RESEARCH ON THE IDENTIFICATION AND EVALUATION OF THE IMPACT ON THE ENVIRONMENT INDUCED BY THE IMPLEMENTATION OF THE ROSIA MONTANA MINING PROJECT. ENVIRONMENTAL AND FINANCIAL AUDITS

- ABSTRACT-

SCIENTIFIC LEADER
Prof.univ.dr.ing. ARAD DUMITRU VICTOR

DOCTORAND
GHENESCU ALINA MARIA

2024

Content

Keywords: geomechanical characterization of rocks from the Roșia Montană mining perimeter, audits, cyanides, gold, processing.

Within this summary, the chapters and findings resulting from the scientific research dedicated to the theme, are described with relevance and in a unique context. In support of the research topic, the results, personal thoughts and reference books are scientifically significant for the research conducted. The thesis topic is relevant to all areas of science, addresses a current issue and falls within the requirements and guidelines associated with academic research. The results that have been achieved are significant, original and have the potential to be applied in other situations and specific fields. The structure of the doctoral thesis includes an Introduction, eight chapters and a Bibliography with scientific references from the country and abroad.

The *Introduction* highlights the environmental and financial audit that provides an objective opinion on the financial conditions and waste management systems. Approaching this research topic through auditing, the problems related to the impact that exploitations have on the environment are made known, coming up with a solution that involves numerous studies, researches and analyzes for the design of the geometric elements of the exploitation methods in the Roșia Montană quarry, evaluation of the geotechnical risk that may occur on the site of the mining perimeter, geomechanical characterization of the gold-silver deposit, research on the identification and evaluation of the impact on the environment induced by the implementation of the Roșia Montană mining project.

Chapter 1 is entitled *The current state of knowledge at the national and international level*. In this chapter, I described the trends in current research, the comparative analysis on a national and international scale of the exploration of the intersection between geomechanics and auditing in Roșia Montană and the evaluation of the Roșia Montană project with national and international perspectives presenting the current state of national knowledge, the current state of international knowledge, environmental impact and financial impact. The Roșia Montană mining project has been a subject of significant debate and controversy due to its potential environmental impact. In response to these concerns, I carried out this PhD thesis to delve into the identification and assessment of the environmental consequences arising from the implementation of the

project. The intersection of geomechanics and auditing in the context of Roșia Montana presents a unique opportunity for comparative analysis both on a national and international scale.

In chapter 2 *The history of the exploitation of the gold-silver deposit in the Roșia Montană mining perimeter,* an incursion is made into the history of the Roșia Montană mining perimeter, the early history of gold and silver mining in Roșia Montană and the modern era of mining in Roșia Montană. The following sub-chapters deal with: the economic impact of mining activities, the environmental impact of mining activities, the social impact of mining activities, opposition and controversy surrounding the mining project and the current state of mining in Roșia Montană. Roșia Montană has a long history of gold and silver mining, dating back to ancient times. This mining area has been the center of economic activity and controversy due to the rich mineral deposits found within its boundaries. The exploitation of these resources has had a significant impact on the local economy, environment and society.

Chapter 3 *The geomechanical characterization of the gold-silver deposit in the Roșia Montană mining perimeter* includes the following sub-chapters: Overview of the Roșia Montană mining area, Analysis of the geomechanical properties that influence the stability of the gold-silver deposit, The influence of the geological structures in the deposit on its geomechanical behavior, Methods used to assess the geomechanical properties of the deposit in the Roșia Montană perimeter, Rock tension distribution and deformation in the Roșia Montană gold-silver deposit, Distribution of the state of tension in the deposit and implications for the stability of the Roșia Montană perimeter, Deformation mechanisms observed in the gold-silver deposit in different tension conditions, How tension state and deformation affect the extraction of gold and silver from the Roșia Montană deposit, Rock mass characterization and support design, Considerations taken into account in the design of support systems for underground mining operations, The influence of the geomechanical properties of the rock mass in the choice of exploitation methods in the deposit, Seismic risk assessment and mitigation strategies, Potential seismic risks associated with mining activities in the Roșia Montană mining perimeter, Use of geomechanical data to assess and mitigate seismic risks in the Roșia Montană deposit, Strategies implemented to ensure the safety of workers and of the infrastructure of the Roșia Montană mining project in the presence of seismic activity, Geomechanical monitoring and deposit management of the Roșia Montană deposit, Monitoring techniques used to track changes in the geomechanical behavior of the Roșia Montană mine deposit over time, Use of data from geomechanical monitoring and Best practices for managing long-term geomechanical risks in the Roșia Montană gold-silver deposit.

