

Study of People's Mining Law in Majalengka Regency

Mochamad Wildan Khaidar*, Endang Sutrisno, Harmono

Fakultas Hukum Universitas Swadaya Gunung Jati, Indonesia

E-mail: khaidarjidan@gmail.com*, Endang.sutrisno@ugj.ac.id, harmono@ugj.ac.id

Keywords

SPPL, people's mining, administrative sanctions, people's mining permits.

ABSTRACT

People's mining activities in Indonesia, including in Majalengka Regency, are often carried out without proper permits, leading to legal uncertainty and environmental degradation. Although regulations require environmental documents such as the Statement of Environmental Management and Monitoring Ability (SPPL) and People's Mining Permits (IPR), many small-scale miners continue to operate illegally. This research aims to analyze the position of the Statement of Environmental Management and Monitoring Ability (SPPL) and the application of sanctions against smallholder mining actors who do not have permits in Majalengka Regency. The research method used is normative juridical, examining laws and regulations, literature, and supporting data related to people's mining. The results of the study show that SPPL holds an important position as a form of environmental approval for small-scale people's mining activities that are not required to have AMDAL or UKL-UPL. However, in practice, there are still people's mining activities that operate without having a People's Mining Permit (IPR) and SPPL. This condition causes administrative violations and has the potential to result in criminal sanctions if activities continue to be carried out without permission. The Majalengka Regency Government, through Satpol PP and related agencies, has implemented administrative sanctions in the form of reprimands and closures of mine sites. This research emphasizes the importance of supervision, coaching, and coordination between agencies in order to create orderly, legal, and environmentally sound governance of people's mining.

INTRODUCTION

The increasing demands of life encourage humans to seek various ways to fulfill them. One approach is to engage in mining activities, which include the process of searching, extracting, processing, and distributing excavated materials (Rahman & Mulada, 2018). In line with the various forms of mining activities carried out by communities, one practice that has developed and persists to this day is people's mining.

People's mining, often referred to in community practice as excavation C, includes the extraction of sand, stones, gravel, and clay. Since the enactment of regional autonomy, regional development is expected to be more responsive, effective, and efficient (Harmono, 2025); therefore, each region should maximize the use of its resources, including non-metallic minerals and rocks (Montolalu, 2017). People's mining differs from large-scale mining in terms of technology, capital, and management objectives. This activity is carried out by local communities on a small scale or jointly, using simple equipment to meet their living needs (Azkia, 2018).

People's mining is generally conducted informally by local communities as a means of fulfilling family economic needs and serving as a primary source of livelihood in various

regions. However, the implementation of people's mining regulations still faces various legal challenges due to excessive exploitation of natural resources and illegal mining practices, which cause environmental problems that are difficult to manage (Sutrisno, Sutarih, & Artadi, 2020). Many mining activities are conducted without permits due to various factors, such as difficulties in accessing the licensing process and limited information (Johnson, Ericsson, & Löf, 2023; Pettersson, Oksanen, Mingaleva, Petrov, & Masloboev, 2015; Söderholm et al., 2015; Yıldız, 2020).

Although people's mining generally utilizes small amounts of mineral resources, demonstrating its traditional and limited territorial scope, these activities must still adhere to the rule of law to ensure the safety of miners, legal certainty, and environmental protection. Regulations aim to prevent illegal mining and natural resource damage. Normatively, people's mining is regulated in Articles 20 to 26 concerning people's mining areas and Articles 66 to 73 concerning People's Mining Permits, as stated in Law Number 4 of 2009 concerning Mineral and Coal Mining (Minerba) (Rahayu & Faisal, 2021).

In a socio-economic context, people's mining plays an important role in the welfare of people in areas with limited employment opportunities. However, its often unorganized characteristics make smallholder mining vulnerable to legal conflicts, environmental damage, and spatial disorder (Zvarivadza & Nhleko, 2018). Therefore, the definition of people's mining encompasses not only mining activities themselves but also a system of regulation, licensing, and community welfare objectives aligned with principles of sustainable development (Bice, 2016; De Haan, Dales, & McQuilken, 2020; Hirons, 2020; O'Faircheallaigh, 2015).

