



THE CRITICAL QUESTION: CAN MINING PERMIT  
EXACTIONS HELP PROCURE CRITICAL MINERALS  
REQUIRED FOR MANUFACTURING DEFENSE  
TECHNOLOGIES?

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*Mineral resources are the literal building blocks of the twenty-first century. Without adequate mineral inputs for manufacturing, access to modern medicine, energy infrastructure, resilient agriculture, and advanced technologies would be curtailed. Executive Order 13817 recognizes that the United States is not self-sufficient for the mineral resources it needs to protect national security and economic prosperity. A comprehensive policy solution requires additional domestic mining with greater efficiency. This comment investigates the nexus between land-use regulation and the Fifth Amendment protections of private property. By way of a hypothetical copper-tellurium example, this comment resolves that federal regulators may exercise their permitting authority to require mining companies to recover coproduced critical minerals without offending the Fifth Amendment Takings Clause. Yielding preference to free-market solutions, this regulatory approach provides one additional mechanism to help the United States attain its security objectives.*

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INTRODUCTION

Access to critical mineral resources is once again a public policy and national security interest.<sup>1</sup> The Trump administration

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<sup>1</sup> James F. Ailshie, *Minerals in National Defense*, 1939 A.B.A. SEC. MINERAL & NAT. RES. L. PROC. 70 (1939) (explaining the mineral-defense nexus and its origins in WWII); James Santini, *The Growing Crisis in the Strategic and Critical Minerals of*

issued an executive order on December 20, 2017 directing the United States Department of the Interior (DOI), in coordination with the Department of Defense (DOD) and other agencies, to designate a list of critical minerals.<sup>2</sup> A mineral is “critical” if it has an at-risk supply chain, the disruption of which would threaten manufacturing processes essential to economic or national security.<sup>3</sup> On May 18, 2018, DOI designated a list of 35 critical minerals.<sup>4</sup> Decision-makers heavily weighed both import dependency and governance risk factors for countries with high concentrations of mineral resources.<sup>5</sup>

Mineral resources are essential manufacturing inputs for all material goods. Technology is a comparatively complex family of material goods, as manufacturing it requires increasing quantities and varieties of critical minerals.<sup>6</sup> Just as rhenium enables high performance jet engines and lithium brings rechargeable batteries to

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*the United States*, 7 J. LEGIS. 63, 64-66 (1980) (discussing the establishment of national nonfuel mineral policy in the 1970s and the lack of cooperation regarding resource security issues between land management and defense agencies).

<sup>2</sup> Exec. Order No. 13817, 82 Fed. Reg. 60,835 (Dec. 20, 2017).

<sup>3</sup> *Id.*

<sup>4</sup> Final List of Critical Minerals 2018, 83 Fed. Reg. 23,295 (May 18, 2018).

<sup>5</sup> See generally U.S. GEOLOGICAL SURV., OPEN FILE REP. 2018-1021, DRAFT CRITICAL MINERAL LIST - SUMMARY OF METHODOLOGY AND BACKGROUND INFORMATION - U.S. GEOLOGICAL SURVEY TECHNICAL INPUT DOCUMENT IN RESPONSE TO SECRETARIAL ORDER No. 3359 (2018).

<sup>6</sup> See, e.g., JAMIE BRAINARD ET AL., GLOBALLY SOURCED MINERAL COMMODITIES USED IN NAVY SEAL GEAR: AN ILLUSTRATION OF U.S. NET IMPORT RELIANCE, U.S. GEOLOGICAL SURVEY GEN. INFO. PROD. 183 1-2 (2017) (labeling examples of mineral components sourced internationally in various Navy SEAL equipment, some of which are designated as critical minerals); NAT'L SCI. & TECH. COUNCIL, EXEC. OFFICE OF THE PRESIDENT, ASSESSMENT OF CRITICAL MINERALS: UPDATED APPLICATION OF SCREENING METHODOLOGY 5 (2018); Andrew L. Gulley et al., *China, the United States, and Competition for Resources That Enable Emerging Technologies*, 115 PNAS 4111, 4111 (2018); Roderick G. Eggert, *Critical Minerals and Emerging Technologies*, 26-4 ISSUES IN SCI. & TECH. (Summer 2010).

life, the existence of countless other technologies depends on critical minerals.<sup>7</sup>

Since the 1950s, domestic mines and mineral processing facilities severely declined due to economic and public policies, causing the United States to increasingly rely on foreign trade.<sup>8</sup> A recent forecast predicts that the competition for mineral resources, particularly between the United States and China, will intensify.<sup>9</sup> Against this backdrop, shortages for some critical minerals are likely to occur. Strengthening domestic mineral supply chains is one potential solution and is one of the Trump administration's current policy objectives.<sup>10</sup>

This comment provides a mechanism by which the federal government could increase the domestic supply of critical minerals through land permitting without violating the Fifth Amendment Takings Clause of the United States Constitution. The scope of this analysis is limited to privately-owned, naturally-occurring domestic minerals located on private land.

Moreover, this comment presents and attempts to resolve a hypothetical scenario in which a copper mining company has an on-site processing facility capable of recovering copper and tellurium. The hypothetical copper ore contains tellurium, a critical mineral as designated by DOI.<sup>11</sup> Consistent with some current copper mining practices, the facility sends the tellurium to the processing waste

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<sup>7</sup> See U.S. GEOLOGICAL SURV., MINERAL COMMODITY SUMMARIES 2018 134 (2018) [hereinafter MINERAL COMMODITY SUMMARIES 2018].

<sup>8</sup> STEVEN M. FORTIER ET AL., COMPARISON OF U.S. NET IMPORT RELIANCE FOR NONFUEL MINERAL COMMODITIES—A 60-YEAR RETROSPECTIVE (1954–1984–2014): U.S. GEOLOGICAL SURV. FACT SHEET 2015-3082 1 (2015).

<sup>9</sup> Gulley et al., *supra* note 6, at 4111, 4113.

<sup>10</sup> Exec. Order No. 13817, *supra* note 2.

<sup>11</sup> Final List of Critical Minerals 2018, *supra* note 4.

streams where it goes unrecovered.<sup>12</sup> A federal agency with authority to issue mining permits conditions an additional or renewed permit based on the good faith attempt of the copper company to recover the tellurium.<sup>13</sup> The government then purchases this tellurium at the prevailing market price. Without creating a Fifth Amendment taking, can the federal government condition a permit so that a company must recover a critical mineral, such as tellurium, when it is mined incidental to another mineral that the company wants?

Section I of this comment explains the mining process and complexities affecting the recovery and global trade of tellurium. This section also summarizes the laws regarding how the federal government procures critical minerals and highlights weaknesses with the current statute. Section II discusses the interface among the Fifth Amendment Takings Clause, eminent domain, land use regulation, including mining permitting, and implied taking by regulation. Then, this section provides the categorical and factor-based tests that determine when the regulation amounts to a taking. Section II also addresses when a permitting exaction violates the Fifth Amendment's Takings Clause by not serving a legitimate public use. The last part of Section II only briefly mentions the just compensation requirement for a taking, as this is strictly a factual matter resolved by evidence. Section III applies the categorical and factor-based tests explained in Section II to the tellurium scenario, finding that the hypothetical permit condition is enforceable and does not amount to an implied regulatory taking. Section IV acknowledges the strengths and limitations that permit exactions

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<sup>12</sup> V. T. McLemore, *Tellurium Resources in New Mexico*, in PROCEEDINGS OF THE SOC'Y OF MINING, METALLURGY & EXPL. ANNUAL MEETING (Feb. 24-27, 2013).

<sup>13</sup> The author recognizes that a well-developed federal mining regulatory framework exists through the Environmental Protection Agency, the Department of the Interior, and others. Of course, all regulatory authority is subject to change by a future act of Congress. The specific regulatory actor has no bearing on the arguments presented herein, so long as the actor is a federal agency enabled by statute. Thus, it is discussed in the abstract for simplicity of analysis.

have for strengthening domestic critical mineral supply chains. It also advises Congress to amend the eminent domain provision in the statute governing critical mineral procurement to contain a time-limiting clause for the courts, and to clarify whether the statute applies to byproduct mineral commodities.