Chapter 4 *The design of the geometric elements of the mining methods in the Roșia Montană* quarry deals with the following aspects: the geometric design of the mining methods, the factors that are taken into account in the design of the geometric elements of the mining methods in the Roșia Montană quarry, the influence of the topography of the Roșia Montană quarry in the design geometric elements, the role of safety regulations in shaping the geometric design of mining methods in the Roșia Montană quarry, shooting techniques in the Roșia Montană quarry, the specific blasting techniques used in Roșia Montană quarry, determination and implementation of quarry blasting models, safety measures taken during quarry blasting operations, selection and use of equipment, selection of equipment to be used in exploitation at Roșia Montană quarry, criteria for choosing the use of machinery in quarry, influencing the equipment used on the overall efficiency of mining methods in the Roșia Montană quarry, monitoring and optimizing mining operations, monitoring techniques used to ensure the effectiveness of mining operations in the Roșia Montană quarry, collecting and analyzing data to optimize mining

operations in the Roșia Montană quarry Montană, strategies implemented to improve the efficiency and productivity of mining methods at Roșia Montană, environmental impact assessment, methods used to assess the environmental impact of mining activities in the Roșia Montană quarry, determination and implementation of mitigation measures to minimize environmental damage from the Roșia Montană quarry, regulations and guidelines followed to ensure sustainable mining practices in the Roșia Montană quarry. The design of the geometric elements of the mining methods is a critical aspect for ensuring efficient and safe operations in quarries, the Roșia Montană quarry serving as a prime example of the complexity involved in this process. Factors such as topography, safety regulations and equipment selection play a critical role in shaping the geometric design of quarry mining methods. Understanding how Roșia Montane's unique topography influences these design elements is critical to optimizing operations.

Chapter 5 *The geotechnical study on the site of the mining perimeter* is an essential aspect of ensuring the safety, stability and sustainability of mining operations. Various geotechnical investigation methods play a crucial role in determining the suitability of a mine site by evaluating factors such as soil composition, rock quality and potential hazards. Geological site characterization helps to identify geological features that may impact mining activities, even if there are challenges in accurately characterizing site conditions. Groundwater assessment is essential in supporting the selection of a location for the Roșia Montană mining perimeter, taking into account factors such as groundwater level and potential contamination risks. Slope stability analysis is important for assessing risks of slope instability and establishing safe limits for mining operations. In addition, regulatory compliance and risk management are imperative to ensure adherence to standards and guidelines, with geotechnical studies playing a vital role in mitigating environmental risks. Failure to carry out a complete geotechnical study before establishing the Roșia Montană mining perimeter can have serious consequences. This research paper delves into the various geotechnical aspects involved in determining the location of the Roșia Montană mining perimeter, emphasizing the importance of thorough investigation and analysis for sustainable and safe mining practices.

In Chapter 6 *Research on the identification and assessment of the impact on the environment induced by the implementation of the Roşia Montană mining project*, the focus will be on providing an overview of the Roșia Montană mining project and its potential impact on the environment. The subchapters will outline the objectives of the study, the research questions addressed and the significance of examining the environmental consequences of the mining project, the importance of examining the environmental consequences of the Roșia Montană mining project, the contribution of the results of this study to future mining projects, the conclusions of the study, the recommendations for mitigating the environmental impact, environmental factors, the main environmental effects identified in the project area, the impact of local biodiversity, the possible long-term effects of the biogeocenosis, assessment methods, potential impacts and mitigation strategies. In addition, the chapter will introduce the methodology used in the research, including data collection methods, analysis techniques and any limitations of the study. Examining the significance of this study in understanding the environmental consequences of the Roșia Montană project and providing recommendations for mitigating these impacts, the results are expected to support well-informed decisions for future mining.

In Chapter 7 *Environmental and Financial Audits on the Roşia Montană Mining Project,* the auditor's findings can influence policy decisions by providing recommendations for stricter regulations, revealing the true financial viability of the project and informing future sustainable development plans. Recommendations from

environmental audits can lead to the implementation of stricter regulations to lessen the ecological consequences of mining activities. Financial audits that reveal the true costs and benefits of the project can help policy makers to ensure that they make well-informed choices and enable access to relevant information on feasibility and sustainability. Data and information generated from audits can inform future sustainable development plans that prioritize the environment and community well-being. Environmental audits are essential to assess the real impact of the Roșia Montană mining project by performing baseline studies, monitoring air, water and soil quality and evaluating the effectiveness of mitigation measures. These audits provide valuable data on pre-existing environmental conditions in the region, allowing a comparison of the effects before and after mining operations. Monitoring air, water and soil quality from inception to project completion at each stage of its life cycle helps identify potential risks and implement corrective actions. Assessing the effectiveness of mitigation measures ensures that environmental damage is minimized to the greatest extent possible. Financial audits are necessary for the evaluation of the cost-benefit analysis of the Roșia Montană mining project by evaluating the economic benefits, calculating the environmental and social costs and evaluating the financial risks. Understanding the economic benefits of the project is crucial for decision makers to weigh financial gains against potential costs. Calculating the environmental and social costs associated with the project provides a comprehensive picture of the real impact on the environment and local communities. Financial risk assessment helps identify potential liabilities and uncertainties that may arise during or after project implementation.