This step is important because without strict regulations, community mining risks causing greater losses than benefits. In this context, the government's role is crucial, not only as a rulemaker that determines legal and technical norms but also as a supervising party that provides recommendations related to licensing so that all people's mining activities comply with regulations. Through open and responsible supervision, technical assistance, and permit issuance, the government can build an orderly people's mining management system oriented toward improving community welfare (Hilson, 2020; Mina, Ruslan, Saleng, Wahid, & Niroula, 2026; Zamrah & Redi, 2025). In this way, people's mining can provide maximum benefits without neglecting environmental sustainability (Haroon & Hayyat, 2025; Monteiro, da Silva, & Neto, 2019).

People's mining management must also be integrated into comprehensive natural resource management. In coastal resource management studies, Sutrisno emphasized that developing a positive legal culture and an integral, comprehensive, and holistic management policy are necessary for natural resource use to support community welfare while maintaining environmental sustainability (Sutrisno, 2014).

This is reflected in the national-level regulation of people's mining permits, particularly Article 1, Number 10 of Law Number 3 of 2020, which defines "People's Mining Permits, hereinafter referred to as IPR, as permits to conduct mining business in people's mining areas with limited area and investment."

Through this regulation, the government demonstrates its commitment to ensuring that people's mining is conducted in a directed manner through a licensing mechanism based on legal certainty, transparency, and supervision, so that the risks of environmental damage and legal conflicts can be anticipated. Additionally, to clarify the implementation of legal

provisions, the government issued the Decree of the Minister of Energy and Mineral Resources Number 174.K/MB.01/MEM.B/2024 concerning Guidelines for the Implementation of People's Mining Permits.

In line with these national provisions, the West Java Provincial Government issued the Governor of West Java Regulation Number 39 of 2017 concerning the Evaluation of Mining Business Licenses issued by Regency/City Regional Governments. Article 1, Number 14 of the regulation defines "People's Mining Permit, hereinafter referred to as IPR, as a permit to conduct mining business in people's mining areas with limited area and investment." At the district level, arrangements relate to Majalengka Regency Regional Regulation Number 11 of 2011 concerning Regional Spatial Planning (RTRW), which establishes zoning for space use and designates areas available for people's mining activities. Additionally, Regional Regulation Number 10 of 2019 concerning the Implementation of Public Order, Order, and Community Protection contains provisions for environmental protection and management, including efforts to prevent pollution or environmental damage.

The relevance of spatial planning in people's mining activities is also connected to environmental carrying capacity. In studies of green open space zoning in Majalengka Regency, controlling space use is considered important when area growth has exceeded environmental capacity, requiring that space use be directed according to sustainable development principles (Sutrisno, Siswoyo, Artadi, & Nurwanty, 2020).

However, in Majalengka Regency, several people's mining business actors still operate without official government permits. This is evidenced by an online media report from *Kabar-Majalengka.com* written by Oki Kurniawan on November 28, 2025, titled "Illegal Mining in Pasir Jurig Majalengka Officially Closed." The report explains that the Regent of Majalengka, Eman Suherman, directly visited the excavation site, identified the mine owner, and engaged in dialogue with management. On that occasion, he instructed that all mining activities be temporarily halted until the licensing process is completed in accordance with applicable regulations.

Additionally, *CINEWS.ID* reported on November 22, 2025, that excavation activities in the Legok Block, Palabuan Village, Sukahaji District allegedly operated without a mining business license. This report emerged as a follow-up to public complaints regarding mining activities that allegedly failed to meet licensing requirements.

This situation demonstrates that rule enforcement in the people's mining sector still faces various obstacles, necessitating further action from the local government to ensure mining activities comply with applicable regulations. Furthermore, coordination between law enforcement officials, technical services, and village governments must be strengthened to enable more effective mining activity supervision. Local governments, through relevant agencies, have the duty and function to coach, supervise, and control all mining activities, including ensuring that business actors comply with licensing provisions, safety standards, and environmental management requirements. Therefore, optimizing these duties and functions is essential to prevent illegal mining operations from resuming and to maintain orderly, sustainable, and legal mining governance. In this context, examining the position of the Statement of Environmental Management and Monitoring Capability (SPPL) in people's mining activities and analyzing how sanctions are applied to people's mining activities lacking IPR and/or SPPL in Majalengka Regency becomes important.