## I. BACKGROUND

### A. *The General Mining Process*

A famous saying in the mining industry is, “If it can’t be grown, it must be mined.”<sup>14</sup> Mineral resources are the literal building blocks of the twenty-first century.<sup>15</sup> Nearly every material in society has a mineral origin.<sup>16</sup> Just as each element on the periodic table has unique physical properties, solid assemblies of these elements into naturally-occurring crystalline structures, or minerals, do as well.<sup>17</sup> Without access to diverse mineral properties, technologies, such as cell phones, could not be developed.<sup>18</sup>

Most minerals have a geological origin,<sup>19</sup> and are primarily captured through a mining process.<sup>20</sup> Mechanized equipment is used

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<sup>14</sup> See, e.g., *If It Can’t Be Grown It Must Be Mined*, MONTANA MINING ASSOCIATION, <http://www.montanamining.org/the-standard-lorem-ipsum-passage-used-since-the-1500s> (last visited Dec. 23, 2018).

<sup>15</sup> See Soc’y of Mining, Metallurgy & Expl., Inc., *The Disconnect on the Importance of Mining*, <https://www.youtube.com/watch?v=Z5JVYo5Mh2Y> (last visited Dec. 23, 2018).

<sup>16</sup> *Id.*

<sup>17</sup> See Hobart M. King, *What are Minerals?*, GEOLOGY.COM, <https://geology.com/minerals/what-is-a-mineral.shtml> (last visited Dec. 23, 2018).

<sup>18</sup> JANE E. JENNESS ET AL., A WORLD OF MINERALS IN YOUR MOBILE DEVICE: U.S. GEOLOGICAL SURV. GEN. INFO. PROD. 167 (2016), available at <https://pubs.er.usgs.gov/publication/gip167>.

<sup>19</sup> See generally MINERAL COMMODITY SUMMARIES 2018, *supra* note 7.

<sup>20</sup> See generally HOWARD L. HARTMAN & JAN M. MUTMANSKY, INTRODUCTORY MINING ENGINEERING (John Wiley & Sons 2d ed. 2002); see generally MINERAL COMMODITY SUMMARIES 2018, *supra* note 7.

to cut, load, and haul raw earth containing minerals (“ore”) to a mineral processing facility.<sup>21</sup> Ore naturally contains many minerals but is mined for a particular mineral (“primary commodity”) that economically justifies the mining cost.<sup>22</sup>

The primary commodity is separated from the worthless dirt (“gangue”) at the process facility.<sup>23</sup> Gangue becomes part of the waste stream, which is chemically treated and returned to the environment in a reclamation process.<sup>24</sup> Not all valuable minerals are captured (“recovered”) at the processing facility, and they instead become part of the waste stream.<sup>25</sup> Sometimes a portion of the primary commodity reaches the waste stream as a processing inefficiency.<sup>26</sup> All minerals that enter a process facility are either eventually recovered or sent to waste streams.<sup>27</sup>

In other instances, minerals accompanying the primary commodity are intentionally sent to waste streams because they cost

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<sup>21</sup> See generally HARTMAN & MUTMANSKY, *supra* note 20.

<sup>22</sup> Graham W. Lederer & Erin A. McCullough, *Meeting the Mineral Needs of the United States*, EARTH & SPACE SCI. NEWS (July 18, 2018), <https://eos.org/features/meeting-the-mineral-needs-of-the-united-states>.

<sup>23</sup> HARTMAN & MUTMANSKY, *supra* note 20, at 3.

<sup>24</sup> *Id.* at 13.

<sup>25</sup> J. Mark Richardson & Robert D. Morrison, *Metallurgical Balances and Efficiency*, in PRINCIPLES OF MINERAL PROCESSING 363-65 (Maurice C. Fuerstenau & Kenneth N. Han eds., 2003); Deepak Malhotra, *Flotation*, in SME MINING REFERENCE HANDBOOK 288, 302 (Raymond L. Lowrie ed. 2003) (providing quantitative engineering designs regarding efficacy of mineral extraction).

<sup>26</sup> See generally Malhotra, *supra* note 25.

<sup>27</sup> See generally U.S. ENVTL. PROT. AGENCY, IDENTIFICATION AND DESCRIPTION OF MINERAL PROCESSING SECTORS AND WASTE STREAM - FINAL TECHNICAL BACKGROUND DOCUMENT (1998), *available at* <https://archive.epa.gov/epawaste/nonhaz/industrial/special/web/pdf/part4.pdf>. This information is displayed in the commodity flow diagrams. Although processing can occur across multiple facilities, I present the hypothetical copper mine and processing facility to be vertically integrated for simplicity of analysis.

too much to recover.<sup>28</sup> Minerals sent to the waste stream are termed “byproducts.”<sup>29</sup> Byproducts are instead “byproduct commodities” when the processing facility recovers them in addition to the primary commodity.<sup>30</sup> Some minerals are predominantly mined as byproduct commodities, making their supply availability wholly dependent on the market conditions affecting the primary commodity.<sup>31</sup> Twelve of the critical minerals as designated by DOI are byproduct commodities.<sup>32</sup>

### B. The Mining Process for Tellurium

Tellurium is an exceptionally rare element in Earth’s crust.<sup>33</sup> The planetary abundance of tellurium is approximately 300 parts per billion (or 0.00003 percent).<sup>34</sup> However, an estimated 96 percent of this tellurium is located at the core and is therefore inaccessible by modern mining methods.<sup>35</sup> Rocks bearing tellurium closer to the surface have even lower concentrations of approximately 8 parts per billion (0.0000008 percent).<sup>36</sup> Since tellurium has such a low mineral

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<sup>28</sup> Lederer & McCullough, *supra* note 22 (“For by-product mineral commodities, extraction and recovery costs control the economic viability of production.”).

<sup>29</sup> *Id.*

<sup>30</sup> *Id.*

<sup>31</sup> NAT’L SCI. & TECH. COUNCIL, EXEC. OFFICE OF THE PRESIDENT, ASSESSMENT OF CRITICAL MINERALS: SCREENING METHODOLOGY AND INITIAL APPLICATION 3 (2016) (“Concerns regarding byproduct minerals stem from their dependency on the main resource for profitable recovery. Byproduct mineral supply is therefore thought to be relatively price-inelastic.”).

<sup>32</sup> U.S. GEOLOGICAL SURV., *supra* note 5, at 10.

<sup>33</sup> Richard J. Goldfarb et al., *Tellurium*, in CRITICAL MINERAL RESOURCES OF THE UNITED STATES – ECONOMIC AND ENVIRONMENTAL GEOLOGY AND PROSPECTS FOR FUTURE SUPPLY R1 (Klaus J. Schulz et al. eds., 2017).

<sup>34</sup> *Id.* at R3.

<sup>35</sup> *Id.*

<sup>36</sup> *Id.*



concentration worldwide, it is seldom mined as a primary commodity.<sup>37</sup>

More than 40 species of telluride mineral forms exist.<sup>38</sup> Tellurium most frequently associates with copper, lead, gold, and silver, and is almost exclusively mined as a byproduct commodity.<sup>39</sup> Approximately 90 percent of tellurium is a byproduct commodity of copper refining.<sup>40</sup> Numerous works have commented on the supply risks affecting byproduct commodity markets, including tellurium, because of the inherent dependency on a primary commodity.<sup>41</sup> In fact, roughly only one pound of tellurium can be produced for every 500 tons of copper when processing copper-tellurium ore.<sup>42</sup>

Furthermore, even when it is profitable to mine tellurium-containing ore, there is no guarantee that the tellurium will be recovered. Empirical research suggests that one processing facility capable of recovering tellurium only operates at 40 percent efficiency or lower.<sup>43</sup> More commonly, tellurium recovery is never attempted at the primary commodity processing facility, and the entirety of tellurium is instead sent to waste streams.<sup>44</sup> Recovering wasted tellurium during copper mineral processing could significantly increase the domestic supply, depending on the tellurium

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<sup>37</sup> *Id.* at R1.

<sup>38</sup> McLemore, *supra* note 12, at 1.