In the last chapter entitled Chapter 8. *Conclusions and personal contributions*, the results determined following the research carried out, as well as future research directions, are highlighted. The doctoral thesis aimed to highlight the effective points for improving and increasing the attractiveness of the extractive industry, by auditing this branch and by discovering some recommendations and correlation with the existing provisions. I believe that there are solutions to eliminate the current problems, in this way to achieve compliance with a favorable legislative framework, to support the implementation of the gold-silver ore exploitation project that has the possibility of transforming and renewing the financial infrastructure of the Romanian state.

The extraction and processing of mineral resources is the area of greatest national economic interest. The current project proposes that the development of this industry must respect and be in accordance with the special regulation adapted to their specifics. In the mining context, the audit supposes the existence of a management capable of establishing and applying the best practices in conditions of maximum safety, exploitation and up to closure and monitoring, aiming at obtaining favorable results and the constant improvement of the environment, economy and society. On a national level, there are few specific environmental and financial audits related to Roșia Montană. However, research continues to bring new information and insights into this important topic. Roșia Montană's 2,000-year history of mining has led to mining in quarries and underground, which are now closed to the public due to lack of security.

It is essential in starting an exploitation project in the area, for the establishment of areas for the unloading of archaeological loads in order to be returned to the economic cycle.

Gold and silver mining in Roșia Montană is a complex and controversial story that highlights the challenges of balancing economic development with social and ecological responsibility. The area's mining heritage serves as a reminder of the importance of sustainable resource management and community engagement in extractive industries.

A large space within the thesis was dedicated to the geomechanical characterization of the gold-silver deposit in the Roșia Montană perimeter. We designed the geometric

elements for the mining methods in the Roșia Montană quarry. We carried out the geotechnical study for the location of the mining perimeter. We identified and evaluated the impact on the environment induced by the implementation of the Roșia Montană mining project.

In the thesis I performed environmental and financial audits, as well as the analysis of problems related to the exploitation and processing of gold-silver deposits on environmental factors. I analyzed the methods and techniques of exploration, the analysis and management of risk in exploration. In the Laboratory of Analyzes and Tests in Grade I Constructions of the University of Petroșani, I participated in the determination of physical, mechanical, geomechanical properties; I carried out geotechnical studies on the perimeter of Roșia Montană, according to current standards.

I believe that the completion of the Roșia Montană mining project would bring considerable profit to the Romanian economy. The Roșia Montană project, which aims to mine precious metals, has been the subject of intense debate and raised concerns about the environmental impact and risks associated with the use of cyanide. The application of the Roșia Montană project would lead to the extraction of 300 tons of gold and 1,400 tons of silver. In this way, Romania would become the number one producer of gold in Europe, surpassing Finland and Sweden.

The research paper delves into the complex design of the geometric elements of the exploitation methods in the Roșia Montană quarry. I emphasize the importance of optimizing these elements for efficiency, safety and environmental sustainability.

Geological, hydrogeological and geomechanical expertise is essential in anticipating subsidence processes and ensuring structural stability. Adherence to international standards and regulations is essential in preventing surface disturbances, controlling water balance and selecting appropriate equipment for mining operations. The depth of the Roșia Montană quarry, given by the surface morphology, emphasizes the impact of the landscape.

Safety regulations not only protect the environment, but directly influence the geometry of mining methods and prioritize worker protection and economic efficiency. The selection of equipment, the implementation of monitoring systems and the adoption of measures to mitigate the impact on the environment underline the commitment to sustainable mining practices in the Roșia Montană quarry. Blasting methods, compliance with safety protocols and planning of quarrying methods would ensure a balance between productivity and safety. Future research directions could focus on further improving safety measures, optimizing equipment selection and exploring innovative technologies to improve operational efficiency and sustainability of mining methods in the Roșia Montană quarry. The practical application of the slogan ”new areas, new ideas, new technologies” could lead to the discovery of new deposits, even economically unviable at the moment, could constitute a source of gold and other useful elements for future generations.