Several studies have examined people's mining from various perspectives. Patumela (2015) researched the socio-economic impact of andesite stone mining in Majalengka but did not address licensing and environmental document aspects. Sutrisno, Sutarih, and Artadi (2020) found that excavation C mining in Palasah District, Majalengka, has operated for generations without a People's Mining Permit (IPR). Santoso (2023) criticized the application of criminal sanctions as a *primum remedium* in mineral law, noting its potential for overcriminalization. Dewi and Iqramina (2024) reveal a significant gap between the area of People's Mining Areas (WPR) and the scarcity of nationally registered IPRs. Most recently, the West Pasaman PETI Handling Team (2025) highlighted that addressing unlicensed mining requires an integrated approach encompassing multi-door law enforcement, community participation, formalization through WPR and IPR, and ecological restoration.

Three main research gaps exist regarding people's mining in Majalengka Regency. First, the significant gap between the People's Mining Area covering 580,712 hectares with 3,329 blocks and the scarcity of nationally registered People's Mining Permits (only 16 IPRs until November 2020) indicates systemic problems in licensing policy implementation that have not received adequate attention in previous Majalengka studies. Second, research on people's mining in Majalengka has focused on socio-economic impact and environmental implications without in-depth examination of SPPL environmental documents' position and sanctions application against unlicensed miners, despite SPPL being an important environmental management instrument for small-scale mining. Third, although mining sector law enforcement research has been conducted nationally, no research has specifically examined sanctions application against unlicensed folk mining perpetrators in Majalengka Regency from an administrative and environmental law perspective, despite illegal mining persisting in the Talaga, Bantarujeg, Palasah, and Kasokandel areas. This research's novelty lies in its assessment of SPPL's previously overlooked position in people's mining, integration of normative juridical analysis of central and regional regulations with empirical data from media reports and law enforcement interviews, and special attention to the hierarchy and gradation of administrative, civil, and criminal sanctions applied proportionally according to violation levels and impacts.

Based on this background, research gaps, and novelty, this study aims to analyze and describe the position of SPPL in people's mining activities in Majalengka Regency, including its relationship with IPR as the primary permit; identify and analyze sanctions application against people's mining business actors lacking IPR and/or SPPL, as well as factors affecting law enforcement effectiveness; and formulate policy recommendations for the Majalengka Regency Government to increase legal compliance while maintaining environmental sustainability. Theoretically, this research contributes to mining and environmental law development through enriched literature on SPPL implementation, sanctions gradation analysis, and normative juridical approaches integrated with empirical data. Practically, this research benefits the Majalengka Regency Government as input for people's mining supervision policy, law enforcement officials as guidance for proportionate sanctions application, the mining community as understanding of legal obligations and consequences of unlicensed mining, and future researchers as a foundation to examine other aspects such as coaching program effectiveness, community participation in supervision, or post-mining environmental restoration models.

METHOD

In research, there are generally three types of data collection tools, namely document studies or library materials, observation or observation, and interviews (Soerjono Soekanto 1986). In this study, a normative juridical approach research method is used. This approach is used because normative legal research relies on the study of positive legal norms, legal principles, and legal literature that is relevant to the object of research (Zainuddin & Karina, 2023). In addition, this research is supported by secondary data in the form of laws and regulations, literature, media reports, and the results of interviews with relevant agencies as supporting materials for the analysis.

Thus, the use of a normative juridical approach in this study is expected to help to comprehensively understand the legal regulations related to people's mining, especially in the aspects of licensing, environmental documents, and the application of sanctions.

RESULT AND DISCUSSION

Position of the Statement of Environmental Management and Monitoring Capability (SPPL) in the Implementation of People's Mining in Majalengka Regency

Regulation of the Minister of Environment and Forestry Number 4 of 2021 concerning the List of Businesses and/or Activities that Must Have an Environmental Impact Analysis (EIA), Environmental Management Efforts and Environmental Monitoring Efforts (UKL-UPL), or the Statement of Environmental Management and Monitoring Capability (SPPL) emphasizes that SPPL is a statement of the ability of the person in charge of the business or activity to carry out environmental management and monitoring living on the environmental impact of businesses and/or activities that are not required by AMDAL or UKL-UPL.