<sup>39</sup> See Goldfarb et al., *supra* note 33, at R1; McLemore, *supra* note 12, at 1.

<sup>40</sup> MINERAL COMMODITY SUMMARIES 2018, *supra* note 7, at 167.

<sup>41</sup> E.g., Michele L. Bustamante & Gabrielle Gaustad, *Challenges in Assessment of Clean Energy Supply-Chains Based on Byproduct Minerals: A Case Study of Tellurium Use in Thin Film Photovoltaics*, 123 APPLIED ENERGY 397, 404 (2014).

<sup>42</sup> McLemore, *supra* note 12, at 1.

<sup>43</sup> Amy E. Josephson, *The Behavior Of Tellurium During Copper Ore Processing at the American Smelting and Refining Company* (Tucson, AZ) (Aug. 18, 2016) (unpublished Master of Science thesis, University of Alaska Fairbanks) (on file with Scholar Works, University of Alaska).

<sup>44</sup> McLemore, *supra* note 12, at 3 (finding the presence of tellurium in copper mineral processing waste streams).

concentration, quantity of ore extracted, processing operational capacity, and a variety of other engineering factors.<sup>45</sup>

### C. The Global Tellurium Market

According to the U.S. Geological Survey, tellurium has historically been produced in 16 countries, but publicly available recovery statistics for 2018 are only available for seven countries: Bulgaria (5 metric tons), Canada (30 metric tons), China (300 metric tons), Japan (36 metric tons), Russia (35 metric tons), South Africa (7 metric tons), and Sweden (32 metric tons).<sup>46</sup> There is a domestic tellurium industry, but the U.S. Geological Survey considers this data proprietary.<sup>47</sup> Publicly-available export statistics suggest that this domestic tellurium industry is small.

The United States exported approximately 2 metric tons of tellurium internationally in 2017, though this figure includes both domestic recovery and tellurium that was imported before being re-exported.<sup>48</sup> The United States has recently sourced approximately 23 percent of its tellurium imports—equivalent to nearly 38 metric tons—from China.<sup>49</sup> Published data suggests that if the United States stopped exporting tellurium, there could still be unmet civilian and military demand. Export statistics also indicate that China is a relevant player in the trade of tellurium, and imperfect international relations could jeopardize trade as a solution to a mineral shortage.

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<sup>45</sup> In the field of mining engineering, these are well-established production variables. See generally HARTMAN & MUTMANSKY, *supra* note 20.

<sup>46</sup> C. Schuyler Anderson, *Selenium and Tellurium*, in U.S. GEOLOGICAL SURV., 2016 MINERALS YEARBOOK 65.1, 65.8 (2018); U.S. GEOLOGICAL SURV., MINERAL COMMODITY SUMMARIES 2019 167 (2019), available at <https://www.usgs.gov/centers/nmic/selenium-and-tellurium-statistics-and-information>.

<sup>47</sup> MINERAL COMMODITY SUMMARIES 2018, *supra* note 7, at 167.

<sup>48</sup> C. Schuyler Anderson, *Selenium and Tellurium*, in U.S. GEOLOGICAL SURV., 2017 MINERALS YEARBOOK (2019) (Tables-only release).

<sup>49</sup> *Id.*

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*D. Tellurium's Status as a Critical Mineral*

In 2017, DOI designated tellurium a critical mineral.<sup>50</sup> Disruption of the tellurium supply chain would result in substantial economic impact because 40 percent of all recovered tellurium is used in solar cell manufacturing.<sup>51</sup> Currently, the thermal electric sector uses an additional 30 percent of the available tellurium supply.<sup>52</sup> Disruption of the tellurium supply chain could result in market shortages for these in-demand technologies since tellurium is necessary to manufacture them.

Disruption of the tellurium supply chain could also impact national security. Tellurium is a necessary manufacturing input in a suite of military technologies, such as thermal imaging devices and heat-seeking missiles.<sup>53</sup> The military requires uncompromised access to technologies such as these and others to perform a variety of assignments pertinent to national security. Without access to some of these technologies, military operations could be impeded. While other minerals can potentially serve as substitutes for tellurium in some technology designs, they often compromise performance.<sup>54</sup> Substitution is also a limited solution for byproduct commodities, as the most compatible replacement minerals are usually other byproducts of the same primary commodity.<sup>55</sup>

*E. Law Governing Critical Mineral Procurement*

The Defense Production Act of 1950 is the original controlling legislation for critical minerals.<sup>56</sup> Congress reauthorized

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<sup>50</sup> Final List of Critical Minerals 2018, *supra* note 4.

<sup>51</sup> Goldfarb et al., *supra* note 33, at R3.

<sup>52</sup> *Id.*

<sup>53</sup> Anderson, *supra* note 46, at 65.1-65.2.

<sup>54</sup> MINERAL COMMODITY SUMMARIES 2018, *supra* note 7, at 167.

<sup>55</sup> N.T. Nassar et al., *By-product Metals are Technologically Essential but Have Problematic Supply*, 1-3 SCI. ADVANCES 1, 7 (2015).

<sup>56</sup> 50 U.S.C. § 2062(a)(1)(D) (2012).

the Act over 50 times since its original promulgation.<sup>57</sup> In this process, renewed parts of it were dispersed across the U.S. Code.<sup>58</sup> When the President deems a material critical to national defense, including a mineral, he has substantial power to control the domestic market for it.<sup>59</sup> There are several ways the President can control the market, including making private industry give priority to government contracts, awarding incentives to producers of critical minerals, giving preferential treatment for small businesses that produce critical minerals, and by issuing guaranteed loans.<sup>60</sup> DOD may implement special market incentives as directed by the President or as specified by law.<sup>61</sup>

The law relies on market solutions and criminal sanctions to reinforce market outcomes in order to acquire critical minerals.<sup>62</sup> In fact, President Donald Trump has already exercised his authority under federal law to begin mitigating some at-risk supply chains.<sup>63</sup> While business solutions are typically attractive to companies and may even work in most instances, this plan is flawed in three fundamental ways. First, it necessarily assumes that owners of critical minerals will respond to market incentives. Even accompanied by the threat of fines and imprisonment, this assumption is problematic

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<sup>57</sup> JARED T. BROWN & DANIEL H. ELSE, CONG. RESEARCH SERV., R43118, THE DEFENSE PRODUCTION ACT OF 1950: HISTORY, AUTHORITIES, AND REAUTHORIZATION 1 (2014).

<sup>58</sup> Note that some government works still refer to the original legislation and titles of the Defense Production Act. See, e.g., Matthew Seaford, *Title III of the Defense Production Act at the Industry Routable* (2014), available at <https://www.energy.gov/eere/bioenergy/downloads/title-iii-defense-production-act>.

<sup>59</sup> See 50 U.S.C. § 4511 (2012) (prioritization of government contracts); 50 U.S.C. § 4512 (2012) (prevention of civilian hoarding); 50 U.S.C. § 4517 (2012) (allocating incentives); 50 U.S.C. §§ 4518, 4551 (2012) (preferential treatment for small business producers); 50 U.S.C. § 4531 (2012) (guaranteed loans).

<sup>60</sup> See 50 U.S.C. §§ 4511, 4512, 4517, 4518, 4551, 4531 (2012).

<sup>61</sup> 50 U.S.C. § 4511(b) (2012); *Defense Production Act (DPA) Title III*, DEP'T OF DEF. INDUS. POL'Y, <https://www.businessdefense.gov/Programs/DPA-Title-III/> (last visited Feb. 23, 2020).

<sup>62</sup> See *supra* note 59 (listing a variety of market solutions); 50 U.S.C. § 4513 (2012).

<sup>63</sup> E.g., 83 Fed. Reg. 51617 (Oct. 11, 2018); 83 Fed. Reg. 51619 (Oct. 5, 2018).

because it may not quickly resolve circumstances involving sellers who conscientiously object.<sup>64</sup>

Second, a company may try to game the market incentives system by asking for an extraordinarily high price, though it must ultimately accept the government contract.<sup>65</sup> If time is of the essence, DOD may pay the inordinately high prices to quickly settle the contract. However, there is likely a price point for each critical mineral that even DOD will not pay. The longer the dispute persists between DOD and the producing company in a time of necessity, the greater the negative impact on national security.

