reclamation fund is now more important than ever. This would ensure that future critical mineral operations benefit local communities and restore scarred landscapes. Failing to include such a provision would be squandering this exceptional moment when increasing demand offers the potential to fund long overdue cleanup. To aid the remediation efforts of the proposed Reclamation Fund, Congress should also reduce liability to private entities who undertake to clean up abandoned mines themselves.

D. Reducing "Good Samaritan" Liability

Funding state and tribal government efforts to clean up abandoned hardrock mines would go a long way toward righting the mining industry's past wrongs, but a reform of the Mining Law could go further still. A "Good Samaritan" provision would allow third parties to voluntarily remediate an abandoned hardrock mine with reduced fear of incurring expensive liability under CERCLA or CWA.[220]

This could accelerate remediation by harnessing market forces instead of relying solely on government action.[221] Many abandoned mines contain commercially viable minerals in their waste rock and tailings, but these resources are effectively inaccessible because it is prohibitively expensive to

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218. OFF. OF SURFACE MINING RECLAMATION & ENF'T, U.S. DEP'T OF THE INTERIOR, FY 2019 ANNUAL REPORT 6 (2019), https://www.osmre.gov/sites/default/files/inline-files/OSMRE%20FY%202019%20Annual%20Report.pdf [https://perma.cc/Z6DY-M8QE].

219. *See supra* notes 145–50 and accompanying text.

220. Glatzel & Gordon, *supra* note 29.

221. *See id.*

assume liability for these polluted sites.[222] Industry advocates support Good Samaritan provisions, arguing that easing this regulatory hurdle would incentivize mining companies to remine sites using modern technologies and standards.[223] Once the remining was complete, the formerly abandoned mine would be left safer and cleaner than its current state.[224]

However, Good Samaritan proposals have been met with staunch opposition.[225] Opponents argue that some Good Samaritans will be motivated purely by self-interest rather than concern for the environment or downstream communities.[226] In a worst-case scenario, bad actors could extract profits from the site, leave it in worse shape than before, and then enjoy the legal protections conferred by their Good Samaritan status.[227]

These are valid criticisms, but mining advocates point out that the alternative is the status quo: an enormous number of abandoned mines that are actively polluting waterways every day without any funding mechanism in place to remediate them. According to proponents, opposing Good Samaritan provisions in favor of inaction makes the perfect the enemy of the good.[228]

With both views in mind, an updated Mining Law should include a Good Samaritan policy that proceeds with caution. It should start out with a closely monitored pilot program, and it should require the Administrator of the EPA to approve "Good Samaritan permits" only for parties who can demonstrate that they can restore the site in a responsible manner.[229] Applicants who intend to remine the site should receive permits only if they will produce strategically important critical minerals. After ten years, if the program proves beneficial and has not caused further environmental degradation, then the Administrator should have discretion to expand the program.

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222. *See* Struhsacker Statement, *supra* note 159, at 23–24; Shuronjit Kumar Sarker et al., *Recovery of Strategically Important Critical Minerals from Mine Tailings*, 10 J. ENV'T CHEM. ENG'G 1, 2–3 (2020).

223. Struhsacker Statement, *supra* note 159, at 23–24.

224. Glatzel & Gordon, *supra* note 29.

225. *Id.*

226. *Id.*

227. *Id.*

228. *Id.*

229. In February 2022, Senators Heinrich (D-NM) and Risch (R-ID) introduced a bill that included a similar plan, but it died in committee. *See* Good Samaritan Remediation of Abandoned Hardrock Mines Act of 2022, S. 3571, 117th Cong. (2022); *S. 3571 (117th): Good Samaritan Remediation of Abandoned Hardrock Mines Act of 2022*, GOVTRACK, https://www.govtrack.us/congress/bills/117/s3571 [https://perma.cc/5EEN-LLPB].

E. Speeding Up the NEPA Process

Lastly, Congress must speed up the NEPA approval process for proposed critical mineral projects. As the primary reason that mining projects take two to three times longer to approve in the U.S. than in other countries,[230] compressing this timeline could greatly increase domestic output of critical minerals and lower energy costs for consumers.

Fortunately, section 40206 of the Infrastructure Investment and Jobs Act, passed in 2021, purports to do just that.[231] It requires the DOI and the U.S. Department of Agriculture ("USDA") to streamline critical mineral-related projects by (1) establishing timelines for final decisions on permits; (2) setting quantifiable performance goals and tracking progress; (3) engaging in interagency and stakeholder collaboration to minimize delays; (4) consulting with state and tribal governments; and (5) showing "demonstrable improvements," including lower costs and more timely decisions.[232] It also required the DOI and USDA to prepare a one-year report outlining how the agencies plan to implement the new requirements.[233]

That one-year report was due on November 16, 2022.[234] As of March 2023, the DOI and USDA still have not issued this statutorily required report, and it remains to be seen how effective this provision will be at reducing the regulatory burdens on critical mineral production. However, the requirements imposed by the Act appear highly promising. And because they were passed with bipartisan support, the DOI and USDA will likely need to comply with these requirements eventually.

Until these permitting reforms have had more time to come into effect, it is too soon to say precisely what further action needs to be taken. Proponents of renewable energy can only hope that Congress was successful in removing one of the largest regulatory hurdles to mining in the United States. But if section 40206 proves ineffective for whatever reason, then Congress should redouble its efforts to streamline the NEPA approval process for critical mineral production.

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230. Struhsacker Statement, *supra* note 159, at 29, 33.

231. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, § 40206, 135 Stat. 429, 961 (2021) (codified at 30 U.S.C. § 1607).

232. § 40206(c).

233. § 40206(d).

234. *See supra* text accompanying note 162.

V. CONCLUSION

Because of the rapid growth of renewable energy technologies, critical minerals are in ever-higher demand, and the United States is rightly prioritizing securing a domestic critical mineral supply chain. While this serves the sustainability goal of reducing GHG emissions, it could also perpetuate a long history of unsustainable mining practices under the Mining Law if not done responsibly.

With U.S. critical mineral production on the rise, Congress should seize this unique moment to address both sustainability concerns through a reform to the Mining Law. A balanced reform should therefore include: (1) a leasing system; (2) a modest gross royalty that distinguishes between critical and non-critical minerals; (3) the creation of an Abandoned Hardrock Mine Reclamation Fund; (4) a cautiously implemented reduction in liability for "Good Samaritan" cleanup and remining of abandoned mines; and (5) a streamlined NEPA approval process.

Reforming the General Mining Law of 1872 has been an evergreen topic for nearly a century, but if there was ever a time to update this antiquated law, we are in it. The Mining Law was born in the nineteenth century, when Americans were racing to the Western frontier to capitalize on the latest gold rush. It's high time to update the Mining Law with legislation that is better suited for today's gold rush: critical minerals.