One form of business that can require SPPL is a smallholder mining business on a certain scale. In this case, SPPL's position in the people's mining business is a form of responsibility of business actors so that the mining operates properly and pays attention to environmental aspects. This is in line with what was stated by M. Daud Silalahi where spatial control is an activity that is shown to maintain that spatial planning activities are carried out in accordance with the spatial plan, this control activity includes licensing (Prof. Dr. Daud Silalahi, 2001). So that it does not cause a significant negative impact. Through SPPL, smallholder mining business actors are committed and express their readiness to comply with environmental management and monitoring provisions in accordance with the scale of their business. This is necessary to prevent damage to the ecosystem, landslides, and other environmental impacts. In addition, SPPL also serves as proof that business actors understand the environmental obligations regulated by the government.

Based on Article 3 of Government Regulation No. 22 of 2021, business actors are required to comply with environmental approvals before carrying out activities. Without SPPL, business activities can be considered as not fulfilling environmental obligations as stipulated in applicable regulations. This condition can have legal consequences, including administrative sanctions from the competent authorities.

SPPL does not replace mining permits. In the people's mining sector, business actors are still required to have a People's Mining Permit (IPR) in accordance with Law Number 3 of 2020 concerning Mineral and Coal Mining. Thus, SPPL is an environmental document that

complements licensing obligations, while IPR is the main permit to carry out people's mining activities. Therefore, SPPL cannot be used as a basis for legalizing mining activities that do not have IPR.

However, in practice, some people's mining activities in Majalengka Regency have been operating before having SPPL and IPR. In these conditions, people's mining actors can be subject to administrative sanctions in the form of reprimands, cessation of activities, and government coercion, and potentially subject to criminal sanctions if they continue to mine without a permit. In addition, if these activities cause environmental impacts, the perpetrator can also be required to recover and pay compensation.

Implementation of Sanctions for People's Mining Business Actors Who Do Not Have a Statement of Environmental Management and Monitoring Ability (SPPL) in Majalengka Regency

Examining the legal framework of mining in Indonesia, people's mining activities remain subject to licensing provisions and environmental protection requirements. One of the obligations that must be fulfilled by people's mining business actors is obtaining an environmental document in the form of a Statement of Environmental Management and Monitoring Capability (SPPL) for activities not requiring AMDAL or UKL-UPL. If smallholder mining actors lack SPPL, this constitutes a violation of environmental protection and management provisions as stipulated in Law Number 32 of 2009 concerning Environmental Protection and Management.

Within the framework of Law No. 32 of 2009 read with Government Regulation No. 22 of 2021, every business and/or activity required to have environmental documents must obtain environmental approval before operating. SPPL constitutes a statement of capability that forms part of environmental approval fulfillment for businesses of a certain scale; therefore, its absence indicates that administrative obligations in the environmental sector have not been met.

This is evident in people's mining activities in Majalengka Regency. Several people's mining business actors in Majalengka Regency lack IPR and/or SPPL. Based on a Mediasaksi.com report from December 13, 2025, excavation C activities in Ciberem Village, Talaga District, Majalengka Regency are suspected of operating without a mining permit. Furthermore, a Kabar-Majalengka.com report from November 28, 2025, documented mining activities in the Pasir Jurig area of Ranji Village and Jatimulya Village, Kasokandel District. Additionally, two mining locations are reported in Baribis Village, Cigasong District. This aligns with an interview with the Pamong Praja Police Unit (Satpol PP) for Regional Regulation Enforcement, which confirmed that some mining sites lack SPPL.

These mining locations demonstrate that several mining activities have been operating without SPPL and IPR. Furthermore, other mining activities may be actively operating without fulfilling these two obligations. Therefore, the Majalengka Regency Government and related regional agencies must focus not only on sanctions implementation but also on coaching approaches, recognizing that natural resource management cannot be pursued through norm enforcement alone but requires building community legal culture through socialization, participation, and policies that favor environmental protection and community welfare (Sutrisno, 2014).

This issue is significant because people's mining produces diverse impacts. Positively, mining activities create employment and increase economic activities. However, mining operations lacking permits and SPPL carry potential negative impacts, including ecosystem damage, land conversion, landslides, and floods.

The Majalengka Regency Government's commitment is evident in the actions of Regent Eman Suherman, who conducted direct field inspections to verify SPPL and IPR compliance in people's mining activities. Based on inspection results, several mining locations lacked permits and SPPL, prompting strict enforcement through mine site closures.