Third, the Code contains an ambiguous eminent domain provision for critical materials.<sup>66</sup> The eminent domain provision at 50 U.S.C. § 3816(c)-(d) reads as follows:

(c) Failure to give precedence; Government possession

In case any person with whom an order is placed pursuant to the provisions of subsection (a) of this section refuses or fails—

(1) to give such order such precedence with respect to all other orders (Government or private) theretofore

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<sup>64</sup> As an example of conscientious objection to mining, owners of a mining company may conscientiously object to doing business with the military when it would be in support of a war effort. Additionally, there are relevant social sensitivities concerning Native American cultural spaces. A mining company, especially if backed by Native American investors, may abstain from recovering minerals like gold in areas where such mining practices have historically caused persecution or environmental harm. Michael Lopez provides a brief discussion of how past and present mining practices harm social justice in Native American communities in *Tribal Rights: The 1872 Mining Law's Past and Future*, 34 NAT. RES. & ENV'T 3 (2020). This is all to say, conscientious objection to mineral recovery is conceivable.

<sup>65</sup> This could occur in markets where there is limited competition, the supply is in dire shortage, and no substitutes are feasible.

<sup>66</sup> See 50 U.S.C. § 3816(b)-(d), (f) (2012).

or thereafter placed with such person as the President may have prescribed;

(2) to fill such order within the period of time prescribed by the President or as soon thereafter as possible as determined by the President;

(3) to produce the kind or quality of articles or materials ordered; or

(4) to furnish the quantity, kind, and quality of articles or materials ordered at such price as shall be negotiated between such person and the Government agency concerned; or in the event of failure to negotiate a price, to furnish the quantity, kind, and quality of articles or materials ordered at such price as he may subsequently be determined to be entitled to receive under subsection (d);

the President is authorized to take immediate possession of any plant, mine, or other facility of such person and to operate it, through any Government agency, for the production of such articles or materials as may be required by the Government.

(d) Payment of compensation by United States

Fair and just compensation shall be paid by the United States (1) for any articles or materials furnished pursuant to an order placed under subsection (a) of this section, or (2) as rental for any plant, mine, or other facility of which possession is taken under subsection (c).<sup>67</sup>

This eminent domain provision is unpredictable. A plain language reading of the statute suggests that for a line of production at a mine or processing facility to be lawfully taken, it must already

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<sup>67</sup> 50 U.S.C. § 3816(c)-(d) (2012).

exist. The statute does not expressly authorize the President or any of his appointed actors to force a private party to start a new line of production so that the future assets can be taken. This distinction is important for critical minerals that are commonly produced as byproduct commodities. Unless the mining company currently recovers, or at least historically recovered, the byproduct commodity, it is not clear that this eminent domain provision could force a mining company to start.

This eminent domain power may also be difficult to use in practice. In the famous constitutional law case, *Youngstown Sheet and Tube Co. v. Sawyer*, President Truman seized most of the domestic steel mills through an executive order to prevent an emergency steel shortage.<sup>68</sup> Though the majority opinion of the Supreme Court said this was an unconstitutional exercise of presidential power, the controversy did lend insight into an unreliable material procurement system.<sup>69</sup> At the time, two statutes authorized the President to seize private assets under specific circumstances, including an earlier version of the Defense Production Act (DPA).<sup>70</sup> The government explained that it did not follow the protocols as specified in the DPA because they were “much too cumbersome, involved, and time-consuming for the crisis which was at hand.”<sup>71</sup> Regarding the procurement and prioritization of critical materials, the original DPA as referenced in this case, contained provisions substantially similar to the ones codified today.<sup>72</sup> If another instance arises where immediate access to critical minerals becomes necessary, eminent domain protocols<sup>73</sup> alone may be ill-equipped for the circumstance.

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<sup>68</sup> *Youngstown Sheet & Tube Co. v. Sawyer*, 343 U.S. 579, 582-83 (1952).

<sup>69</sup> *Id.* at 586, 589.

<sup>70</sup> *Id.* at 585-86.

<sup>71</sup> *Id.* at 586.

<sup>72</sup> See BROWN & ELSE, *supra* note 57, at 3.

<sup>73</sup> 50 U.S.C. § 3816(c)-(d) (2012).

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II. EMINENT DOMAIN AND LAND USE REGULATION

Eminent domain is sovereign government's right to dispossess an owner's private property for public benefit.<sup>74</sup> Under the exercise of eminent domain, a government may "take" private property for "public use" provided that the government pays "just compensation" to the owner.<sup>75</sup> A government can take property without consent of the property owner, but must have legislative authorization.<sup>76</sup> In an affirmative exercise of eminent domain, the government begins a condemnation proceeding to obtain the property.<sup>77</sup> Courts afford great deference to the legislature when the government exercises eminent domain.<sup>78</sup>

The Fifth Amendment of the United States Constitution reads, "No person shall . . . be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation."<sup>79</sup> The Fifth Amendment does not prohibit taking by the government—it only guarantees due process and a remedy of just compensation.<sup>80</sup> This guarantee is "designed to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be

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<sup>74</sup> *Miss. & Rum River Boom Co. v. Patterson*, 98 U.S. 403, 406 (1878); *Kohl v. United States*, 91 U.S. 367, 371-72 (1875).

<sup>75</sup> U.S. CONST. amend. V.

<sup>76</sup> *Patterson*, 98 U.S. at 406; *Cherokee Nation v. Southern Kan. Ry. Co.*, 135 U.S. 641, 656 (1890) ("[F]or the United States may exercise the right of eminent domain, even within the limits of the several states, for purposes necessary to the execution of the powers granted to the general government by the constitution. Such an authority, as was said in [*Kohl*], is essential to the independent existence and perpetuity of the United States, and is not dependent upon the consent of the states.").

<sup>77</sup> 29A C.J.S. *Eminent Domain* § 250 (2018).

<sup>78</sup> See *Pa. Coal Co. v. Mahon*, 260 U.S. 393, 413 (1922); *Kelo v. City of New London*, 545 U.S. 469, 488 (2005).

<sup>79</sup> U.S. CONST. amend. V.

<sup>80</sup> *Id.*



borne by the public as a whole.”<sup>81</sup> When the government interferes with private property rights, it destroys them.<sup>82</sup>

While the government has the inherent power and public responsibility to regulate, this power is limited.<sup>83</sup> Balancing public interests achieved through regulation with the sanctity of private property begins with the Fifth Amendment.<sup>84</sup> “While property may be regulated to a certain extent, if regulation goes too far, it constitutes a taking.”<sup>85</sup>

The government can “take” property inadvertently by excessively regulating how the owner uses and enjoys it, called an “implied taking by regulation.” With implied takings by regulation, the government does not affirmatively exercise eminent domain and commence a formal condemnation proceeding.<sup>86</sup> Instead, it promulgates the regulation and an owner must bring a reverse condemnation suit to challenge it.<sup>87</sup> When a court finds an implied taking by regulation, the regulation typically stands but the government pays just compensation to the land owner.<sup>88</sup>

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<sup>81</sup> *Armstrong v. United States*, 364 U.S. 40, 49 (1960).

<sup>82</sup> *Loretto v. Teleprompter Manhattan CATV Corp.*, 458 U.S. 419, 434-35 (1982).

<sup>83</sup> See *Pa. Coal*, 260 U.S. at 413-14.

<sup>84</sup> Mark S. Barron, *Constitutional Protections for Mineral Interest Holders: Oil and Gas Regulation and the Takings Clause*, 61 ROCKY MT. MIN. L. INST. 13-1, 13-3 (2015).

<sup>85</sup> *Pa. Coal*, 260 U.S. at 415.

<sup>86</sup> Mary Feighny, *Stealth Takings: Inverse Condemnation*, 84 J. KAN. B. ASS'N 33, 33 (2015).