I believe that the involvement of foreign companies in the exploration activity in Romania has brought and will bring benefits to the research of mineral resource reserves, allowing access to new exploration and exploitation techniques. The geotechnical study on the location of the Roșia Montană mining perimeter is essential for ensuring the sustainability, safety and efficiency of mining operations. In the paper I highlighted the indispensable role of geotechnical investigation methods in determining the optimal location of the mining perimeter. The multidisciplinary approach taking into account geomechanical, environmental and local infrastructure factors was aimed at assessing the impact of mining activities on the environment. Geotechnical investigations provide valuable insights into a mining operation and the assessment of risks associated with slope instability and the presence of underground gases. The collaboration between

geotechnicians, engineers and specialized teams is vital for ensuring a comprehensive approach to safety and stability in the Roșia Montană mining perimeter.

I believe mining site preparation and mining resource exploitation underscores a commitment to sustainable and responsible mining practices. In the research paper, I emphasize the need for geotechnical investigations in the Roșia Montană area and the determination of the slope, the exploitation steps and the equipment to ensure a safe and efficient exploitation. I specify that the assessment of groundwater and environmental protection measures are essential in choosing the right location for a Roșia Montană mining perimeter. The geotechnical investigation methods presented in the paper can serve as viable tools in the appropriate choice of the Roșia Montană mining site. Integrating geotechnical studies into all phases of mining operations, mining companies that will work in the perimeter of Roșia Montane can optimize efficiency, minimize risks and contribute to sustainable mineral resource extraction practices. The commissioning of the Roșia Montană mining project would place Romania among the top gold-producing countries in the world and first in Europe.

Stopping this project for reasons related to environmental protection and legislative loopholes would constitute an economic loss not only for investors, but also for the Romanian state. This choice is detrimental to mineral resource exploration investors. The results of the exploration work undertaken and the metallogenetic potential of Romania are elements of attraction for mining companies.

The start of these mining projects will involve the application of modern technologies and international practices regarding environmental protection. In order to attract foreign investments in the field of exploitation of mineral resources in Romania, the authorities should revise the legislation and carry out environmental and financial audits.

In conclusion, the Roșia Montană mining project is a complex issue that involves a multitude of factors, consequences and perspectives of the interested parties. By examining the historical, environmental, economic, social and stakeholder dimensions of the project, we can better understand the challenges and opportunities it presents. It is essential that all parties involved engage in constructive dialogue, consider the long-term implications and work towards sustainable solutions that benefit both present and future generations. I conclude that the Roșia Montană mining project has potential, with minimal impact on the environment. I believe that a comprehensive environmental impact assessment and the implementation of effective strategies are possible to minimize the environmental footprint of the project and protect the region's natural resources for future generations. After the successful completion of the closure and rehabilitation works I recommend that the environmental liability bond be gradually reduced based on the reduction and elimination of environmental risks. The researches and studies carried out show that it is feasible to exploit the Roșia Montană deposit both from a mining point of view and from an ecological point of view.

The bibliography includes 127 updated references from Romania and from abroad.

1. Arad, S., Arad,V., Bobora, B., *Robotics and automation in construction*, Cha 23: Advanced Control Schemes for Cement Fabrication Processes, Ed. InTech Education and Publishing Viena, Edited by: C. Balaguer and M. Abderrahim, ISBN 978-953-7619-13-8, *pp 381-404, 404 pgs,* 2008

2. Arad, S., Arad, V., Chindriş, Gh., *Geotehnica mediului***,** Ed. Polidava Deva, ISBN 973-99458-0-5, 232 pg., 2000**,**

3. Arad, S., Arad, V., Cosma, V., *Automation of the technological flow in Casial Cement Factory*, Proc. of 22 nd ISARC2005, Ferrara, Italy, 2005, Proceedings CD, Sensor, Identification & Control, 2005 Indexed by Scopus, http://www.iaarc.org/external/isarc_proceedings

4. Arad, V., Radermacher L., Apostu, S., Mecanica Rocilor, Editura Universitas, Petroșani, ISBN 978-973-741-467-0, 231 pgs., 2016.

5. Arad, V., Radermacher, L., *Materiale de constructii – Teorie si încercări de laborator,* Editura Universitas, Petroșani, ISBN 978-973-741-379-6, 243 pgs., 2014.

6. Arad, V., Radermacher, L., *Mecanica materialelor de construcţii. Stabilitatea construcţiilor*, Editura Universitas, Petroșani, ISBN 978-973-741-374-1, 336 pgs., 2014.

7. Arad, V., Radermacher, L., *Evaluarea și gestionarea riscurilor în construcţii miniere*, Editura Universitas, Petroșani, ISBN 978-973-741-380-2, 311 pgs., 2014.