Beyond statutory provisions, Majalengka Regency Regional Regulation prohibits mining operations in the form of excavation and/or dredging without Regent authorization. Violations of these provisions result in sanctions according to applicable laws and regulations, as specified in Article 8, paragraphs (5) and (7) of Regional Regulation Number 10 of 2019 concerning the Implementation of Public Order, Order, and Community Protection.

As noted in the regional regulation, sanctions for violations can be applied through several legal instruments: administrative, civil, and criminal sanctions. Administratively, government agencies can impose sanctions including written reprimands, government coercion, operational freezing, and business license revocation, as stipulated in Articles 76 to 80 of Law Number 32 of 2009 concerning Environmental Protection and Management.

In the context of people's mining, administrative sanctions often serve as the initial enforcement mechanism to compel perpetrators to meet environmental obligations, including SPPL preparation. As discussed earlier, Majalengka Regency applies sanctions to mining actors lacking IPR and/or SPPL in the form of mine site closures. However, one location in Jatimulya Village, Kasokandel District, was closed but subsequently resumed operations. In this instance, when assessed against Mineral and Coal Mining Law provisions, repeated unlicensed mining may constitute criminal mining elements, warranting law enforcement officials to pursue more decisive and comprehensive legal proceedings.

Law Number 2 of 2025 concerning the Fourth Amendment to Law Number 4 of 2009 concerning Mineral and Coal Mining emphasizes that all mining business activities must possess valid mining business licenses. Non-compliance may carry criminal sanctions as stipulated in Article 158, imposing imprisonment and fines for persons conducting mining business without a permit. However, to date, administrative sanctions remain the dominant enforcement approach in Majalengka Regency, with criminal sanctions not yet fully implemented.

Therefore, the absence of SPPL among smallholder mining actors constitutes not only environmental sector administrative violations but also potentially strengthens broader legal violations when linked to mining business licensing requirements. Consequently, sanctions application against smallholder mining actors lacking SPPL should proceed in stages and proportions, beginning with administrative measures and progressing to criminal sanctions as appropriate, depending on violation severity and environmental impact.

In other words, criminal sanctions under the Mineral and Coal Mining Law and Law Number 32 of 2009 must be understood proportionately. Criminal sanctions serve as an *ultimum remedium* when administrative approaches prove ineffective, but may be applied more decisively when mining activities cause severe environmental damage and pollution with broad community impact.

CONCLUSION

Based on the above discussion, it can be concluded that SPPL has an important position as an environmental document that demonstrates the ability of business actors to manage and monitor the environment. However, SPPL does not replace IPR as the main permit in people's mining activities. In Majalengka Regency, there are still people's mining activities that lack IPR and/or SPPL yet continue to operate. The local government and authorized agencies have implemented sanctions in accordance with applicable laws and regulations, particularly administrative sanctions in the form of written reprimands and mine site closures. However, for activities that continue operating without permits or cause serious environmental impacts, the application of criminal sanctions can still be considered in accordance with the provisions of the Mineral and Coal Mining Law and the Environmental Protection and Management Law.