<sup>87</sup> See *id.*

<sup>88</sup> Note that the Supreme Court remedies the taking through compensation, not by striking the regulation. See Michael Rikon, *Inverse Condemnation*, 67 N.Y. ST. B.J. 28, 29 (1995) (“More recently, the Supreme Court in *Lucas v. South Carolina Coastal Council*, [505 U.S. 1003] (1992) held that where a regulation denies ‘all economically beneficial or productive use of land’ the owner will be entitled to compensation . . .”).

Domestic mining requires permitting, a form of land use regulation, from both local governments and the federal government.<sup>89</sup> The permitting processes derive their authority under the police power when state-based, and by statutory authority as implemented by executive branch agencies when federally-based.<sup>90</sup> At the federal level, mining permits can be granted with conditions.<sup>91</sup>

The Supreme Court recognizes that land use regulations can violate the Takings Clause. The Court provided a bright-line categorical rule relevant to the tellurium scenario. Even when the conditions for the categorical rule are not met, other factor-based tests are available. The following subsections explain rules relevant to resolving the tellurium scenario described in Section I.

#### A. Categorical Rule for Implied Takings

In the landmark case *Lucas v. South Carolina Coastal Council*, a purchaser of beachfront property was prohibited from building any structures on it by a regulation promulgated after the

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<sup>89</sup> What are environmental regulations on mining activities?, AM. GEOSCIENCES INST. (Dec. 24, 2018), <https://www.americangeosciences.org/critical-issues/faq/what-are-regulations-mining-activities>.

<sup>90</sup> See, e.g., *Va. Uranium, Inc. v. Warren*, 848 F.3d 590, 596 (4th Cir. 2017) (showing the tension between historical state police power and federal authority to regulate mining); U.S. ENVTL. PROT. AGENCY, BACKGROUND FOR NEPA REVIEWERS: NON-COAL MINING OPERATIONS 1-2 - 1-10 (1994) (describing the statutory authority under which the EPA derives its ability to regulate aspects of the mining industry).

<sup>91</sup> E.g., Press Release, Excelsior Mining Corp., Excelsior Mining Receives Federal EPA Operating Permit (Dec. 24, 2018), available at <https://www.excelsiormining.com/news/news-2018/excelsior-mining-receives-federal-epa-operating-permit> (explaining that the United States Environmental Protection Agency granted the mining company a permit with protective conditions); U.S. Env'tl. Prot. Agency, Notice of Final Permit Decision: Issuance of the Class III In-Situ Production of Copper Permit No. R9UIC-AZ3-FY16-1 (June 22, 2018), <https://www.epa.gov/sites/production/files/2018-06/documents/r9uic-az3-fy16-1-excelsior-permit-notice-final-permit-decision-2018-06-22.pdf> (announcing the issuance of the permit announced by Excelsior Mining).

transaction.<sup>92</sup> Under the *Lucas* rule, a land use regulation that “call[s] upon [the owner] to sacrifice all economically beneficial uses” experiences a taking.<sup>93</sup> A landowner’s claim will fail if “the proscribed use interests were not part of his title to begin with.”<sup>94</sup> Ten years later, the Supreme Court would again see a *Lucas*-style claim in *Tahoe-Sierra Preservation Council v. Tahoe Regional Planning Agency*. This case involved a 32-month moratorium that prohibited nearly all construction and development on a parcel of land.<sup>95</sup> Here, the Supreme Court established that in order to prevail under a *Lucas* theory of taking, the total deprivation<sup>96</sup> of value must be permanent.<sup>97</sup> If an implied takings claim does not prevail under a categorical rule, it can still prevail under factor tests.

### B. Factor Tests for Implied Takings

*Pennsylvania Coal v. Mahon* established the original factor test for implied takings.<sup>98</sup> The Supreme Court struck down a statute that forbade a company from mining coal below houses because “[t]o make it commercially impracticable to mine certain coal has very nearly the same effect for constitutional purposes as appropriating or destroying it.”<sup>99</sup> The *Pennsylvania Coal* test contains two factors: first, the reduction of value that the regulation imparts on the land, and second, the reciprocity of benefit that the regulation creates.<sup>100</sup>

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<sup>92</sup> *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1006 (1992).

<sup>93</sup> *Id.* at 1019.

<sup>94</sup> *Id.* at 1027.

<sup>95</sup> *See id.* at 1003; *Tahoe-Sierra Pres. Council v. Tahoe Reg’l Planning Agency*, 535 U.S. 302, 306 (2002).

<sup>96</sup> *Tahoe-Sierra Pres. Council*, 535 U.S. at 330 (reiterating that the *Lucas* categorical rule would not apply if the diminution in value were 95 percent instead of 100 percent).

<sup>97</sup> *See Lucas*, 505 U.S. at 1003; *Tahoe-Sierra*, 535 U.S. at 321.

<sup>98</sup> *See generally* *Pa. Coal v. Mahon*, 260 U.S. 393 (1922).

<sup>99</sup> *Id.* at 414.

<sup>100</sup> *Id.* at 413-15.

Conceptualizing the first factor as a fraction,<sup>101</sup> the numerator is the change in value caused by the regulation and the denominator is the total value of the coal mineral estate.<sup>102</sup> Decades later, the Supreme Court in *Keystone Bituminous Coal Ass'n v. DeBenedictis* expanded the *Pennsylvania Coal* first factor denominator to include the entire estate of land when a mining company owns both the support and mineral estates of a parcel.<sup>103</sup> This resulted in a higher value denominator—meaning that all things equal, the formula yielded a smaller change in value.<sup>104</sup> The numerator did not change.<sup>105</sup>

The Supreme Court in *Pennsylvania Coal* did not explain the second factor, reciprocity of benefit, in any detail, though it does acknowledge that a regulation which provides safety to the party weighs against the landowner.<sup>106</sup> “The general rule at least is that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking.”<sup>107</sup> One challenge with practically applying the *Pennsylvania Coal* test is that the Supreme Court never delineated how far is “too far.”<sup>108</sup>

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<sup>101</sup> Frank I. Michelman, *Property, Utility, and Fairness: Comments on the Ethical Foundations of “Just Compensation” Law*, 80 HARV. L. REV. 1165, 1192 (1967) (illustrating the *Pennsylvania Coal* test as a fraction).

<sup>102</sup> *Pa. Coal*, 260 U.S. at 413-14 (*Pa. Coal* Reduction of Value = (Initial Value – Final Value After Regulation) / (Total Value of the Mineral Estate)).

<sup>103</sup> *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 500-01 (1987) (“It is clear, however, that our takings jurisprudence forecloses reliance on such legalistic distinctions [between sections of estates in land] within a bundle of property rights.”); *Pa. Coal*, 260 U.S. at 414.

<sup>104</sup> See *Pa. Coal*, 260 U.S. at 393; *Keystone*, 480 U.S. at 470 (*Keystone* Reduction of Value = (Initial Value – Final Value After Regulation) / (Total Value of the Estate in Land)).

<sup>105</sup> *Keystone*, 480 U.S. at 493. The numerator still represents the impact due to the regulation, which is calculated the same way.

<sup>106</sup> See *Pa. Coal*, 260 U.S. at 413-15.

<sup>107</sup> *Id.* at 416.

<sup>108</sup> *Id.*

In *Penn Central Transportation Company v. City of New York*, the Supreme Court revisited the issue of when a land use regulation amounts to a Fifth Amendment taking.<sup>109</sup> The owner of Grand Central Terminal wanted to construct an office building on top of the station to lease for additional revenue.<sup>110</sup> The terminal, however, was declared a historical landmark under local law, so the New York City Commission declined to issue construction permits for the office building to maintain the historical landmark.<sup>111</sup>

The Supreme Court established a three-factor test to reach its ruling in *Penn Central Transportation*.<sup>112</sup> The test requires an “ad-hoc factual inquiry:” (1) economic impact on owner; (2) interference with investment-backed expectations, and (3) the character of government action.<sup>113</sup> The reference for this test is the entire parcel, as “taking jurisprudence does divide not a single parcel into discrete segments and attempt to determine whether rights in a particular segment have been completely abrogated.”<sup>114</sup>

Regarding the first factor, the Supreme Court found that being denied the opportunity to use a particular property interest is different than economic harm from the regulation.<sup>115</sup> Furthermore, it did not defeat the primary land use expectation, which was to run a train station accommodating passenger travel.<sup>116</sup> Second, the regulation did not violate any investment-backed expectations because the owner had the option of transferring pre-existing air rights to other parcels of land.<sup>117</sup> Third, government interference with

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<sup>109</sup> See generally *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104 (1978).