8. Arad, V., *Riscuri geomecanice în industria minieră*. Ed. Universitas, ISBN 978-973-741-320-0, Petroșani, 2013**.**

9. Arad, V. *Mecanica rocilor și pământurilor*, Ed. Focus, Petroșani, ISBN 978-973-677-227-6, 2010.

10. Arad, V., Arad, S., Cosma, V., Șuvar, M., *Gazodinamic regime on geomechanics point of view for Jiu Valley Coal Beds*, geoconference on science and technologies in geology, exploration and mining, *Proceedings Volume II, Exploration and Mining*, Albena, Bulgaria, pp. 269 – 276, ISBN 978-619-7105-09-4, ISSN 1314-2704, DOI 10.5593/sgem2014B13, 2014

11. Arad V. , Danciu C. , Anca D., Nistor C., Cosma V. *Geomechanical characterization of magmatites from the Mureş* C*orridor* 13th Conference of Enviroment and Mineral Processing, pp.277-282, ISBN 978-80-248-2018-7, 2009,

12. Arad, V., Arad, S., Cosma, V. *Gold mining: economic development versus sustainable development*, Buletinul AGIR-Supliment 2 / 2015, 135-143 pp., an XX, ISSN- 2247-3548, 2015

13. Arad, V., Arad, S., Cosma, V., *Exploatarea aurului: dezvoltare economică versus dezvoltare durabilă,* Zilele Academiei de Ştiinţe Tehnice din România, ediţia a 9-a, "Dezvoltarea durabilă favorabilă incluziunii" Vol. Abstracte: TPDD 4.3, 64 pg, Universitatea Lucian Blaga, Sibiu, 6-7 nov. 2014

14. Arad, V., Bogdan, I., *Determinarea caracteristicilor geomecanice ale rocilor tari utilizate la infrastructura căilor de comunicaţie terestre*, Symposium on "Academy Days of Technical Sciences from Romania, Timișoara, pp. 357-361. 1997,

15. Balaneanu, E, Balaneanu, Fl, Arad, V., *Geotechnical research on the land located in the Seigan Area, Alba Iulia Town, Alba County,* Proceedings Paper, International Multidisciplinary Scientific Geo Conference, vol. 4, pp. 91 -98, DOI: 10.5593/sgem2012, Sofia, Bulgaria Published by STEF 92 Technology Ltd., 1 Andrey Lyapchev Blvd 1797, Sofia,Indexed into ISI Web of Knowledge, Web of Science, CrossRef, Scopus, ProQuest, EBSCO, ISSN 1314-2704.

16. Bărăiac, O., Arad, V., Iancu (Apostu), S., Lasc, Ghe., Cosma, V., *Geomechanics surveys on the stability of some active waste dumps in Jiu Valley*, 6th International multidisciplinary scientific symposium Universitaria SIMPRO 2014, 10-11 October 2014,

Vol. I, Conference Proceedings, *Safety and Environment Engineering; Mining Engineering, Surveying and Cadastrial Area; Rock Mechanics and Geotechnical Applications; Civil Engineering,* Universitas Publishing House, Petrosani, 2014, pp. 224-229, ISSN-L 1842 – 4449, ISSN 2344 – 4754, URL www.upet.ro/simpro/2014/.

17. Catarina Luísa Camarinhas, Raul Zaharia, Daniel Dan, Gheorghe Lucaci, Ayman Batisha, Victor Arad, (Eds). *Recent advances in civil and mining engineering. Mathematics and Computers in Science and Engineering Series* | 18. *Published by WSEAS Press ISSN 2227*-4588, *ISBN* : 978-960-474-337-7, Antalya, 2013

18. Cosma, V., Lasc, Ghe., Bărăiac, O., Iancu (Apostu), S., *Construction, design and evaluation of tailings dams for new mining projects,* 6th International multidisciplinary scientific symposium universitaria SIMPRO 2014, 10-11 October 2014, Vol. I, Conference Proceedings, *Safety and Environment Engineering; Mining Engineering, Surveying and Cadastrial Area; Rock Mechanics and Geotechnical Applications; Civil Engineering,* UNIVERSITAS PUBLISHING HOUSE, PETROSANI, 2014, pp. 224-229, ISSN-L 1842 – 4449, ISSN 2344 – 4754, URL www.upet.ro/simpro/2014/.

19. Pleșa (Ghenescu), A., Raportul de cercetare *Caracterizarea geomecanică a rocilor din perimetrul minier Roșia Montană, județul Alba*, Universitatea din Petroșani, 2022-2023-2024.

20. Pleșa (Ghenescu), A., Raportul de cercetare *Audit de mediu privind utilizarea cianurii în perimetrul minier Roșia Montană*, Universitatea din Petroșani, 2022-2023-2024.