REFERENCES

- Azkia, L. (2018). Analisis sosiologi ekonomi pada tambang rakyat: Kajian terhadap kegiatan ekonomi dalam tambang rakyat intan di Cempaka, Banjarbaru, Kalimantan Selatan. *SosioGlobal: Jurnal Pemikiran dan Penelitian Sosiologi*, 3(1), 59–69.
- [CINEWS.ID](#). (2025, November 22). *Galian C ilegal di Desa Palabuan disidak DLH Majalengka, namun tidak ada penindakan dan sanksi yang jelas*.
- De Haan, J., Dales, K., & McQuilken, J. (2020). *Mapping artisanal and small-scale mining to the Sustainable Development Goals*. University of Delaware (Minerals, Materials and Society Program in Partnership with PACT).
- Harmono, & Gymnastiar, A. (2025). *Hukum pemerintah daerah dalam perspektif otonomi, pembangunan, dan partisipasi publik* (Cetakan 1, hlm. 68). UGJ Press.
- Haroon, M., & Hayyat, M. (2025). Assessing the dual impact of gold mining on local communities: Socio-economic benefits and environmental challenges. *Resources Policy*, 103, 105559.
- Hilson, G. (2020). Formalization bubbles: A blueprint for sustainable artisanal and small-scale mining (ASM) in sub-Saharan Africa. *The Extractive Industries and Society*, 7(4), 1624–1638.
- Hirons, M. (2020). How the Sustainable Development Goals risk undermining efforts to address environmental and social issues in the small-scale mining sector. *Environmental Science & Policy*, 114, 321–328.
- Johnson, E. L., Ericsson, M., & Löf, A. (2023). The mining permitting process in selected developed economies. *Land Use Policy*, 131, 106762.
- [Kabarmajalengka](#). (2025, November 28). *Tambang ilegal di Pasir Jurig Majalengka resmi ditutup*.
- Mina, R., Ruslan, A., Saleng, A., Wahid, A. M. Y., & Niroula, B. (2026). Enhancing mining supervision to protect the environment through collaborative community-based monitoring. *Journal of Law, Environmental and Justice*, 4(1), 1–28.
- Montolalu, T. A. (2017). Kewenangan pemerintah daerah dalam pengelolaan pertambangan bahan galian C menurut Undang-Undang Nomor 23 Tahun 2014. *Lex Privatum*, 5(9), 23–31.
- Monteiro, N. B. R., da Silva, E. A., & Neto, J. M. M. (2019). Sustainable development goals in mining. *Journal of Cleaner Production*, 228, 509–520.
- O’Faircheallaigh, C. (2015). Social equity and large mining projects: Voluntary industry initiatives, public regulation and community development agreements. *Journal of Business Ethics*, 132(1), 91–103.

- Pettersson, M., Oksanen, A., Mingaleva, T., Petrov, V., & Masloboev, V. (2015). License to mine: A comparison of the scope of the environmental assessment in Sweden, Finland and Russia. *Natural Resources*, 6, 237–255.
- Rahayu, D. P., & Faisal, F. (2021). Eksistensi pertambangan rakyat pasca pemberlakuan perubahan Undang-Undang tentang Pertambangan Mineral dan Batubara. *Jurnal Pembangunan Hukum Indonesia*, 3(3), 337–353.
- Rahman, A., & Mulada, D. A. (2018). Kajian yuridis tentang keberadaan pertambangan rakyat. *JATISWARA*, 33(3), 277–292.
- Sara, B. (2016). *Responsible mining: Key principles for industry integrity*. Routledge.
- Söderholm, K., Söderholm, P., Helenius, H., Pettersson, M., Viklund, R., Masloboev, V., Mingaleva, T., & Petrov, V. (2015). Environmental regulation and competitiveness in the mining industry: Permitting processes with special focus on Finland, Sweden and Russia. *Resources Policy*, 43, 130–142.
- Sutrisno, E. (2014). Implementasi pengelolaan sumber daya pesisir berbasis pengelolaan wilayah pesisir secara terpadu untuk kesejahteraan nelayan: Studi di perdesaan nelayan Cangkol Kelurahan Lemahwungkuk Kecamatan Lemahwungkuk Kota Cirebon. *Jurnal Dinamika Hukum*, 14(1), 1–12.
- Sutrisno, E., Siswoyo, M., Artadi, I., & Nurwanty, I. I. (2020). Green open space zonation of urban area in the sustainable development goals perspective. *International Journal of Advanced Science and Technology*, 29(4s), 1529–1533.
- Sutrisno, E., Sutarih, A., & Artadi, I. (2020). Implikasi usaha penambang galian C terhadap degradasi kualitas mutu lingkungan hidup sungai: Studi kasus Kecamatan Palasah Kabupaten Majalengka. *Jurnal Hukum Bisnis Bonum Commune*, 3(1).
- Yıldız, T. D. (2020). The impacts of EIA procedure on the mining sector in the permit process of mining operating activities & Turkey analysis. *Resources Policy*, 67, 101681.
- Zainuddin, M., & Karina, A. D. (2023). Penggunaan metode yuridis normatif dalam membuktikan kebenaran pada penelitian hukum. *Smart Law Journal*, 2(2), 114–123.
- Zamrah, A., & Redi, A. (2025). Renewal of people's mining business permit regulations as an instrument for improving community welfare. *Greenation International Journal of Law and Social Sciences*, 3(3), 1293–1301.
- Zvarivadza, T., & Nhleko, A. S. (2018). Resolving artisanal and small-scale mining challenges: Moving from conflict to cooperation for sustainability in mine planning. *Resources Policy*, 56, 78–86.