<sup>110</sup> *Id.* at 116.

<sup>111</sup> *Id.* at 117.

<sup>112</sup> *Id.* at 124.

<sup>113</sup> *Id.*

<sup>114</sup> *Id.* at 130.

<sup>115</sup> See *Penn Cent.*, 438 U.S. at 136.

<sup>116</sup> *Id.* at 136.

<sup>117</sup> See *id.* at 136-37.

private property rights is less like a taking when it is part of “some public program adjusting the benefits and burdens of economic life to promote the common good.”<sup>118</sup> The station owner admitted that preserving historical character and culture was a valid governmental goal.<sup>119</sup> Although in this instance only the station was affected, the entire community was subject to the same regulations and collectively bore the cost of maintaining historical character.<sup>120</sup>

The *Penn Central* test has no shortage of critics for its inherent difficulty to apply.<sup>121</sup> As one scholar observed, it “conjectures upon claimants’ expectations regarding what they owned, together with inherently subjective notions of fairness.”<sup>122</sup> For example, the Court emphasized public burden and disproportionality of impact, focusing the test on the owner, not the land.<sup>123</sup>

### C. Public Use Test

Existing precedent provides ample guidance about the public use element of eminent domain. Legislatures are initially tasked with defining public use.<sup>124</sup> The definition of public use has evolved to become more broad over time.<sup>125</sup> In the landmark case *Kelo v. City of*

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<sup>118</sup> *Id.* at 124.

<sup>119</sup> *Id.* at 129.

<sup>120</sup> See *Penn Cent.*, 438 U.S. at 134.

<sup>121</sup> Steven J. Eagle, *The Four-Factor Penn Central Regulatory Takings Test*, 118 PENN ST. L. REV. 601, 604 (2014).

<sup>122</sup> *Id.*

<sup>123</sup> *Id.* at 614.

<sup>124</sup> Philip Nichols, Jr., *The Meaning of Public Use in the Law of Eminent Domain*, 20 B.U. L. REV. 615, 615 (1940) (“It is settled law in every American court today that private property may not be taken by eminent domain except for a public use, and that what constitutes a public use, although in the first instance a legislative question, is in the last analysis a question of Constitutional Law to be determined by the courts.”).

<sup>125</sup> Lawrence Berger, *Public Use Requirement in Eminent Domain*, 57 OR. L. REV. 203, 205 (1978).

*New London*, the Supreme Court held that economic development can meet the public use requirement.<sup>126</sup> Likewise, both national defense and mining are also public uses.<sup>127</sup> If the government were to exercise eminent domain affirmatively through a condemnation proceeding to obtain the tellurium in this scenario, there is little doubt that the public use requirement would be met. In contrast, the public use element is less significant or not even considered by a court in an implied takings analysis.<sup>128</sup> The notable exception is when the government conditions the land use permit with an exaction.

An exaction, or a quid pro quo regulation that presents an onerous condition(s) in a permitting process to advance public interests, can be part of the land use regulation process.<sup>129</sup> An improper exaction is a taking because the owner is effectively barred from using the property without a permit.<sup>130</sup> As observed by the Supreme Court, “so long as the [land use] permit is more valuable than any just compensation the owner could hope to receive for the right-of-way, the owner is likely to accede to the government’s demand, no matter how unreasonable. Extortionate demands of this sort frustrate the Fifth Amendment right to just compensation . . .

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<sup>126</sup> *Kelo v. City of New London*, 545 U.S. 439, 488-89 (2005).

<sup>127</sup> See *Nichols*, *supra* note 124, at 617 (providing a detailed description of mining as public use in some states); *Int’l Paper Co. v. United States*, 282 U. S. 399, 408 (1931) (ruling that the government requisition of electricity for national defense meets the public use requirement).

<sup>128</sup> *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1015 (1992) (“We have, however, described at least two discrete categories of regulatory action as compensable without case-specific inquiry into the public interest advanced in support of the restraint.”).

<sup>129</sup> Richard D. Rattner & Patrick M. Ellis, *After Koontz: Practical Considerations, Real Implications*, 40 MICH. REAL PROP. REV. 105, 107 (2014).

<sup>130</sup> *Id.* at 107.

<sup>131</sup> *Koontz v. St. Johns River Water Mgmt. Dist.*, 570 U.S. 595, 605 (2013).

*Nollan v. California Coastal Commission* is an influential case that addressed the legality of exactions in land use permitting.<sup>132</sup> The owner of a beachfront house sought a building permit to build a new home on the lot.<sup>133</sup> In an administrative proceeding, the California Coastal Commission found that the larger home design would block the existing view of the beach front and would impede access to and along the beach.<sup>134</sup> The Commission approved the permit but with a condition that the owner must grant a public easement through the parcel of land for beach access.<sup>135</sup> To resolve whether this condition was an improper exaction amounting to a taking, the Supreme Court established the “essential nexus” test.<sup>136</sup> The Court describes the essential nexus test as follows:

The Commission argues that a permit condition that serves the same legitimate police-power purpose as a refusal to issue the permit should not be found to be a taking if the refusal to issue the permit would not constitute a taking. We agree. Thus, if the Commission attached to the permit some condition that would have protected the public’s ability to see the beach notwithstanding construction of the new house—for example, a height limitation, a width restriction, or a ban on fences—so long as the Commission could have exercised its police power (as we have assumed it could) to forbid construction of the house altogether, imposition of the condition would also be constitutional.<sup>137</sup>

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<sup>132</sup> See generally *Nollan v. Cal. Coastal Comm’n*, 483 U.S. 825 (1987).

<sup>133</sup> *Id.* at 828.

<sup>134</sup> *Id.* at 828-29.

<sup>135</sup> *Id.* at 829.

<sup>136</sup> *Id.* at 837.

<sup>137</sup> *Nollan*, 483 U.S. at 836.



Thus, if the condition does not advance the same interest that prohibiting the permit would, the essential nexus test fails and the condition is a taking.<sup>138</sup>

One challenge is that the Supreme Court in *Nollan* never specified how close the essential nexus must be.<sup>139</sup> This test was refined in *Dolan v. City of Tigard* to include a measure of “rough proportionality.”<sup>140</sup> In *Dolan*, a land owner applied for a permit to double the size of her store and to construct an additional structure within a designated 100 year flood plain, which was granted with two conditions.<sup>141</sup> The Court explained the conditions had to meet the “rough proportionality” test described as follows:

We think a term such as “rough proportionality” best encapsulates what we hold to be the requirement of the Fifth Amendment. No precise mathematical calculation is required, but the city must make some sort of individualized determination that the required dedication is related both in nature and extent to the impact of the proposed development.<sup>142</sup>

Later, the Supreme Court in *Koontz v. St. John Water Management District* solidified the *Nollan* and *Dolan* tests, establishing that both must be performed when assessing whether an exaction is a Fifth Amendment taking.<sup>143</sup> Together, the *Nollan* and *Dolan* tests provide the government with flexibility to manage how

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<sup>138</sup> *Id.* at 836.

<sup>139</sup> *Id.* at 825; Christopher J. St. Jeanos, *Dolan v. Tigard and the Rough Proportionality Test: Roughly Speaking, Why Isn't a Nexus Enough?*, 63 FORDHAM L. REV. 1883, 1885 (1995).

<sup>140</sup> *Dolan v. City of Tigard*, 512 U.S. 374, 391 (1994).

<sup>141</sup> *Id.* at 379.

<sup>142</sup> *Id.* at 391.