21. Pleșa (Ghenescu), A., Raportul de cercetare *Cercetari privind evaluarea financiară a rezervelor zăcământului Roșia Montană* , Universitatea din Petroșani, 2022- 2023-2024

22. Das, B.M., *Principles of Geotechnical Engineering,* Second Edition. PWS-Kent Publishing Corp., Boston, Massachusetts, 1990.

23. Davies, M.P., T.E. Martin and P.C. Lighthall, *Tailings dam stability: essential ingredients for success. Chapter 40, Slope Stability in Surface Mining,* SME, pp. 365-377, 2000.

24. Davies, M.P. and S. Rice, *An alternative to conventional tailings management – "dry stack" filtered tailings. . "Tailings and Mine Waste* 2001," Fort Collins, Colorado, pp. 411-420, 2001.

25. Dougherty, E.R., *Probability and Statistics for the Engineering, Computing, and Physical Sciences*. Prentice Hall: New Jersey, 1990.

26. Doyle, F.M. (ed.)., "Mining and Mineral Processing Wastes: *Proceedings of the Western Regional Symposium on Mining and Mineral Processing Wastes, Berkeley, CA,* May 30 - June 1, 1990." Society for Mining, Metallurgy, and Exploration, Inc. Littleton, Colorado, 1990.

27. Dunne, B. Managing design and construction of tailings dams. "*Proceedings of the International Workshop on Managing the Risks of Tailings Disposal".* ICME-UNEP, Stockholm, pp. 77-88, 1997.

28. Lasc, Ghe., Arad, V., Bărăiac, O., Cosma, V., *Comparative closure methods of the underground exploitation of lignite in Romania, G*eoConference on science and technologies in geology, exploration and mining, *Proceedings Volume II, Exploration and Mining*, Albena, Bulgaria, pp. 113 – 120, ISBN 978-619-7105-09-4, ISSN 1314-2704, DOI 10.5593/sgem2014B13, 2014.

29. Lasc, Ghe., Arad, V., Bărăiac, O., Cosma, V., *The study of similarity stability surfaces from mining fields of salt in solution extraction in Romania,* GeoConference on Science and Technologies in geology, exploration and mining, *Proceedings Volume II, Exploration and Mining*, Albena, Bulgaria, pp. 705 – 712, ISBN 978-619-7105-09-4, ISSN 1314-2704, DOI 10.5593/sgem2014B13.

30. Michael P. Davies, Peter C. Lighthall, Steve Rice and Todd E. Martin Canadian Dam Association (CDA) 1999. "*Dam Safety Guidelines*".
31. Nistor, D., Arad, V., Nistor, C., Bărăiac, O., Cosma, V., *Experimental research regarding the improvement of foundation soil in the Rovinari mining Basin*, GeoConference on Science and Technologies in geology, exploration and mining, *Proceedings Volume II, Exploration and Mining*, Albena, Bulgaria, pp. 253 – 260, ISBN 978-619-7105-09-4, ISSN 1314-2704, DOI 10.5593/sgem2014B13, 2014
32. Fodor, D., *Explozivi industriali*, Ed. Infomin Deva, 2000;
33. Fodor, D., - *Impactul împușcărilor masive în cariere asupra mediului și posibilități de diminuare a efectelor negative*, Revista Minelor nr. 3,4,5/2003;
34. Fodor, D., Baican, G. *Impactul industriei miniere asupra mediului*, Editura Infomin, Deva, 2001.
35. Onica I., *Impactul exploatării zăcămintelor de substanțe minerale utile asupra mediului*, Ed.Universitas, 2001;
36. Popescu Gh. C., *Applied metallogeny and geological prognosis"* (in Romanian), Part 1. Ed. Univ. Bucharest, 1986.
37. Popescu Gh. C., Neacsu, A.,**.** *Modeling of epithermal gold and porphyry copper deposits from metaliferi mountains (Romania)***,** Romanian journal of mineral deposits, Geological Institute of Romania Society of Economic Geology of Romania, ISSN 1220-5648, vol 85 issue 1, Bucharest, 2012
38. Semen C., - Bilanțul energiei potențiale a explozivilor și posibilități de evaluare pe forme de consum. Revista Minelor Nr.8/2002;
39. *** RMGC project, http://www.rmgc.ro/
40. *** U.S. Environmental Protection Agency Office of Solid Waste Special Waste Branch, *Design of Tailings Dams and Impoundments*
41.*Ministry of Economy, *Strategia_2008-2020*,
http://www.minind.ro/strateg_miniera/Strategia_2008-2020_02062008.pdf
42. *** International Committee on Large Dams (ICOLD) 1994. *"Tailings Dams – Design of Drainage – Review and Recommendations*", Bulletin 97.
43. *** Legea 126/1995 privind regimul materiilor explozive, cu modificările și completarile ulterioare;
44. *** OUG 68/2007;
45. *** DIRECTIVA 2004/35/CE;
46. *** RAPORT COMISIE UE 2009-2010 actualizată în 2013.
47. *** *EC COM(2011) 0025 Tackling the Challenges in Commodity Markets and on Raw Materials*
48. *** *EC COM(2013) 0442 On the implementation of the Raw Materials Initiative*
49. *** *EC COM(2010) 2020 "Europe 2020", and COM(2010) 614 "An Integrated Industrial Policy for the Globalisation Era".*
50. *** *EC COM(2010) 2020 "Europe 2020", and COM(2011) 21 "A resource-efficient Europe: flagship initiative under the Europe 2020 strategy".*
51. *** LEGEA 575 "Planului de amenajare a teritoriului naţional – Sesiunea a V-a – Zone de risc natural.
52. *** NORMATIV NP 126 - Fundarea construcţiilor pe pământuri cu umflări şi contarcţii mari.
53. *** Zonarea seismica. Macrozonarea teritoriului României pe baza intensităților pe scara MSK conform SR 11100-1:93**.**
54. Etapele procedurii de evaluare a impactului asupra mediului. (n.d.), lege5.ro
55. Anexa nr. 5 Procedura de evaluare a impactului asupra mediului (n.d.), www.mmediu.ro/app/webroot/uploads/files/Anexa_5.pdf

56. Studiu de evaluare a impactului asupra mediului (n.d.) www.eib.org/attachments/pipeline/20070524_eia1_ro.pdf
57. Raport privind impactul asupra mediului. (n.d.) www.epcmediu.ro
58. Evaluarea impactului asupra mediului. (n.d.) www.sgpmoldova.org
59. Evaluarea impactului asupra mediului - cum să te asiguri ? www.stratos.ro
60. Procedura de evaluare a impactului asupra mediului pentru anumite proiecte publice şi private^9 | Lege 292/2018. (n.d.) www.lege5.ro
61. Audit de mediu (n.d.) www.solutiidemediu.ro/audit-de-mediu/
62. Ce presupune un audit de mediu? (n.d.) www.auditeco.ro/ce-presupune-un-audit-de-mediu
63. Audit de mediu. (n.d.) www.sigad.ro/servicii/audit-de-mediu/
64. Impactul financiar asupra bugetului general consolidat (n.d.) www.lege5.ro
65. Ghid de evaluare a impactului reglementării. (n.d.) www.anfp.gov.ro
66. Metodologia de evaluare a impactului economic (n.d.) www.igsu.ro
67. D4: Evaluarea Eficienței Economice (n.d.) www.mfinante.gov.ro
68. Metodologia de evaluare a impactului asupra mediului (n.d.)www.anap.gov.ro
69. Evaluarea impactului cheltuielilor | Lege 69/2010. (n.d.) www.lege5.ro
70. Analiza impactului financiar (n.d.) www.unicef.org
71. Audit financiar - Noa Group. (n.d.) noagroup.ro/serviciu/audit-financiar/
72. Auditul financiar – ce este și când au nevoie companiile, www.necesit.ro
73. Ce este auditul financiar - Tipuri de audit financiar. (n.d.) www.colorful.hr
74. Auditul legal – Asigurarea acurateței situațiilor financiare www.eur-lex.europa.eu
75. Auditul | Reglementare actualizat 2024. (n.d.) www.lege5.ro
76. România-Biodiversitate și Mediu Construit. (n.d.) www.constructive-voices.com
77. Biodiversitatea în mediul construit: studii de caz de succes. www.constructive-voices.com
78. Impactul forajului de puțuri asupra biodiversității locale. (n.d.) www.forari-puturi.eu
79. Biodiversitate, (n.d.) www.eea.europa.eu/ro/themes/biodiversity/intro
80. Schimbările climatice: turismul și agricultura afectate (n.d.),www.blue-europe.eu
81. Sustenabilitate (n.d.) www.wikipedia.org/wiki/Sustenabilitate
82. Consecințele schimbărilor climatice (n.d.) www.climate.ec.europa.eu
83. www.studii-cercetari-academice.org
84. Popovici, D. 71-89. (n.d) ibn.idsi.md/sites/default/files/imag_file/71-89.pdf
85. Carol, I. Managementul_și_conducerea_militară_strategică_în_viitoarele_confruntări_armate. (n.d.) www.cssas.unap.ro
86. Rîndașu, S. Articol_9653. (n.d.) http://revista.cafr.ro/temp/Articol_9653.pdf
87. Enachescu, D. 234594450. (n.d.) core.ac.uk/download/pdf/234594450.pdf
88. Exploatarea pe fundul mării adânc. (n.d.) din oceanfdn.org/ro/deep-seabed-mining/
89. Hosszu, R. hosszu-ramona-alexandra-digital-divides-and-ambivalence.-a-sociological-study-of-the-digital-transformation. (n.d.) din nameofthegame.ro
90. Gârboan, R. Metode de cercetare utilizate în evaluare | GÂRBOAN | Revista Transilvană de Ştiinţe Administrative. (n.d.) din www.rtsa.ro/rtsa/index.php/rtsa/article/view/148
91. Analiza Academiei Române – riscuri privind mediul şi dezvoltarea durabilă a zonei Roşia Montană. (n.d.) din www.cotidianul.ro
92. Proiectul Roşia Montană, între riscuri şi beneficii | Ştiinţă | Art-emis. (n.d.) din www.art-emis.ro
93. comments_hung. (n.d.) din www.cdep.ro/img/rosiam/pdfs/comments_hung.pdf
95. Evaluarea staanderdelor, Culegere-articole_SS-isbn_2020. (n.d.) din ibn.idsi.md