<sup>143</sup> *Koontz v. St. Johns River Water Mgmt. Dist.*, 570 U.S. 595, 605.

the permit applicant will internalize the full cost of the proposed activity, so long as both tests are met.<sup>144</sup>

#### *D. Just Compensation*

To award compensation for the taking, a reasonable value must be ascertained. Compensation is awarded based on the market value of the owner's loss, not the taker's subjective gain.<sup>145</sup> Prevailing market value is the "yardstick" for assessing mineral land compensation in eminent domain cases.<sup>146</sup> The government can reasonably ascertain the prevailing market value per unit for a mineral through published values, expert testimony, or other evidence to this effect.<sup>147</sup>

### III. ANALYSIS OF THE TELLURIUM SCENARIO

Returning to the tellurium scenario, the copper company is primarily interested in the copper content of the mined ore, though tellurium is present in much smaller quantities in the ore as well. The company currently has technology available to recover the tellurium but does not use it. In this analysis, I presume the process and recovery ratio of tellurium is consistent with the scientific literature: one pound of tellurium for every 500 tons (one million pounds) of copper.<sup>148</sup> Assuming this condition to recover tellurium is otherwise facially valid, does it amount to a Fifth Amendment taking?

This analysis begins with the presumption that the copper company contests the requirement to recover the tellurium through a reverse condemnation claim after exhausting all administrative

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<sup>144</sup> *Id.* at 605-06.

<sup>145</sup> *United States v. Miller*, 317 U.S. 369, 375 (1943).

<sup>146</sup> John P. Horgan, *Mineral Valuation in Eminent Domain Cases*, 7 HASTINGS L.J. 163, 163 (1956).

<sup>147</sup> See generally Rebekah King, *Valuation of Minerals in Takings Cases*, 42 NAT. RES. J. 185, 189, 201 (2002).

<sup>148</sup> McLemore, *supra* note 12, at 1.

remedies. The following analysis guides the likely outcome of the reverse condemnation proceeding.

*A. Lucas Categorical Rule for Taking*

Under the *Lucas* rule, a regulation that permanently destroys all economic value for a property is a taking.<sup>149</sup> The regulation must destroy the entire value of the property; a mere reduction is not enough.<sup>150</sup> The copper company will fail to show a taking under the *Lucas* rule because the tellurium condition does not destroy all value of the property.<sup>151</sup> First, the regulated land is still valuable because it can conceivably be used in valuable ways other than mining, such as for harvesting timber or grazing animals. Second, the regulated land still has value as a mining property. Even if the copper company incurs a loss to recover the tellurium, it would almost certainly not equal or exceed the profit that the company generated recovering the millions of pounds of copper, especially after the government pays market price for the tellurium.

Even if in the extremely unlikely event that the copper company could prove that recovering tellurium would eliminate 100 percent of the profit earned from mining copper, the company must also prove that the regulation is permanent per the ruling in *Sierra Tahoe*.<sup>152</sup> One way the government could preempt this claim would be for the permit-issuing agency to expressly state a time limitation for the condition. The limitation could be for a duration of days, or until a minimum threshold of tellurium is recovered. The *Lucas* rule requires the regulation to be permanent, so a temporary deprivation

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<sup>149</sup> *Lucas*, 505 U.S. at 1016.

<sup>150</sup> *Tahoe-Sierra Pres. Council v. Tahoe Reg'l Planning Agency*, 535 U.S. 302, 330 (2002).

<sup>151</sup> See *Lucas*, 505 U.S. at 1019.

<sup>152</sup> See *Tahoe-Sierra Pres. Council*, 535 U.S. at 321.

of value in any amount will not support an inverse condemnation claim under this categorical rule.<sup>153</sup>

### *B. Pennsylvania Coal Factor Test for Taking*

The *Pennsylvania Coal* factor test, though old, is still valid.<sup>154</sup> Therefore, the two-factor test lends guidance for the tellurium scenario. First, a court will consider how much a regulation devalues the mineral estate.<sup>155</sup> Representing this factor as a fraction, the first equation restates the generic form and the second applies it to the tellurium scenario:

$$\text{Pa. Coal Reduction of Value} = \frac{\text{Initial Value} - \text{Final Value After Regulation}}{\text{Total Value of the Coal Mineral Estate}}$$

$$\text{Pa. Coal Reduction of Value} = \frac{A - B}{C}$$

A = Initial profit from recovering copper.

B = Profit from recovering copper – cost of recovering tellurium + price received for tellurium.

C = Total value of the Copper and tellurium ore, in which tellurium is valued at zero because it is sent to the waste streams.<sup>156</sup>

One challenge with applying the first factor of the *Pennsylvania Coal* test is defining the subset of land to use as the denominator. In *Pennsylvania Coal*, the Court drew the line around

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<sup>153</sup> *Id.*

<sup>154</sup> *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 484-485 (1987); Robert M. Washburn, *Land Use Control, The Individual, and Society: Lucas v. South Carolina Coastal Council*, 52 MD. L. REV. 162, 177 (1993) (“[T]he Court [in *Keystone*] expressly affirmed the regulatory takings doctrine set forth in *Pennsylvania Coal* . . .”).

<sup>155</sup> *Pa. Coal Co. v. Mahon*, 260 U.S. 393, 413 (1922).

<sup>156</sup> See Michelman, *supra* note 101, at 1192.

the entire coal mineral estate.<sup>157</sup> Coal, however, is a geological nuance because the mineral content “in the ore” is 100 percent; the coal is both the mineral content and the entire mineral estate.<sup>158</sup> As applied to mineral cases in which an individual mineral is among others in an orebody, the context of the decision suggests the Court intended the denominator to represent the entire mineral estate.<sup>159</sup> Thus, in this tellurium scenario, the copper and tellurium ore together is the value in the denominator, not just the tellurium portion of the mineral estate.

The first factor of the *Pennsylvania Coal* test would benefit from factual inputs not provided by this tellurium scenario. Regardless, it may be applied conceptually and yield the same result. When simplified, the numerator is relatively small compared to the denominator, which shows a small reduction in value. Since the ratio of copper to tellurium recovery is 1 million pounds to 1 pound, the cost of recovering the tellurium would almost certainly be magnitudes smaller than the size of the profit gained by copper mining. As applied, the first factor of the *Pennsylvania Coal* test weighs against a taking.

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<sup>157</sup> *Pa. Coal*, 260 U.S. at 413-14.

<sup>158</sup> The mining industry sometimes settles this discrepancy by calling coal a rock instead of a mineral because minerals are constituents in rock orebodies. See, e.g., National Mining Association, FACTS ABOUT COAL AND MINERALS 6 (2016). I note that this technical distinction (coal as a rock versus coal as an ore with 100 percent mineral content) is not uniformly recognized in the mining industry, and was clearly not considered, if even known, to the Supreme Court in *Pennsylvania Coal*.

<sup>159</sup> See *Pa. Coal*, 260 U.S. at 412-14 (“[The regulation] purports to abolish what is recognized in Pennsylvania as an estate in land—a very valuable estate—and what is declared by the Court below to be a contract hitherto binding the plaintiffs.”). Note that the Court is describing a mineral estate, not the valuable consistent part (coal) of a mineral estate.

The *Keystone Coal* supplement to *Pennsylvania Coal* further weighs the test against the copper mining company.<sup>160</sup> In *Keystone*, the Court drew the line around the entire estate of land, not just the mineral portion.<sup>161</sup> This increases the initial value in the numerator and the total value in the denominator because the entire estate in land has value beyond the mineral portion. The cost of recovering tellurium is the same, resulting in larger initial values under *Keystone* that make the first factor weigh even further against a taking.<sup>162</sup>

The second factor of the *Pennsylvania Coal* test considers the mutual benefit gained by the copper company and society through the regulation.<sup>163</sup> This factor weighs against the copper company if it benefits from the regulation for two reasons. First, the copper company benefits from national defense, which is enabled and enhanced by the regulation. The recovered tellurium is a manufacturing input for defense technologies, such as thermal imaging devices, without which military operations would suffer.

Second, the copper company benefits from the regulation because now the government is vested in the success of the operation. Barring some extreme circumstance, it would be unreasonable for the government to revoke copper mining permits if it depends on the continuation of copper mining to recover tellurium. In this sense, the tellurium regulation joins two historically adverse parties, the government and a mining company, to work towards a common interest. The copper mining company benefits from this arrangement because it is exposed to less risk of the government shutting it down.