96.Paks_II_RIM_capitolul_privind_impactul_transfrontier_in_lb_romana(1) (n.d.) www.mmediu.ro
97. Manual_închidere_exploatări (n.d.) din www.oldeconomie.gov.ro
98. Memoriu_prezentare. (n.d.) din www.mmediu.ro
99. Omologarea și supravegherea pieței (n.d.) din eur-lex.europa.eu
100. Managementul riscului (n.d.) din www.unitbv.ro
101. B DIRECTIVA 2007/46/CE A PARLAMENTULUI (n.d.) din eur-lex.europa.eu
102. Raport privind impact asupra mediului(n.d.) din www.certejudesus.ro
103. INCD INSEMEX Petroșani. (n.d.) din insemex.ro
104. RFID, BLE, IoT și drone pentru industria minieră. (n.d.) din gaorfid.com/ro/rfid-ble-iot-drones-for-mining-industry/
105. Măsuri de siguranţă care se iau pe timpul executării lucrărilor miniere(n.d.) din lege5.ro
106. Roșia Montană Gold Corporation. (n.d.) din ro.wikipedia.org
107. Minerit și extracții. (n.d.) din mecc.gov.md
108. După Roșia Montană | Vorbim doar despre aur, dar România stă pe bogății și mai mari. Pot fi ele exploatate sustenabil? din panorama.ro/rosia-montana-aur-romania-bogatii-exploatate/
109. Document-2013-09-12-15566142-0-alternativa-zero-costurile-nerealizarii-proiectului-rosia-montana-raport-rmgc. (n.d.) din media.hotnews.ro
110. M. Sandu-Rezumat. (n.d.) din www.anacec.md/files/Sandu-rezumat.pdf
111. Gabriela, D., Svetlana, T., Nina, B. Gavbriela_Damian-Timosenco_thesis. (n.d.) din www.cnaa.md
112. Ghid 20/02/2020. (n.d.) din legislatie.just.ro/Public/DetaliiDocumentAfis/224617
113. Ghid privind cariere, exploatații miniere de suprafață (n.d.) din www.mmediu.ro
114. Managementul mediului în sectorul minier. (n.d.) din oldeconomie.gov.ro
115.Ghid din 20 februarie 2020 privind Cariere și exploataţii (n.d.) din www.monitoruljuridic.ro
116.Linii directoare pentru dezvoltare (n.d.) din urban-mobility-observatory.transport.ec.europa.eu
117. Raport de Analiza Resurse Minerale 16.03.2021.docx. (n.d.) din oldeconomie.gov.ro
118. Manualul-de-închidere-a-minelor-Ordin-273.2001. (n.d.) din oldeconomie.gov.ro
119. Culegere_directive_2010.pdf. (n.d.) din adideseurihd.ro
120. Memoriu_prezentare. (n.d.) din www.mmediu.ro
121. Atribuirea perimetrelor miniere - AGRM. (n.d.) din agrm.gov.md
122. 6_cnc_inginerie_miniera. (n.d.) din mecc.gov.md/sites/default/files/6_cnc_inginerie_miniera.pdf
123. Poluarea apelor subterane – tipuri, efecte și modalități de limitare a fenomenului (n.d.) din stratos.ro
124. Manual_inchidere_exploatari (n.d.) din oldeconomie.gov.ro
125. Managementul riscurilor geotehnice, structurale și de mediu. (n.d.) din www.spatiulconstruit.ro
126. Când se realizează un studiu geotehnic?(n.d.) din www.ecogeodrum.ro/cand-se-realizeaza-un-studiu-geotehnic/
127. Etapele realizării unui studiu geotehnic. (n.d.) din geo-project.ro/etapele-realizarii-unui-studiu-geotehnic/