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<sup>160</sup> *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 500 (1987); *Pa. Coal*, 260 U.S. at 414.

<sup>161</sup> *Keystone Coal*, 480 U.S. at 500-01.

<sup>162</sup> *Id.*

<sup>163</sup> *Pa. Coal*, 260 U.S. at 415.

Both *Pennsylvania Coal* factors weigh against a taking.<sup>164</sup> Under this legal theory, the tellurium condition is permissible and the copper company would not receive just compensation.

*C. Penn Central Factor Test for Taking*

Another legal theory under which a court could analyze the tellurium condition is the *Penn Central* factor test.<sup>165</sup> The first factor in this test concerns the economic impact of the regulation on the owner.<sup>166</sup> This factor will turn on the per unit production cost of tellurium. If the production cost per unit of tellurium exceeds the market price the government pays the copper company for the tellurium, then this factor would weigh towards a Fifth Amendment taking.

The second factor considers investment-backed expectations.<sup>167</sup> The copper company in the tellurium scenario is profitably mining copper, but is now presented with a new condition to recover tellurium present in the ore. A court would likely find that this condition does not impact the initial purpose of investment for two reasons. First, in the same way the zoning regulation in *Penn Central* did not affect passengers frequenting the train station for travel, the condition to recover the tellurium does not interfere with the copper company's ability to mine copper.<sup>168</sup> This remains true, even if the company nets less money mining copper to off-set losses incurred from recovering the tellurium.

Second, a court may consider the existing tellurium technology to be an investment-backed expectation. It is reasonable to infer that investors would want this technology to be used,

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<sup>164</sup> See *id.* at 413-15.

<sup>165</sup> *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978).

<sup>166</sup> *Id.*

<sup>167</sup> *Id.*

<sup>168</sup> See *id.* at 136.

otherwise it would not have been built. Even if using the tellurium technology incurs a loss, the stability gained through the shared public-private interests in the success of the operation strengthen investment-backed expectations.

The third factor in the *Penn Central Station* test assesses the character of the government action.<sup>169</sup> Regulations that adjust societal burdens and benefits to further the public good weigh against a finding of a taking.<sup>170</sup> There is a clear connection between the public good and the tellurium condition because the recovered tellurium would directly impact defense technologies and buffer against sudden shortages in supply. Though the tellurium condition affects only the copper company in this scenario, this is not an isolated case. The government may also present permit conditions of this nature to other producers of critical minerals, who collectively receive the benefit to mine and who share the burden to provide minerals necessary for defense and national security.

Additionally, because mining is a disruptive activity, the federal government has a strong interest in effectively managing its potential effects on the environment. If the copper mining company could continue sending the tellurium to the waste streams, then the tellurium would be placed back into the land as part of the reclamation process. However, if this tellurium becomes a dire need in the future, then the reclaimed parcel of land must be re-mined in order to capture the tellurium. From the perspective of environmental integrity, the requirement to recover tellurium the first time a parcel is mined minimizes the negative impact on the air, soil, and water that society shares in common.

As applied to the tellurium scenario, the *Penn Central Station* factors do not unanimously point to an outcome. The first

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<sup>169</sup> *Id.* at 124.

<sup>170</sup> *Id.*



factor weighs towards a taking, while the second and third weigh strongly against it. Most likely, a court would find no taking and allow the tellurium condition to remain in effect.

*D. Nollan & Dolan Factor Tests for Public Use*

Courts examine the public use requirement of eminent domain when an exaction is involved.<sup>171</sup> This scenario presents an exaction because it conditions the ability of the copper company to mine copper upon a separate act – to recover the tellurium in the copper ore. Exactions are lawful exercises of the police power if they pass the *Nollan & Dolan* two-part test, meaning they are enforceable and do not require the government to pay just compensation.<sup>172</sup>

A court would examine if there is an essential nexus between the harm caused by mining copper and whether the requirement to recover tellurium lessens this harm.<sup>173</sup> One substantial and apparent harm caused by copper mining is environmental degradation, as land must be cleared and displaced to reach the ore underneath. The tellurium condition lessens environmental impact by having the company recover it the first time the ore is processed. If the tellurium is sent to the waste stream and reclaimed, the same parcel or a new parcel in the future will need to be mined to get tellurium. By requiring tellurium recovery along with the copper mining, it increases the military's access to tellurium without requiring additional, unnecessary future environmental harm to obtain it. The tellurium condition passes the essential nexus test, but now must also meet the test's rough proportionality aspect.<sup>174</sup>

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<sup>171</sup> See *Nollan v. Cal. Coastal Comm'n.*, 483 U.S. 825, 841 (1987).

<sup>172</sup> See *id.* at 837; *Dolan v. City of Tigard*, 512 U.S. 374, 391 (1994); *Koontz v. St. Johns River Water Mgmt. Dist.*, 570 U.S. 595, 605 (2013).

<sup>173</sup> See *Nollan*, 483 U.S. at 837.

<sup>174</sup> See *Dolan*, 512 U.S. at 391.

The tellurium condition passes the rough proportionality test because it relates in nature and extent to copper mining.<sup>175</sup> It relates in nature because both copper and tellurium recovery in this scenario originate from the same mining activity causing environmental harm on the same parcel of land. Likewise, the condition relates in extent because it almost certainly would be a relatively small expense compared to the amount of revenue copper mining yields. Adhering to this condition costs the company less than the total private and social costs associated with mining the same or additional land for tellurium in the future. The effect of this condition is to make the copper company internalize recovery costs to prevent further environmental externalities associated with future tellurium mining.

The tellurium condition meets both the *Nollan & Dolan* tests of essential nexus and rough proportionality, thus the exaction is binding and does not amount to a taking.<sup>176</sup>

#### IV. RECOMMENDATIONS & CONCLUSION

Reliable access to technology begins with the first step in the manufacturing supply chain—recovering the requisite mineral inputs. Tellurium is a critical mineral necessary for manufacturing technologies, such as infrared imaging and heat-seeking missiles. Due to its geological scarcity, the costs of recovering tellurium tend only to be justified when the company pursues a primary commodity. Like tellurium, eleven other critical minerals are byproduct commodities.

This comment used a hypothetical scenario to demonstrate a novel alternative method for the government to obtain critical minerals via permit exactions. Naturally, this solution works best before an emergency shortage of a critical mineral occurs. The low

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<sup>175</sup> See *id.* at 391.

<sup>176</sup> See *id.* at 391; *Nollan*, 483 U.S. at 837.

concentration of tellurium, or any byproduct critical mineral, in mined ore likely means that only small amounts can be recovered daily. Even with highly efficient technology, it could take weeks or even months for a single operation to recover the quantity that the government needs. Additionally, a mining company may challenge the condition within the permit-issuing agency and court system, further worsening an emergency shortage if critical mineral supplies are held up until these proceedings conclude.

To further increase mineral security, Congress should amend the eminent domain provision<sup>177</sup> so that it expressly applies to critical minerals present in mined ores but which are not currently recovered. This amendment would clarify existing ambiguity about how the law applies to byproduct minerals. It would also provide the federal government a clear mechanism to obtain them through an affirmative act of eminent domain, if necessary. A recommended timeframe, such as ten days, could guide the courts to promptly adjudicate any condemnation proceeding brought under this statutory provision. Acting in concert with mining permit exactions, this amendment and other procurement methods could increase access to critical minerals.

Certainly, procurement of critical minerals is most efficient in the free market with high levels of cooperation among the federal government, mining companies, and foreign trade partners. Due to the inherently complex nature of mineral supply chains, no procurement solution is effective in all instances. The legal theory presented in this comment should therefore be weighed only as one viable option among others in a comprehensive suite of strategies.

Finally, I caution that eminent domain and permit exactions are invasive. Even when the government lawfully exercises power over private property, it still causes social conflict. Out of respect for

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<sup>177</sup> 50 U.S.C. § 3816(c)-(d) (2012).

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principled notions of property rights essential to the American political reality, the government should exercise eminent domain and permit exactions with great discretion, even when accommodating needs for defense.

