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PIERRE SMITH

Geology and Mineral

Resources of West Africa Cambridge University Press
The constant increase in the consumption of mineral resources, as well as the growing awareness of their exploitation, is causing deep concern within the scientific community. This concern is justified by the fact that the energy transition will increase the pressure on these resources, as renewable energies require an increased and more diversified quantity of mineral materials. This book presents an overview of the exploitation of these mineral resources, where the natural, regulatory and environmental constraints interfere with economic, financial and geopolitical interests. By mobilizing the fields of the humanities, geosciences and engineering, it also analyzes the challenges that the energy transition will encounter, challenges related to the contradictory effects that the acceleration of the extraction of these resources will have on their physical availability, the economies that exploit them and the populations that live off of them

Rock Forming Minerals Springer Science & Business Media
Today's best practice in environmental mine-waste management requires a thorough understanding of the wastes produced. The knowledge of mine wastes represents a new interdisciplinary

science and this book provides an introductory, descriptive and analytic overview of the wastes produced in the mineral industry. It describes the characterization, prediction, monitoring, disposal and treatment as well as environmental impacts. Intended for undergraduate courses, it systematically builds the reader's understanding and knowledge of the wastes produced, their physical and chemical characteristics, and how to deal responsibly with them on a short and long-term basis. The text employs 22 case studies spanning the world's mineral industry that elucidate best practice and specific challenges in mine-waste management and site rehabilitation.

Summary of United States Mineral Resources National Academies Press

An Introduction to Cut-off Grade Estimation examines one of the most important calculations in the mining industry. Cut-off grades are essential to determining the economic feasibility and mine life of a project. Increased cut-off grades can reduce political risks by ensuring higher financial returns over a shorter period of time. Conversely, lower cut-off grades may increase project life with longer economic benefits to shareowners, employees, and local communities. Cut-off

grades also impact reported reserves, which are closely monitored by stock exchanges and regulatory agencies. Author Dr. Jean-Michel Rendu, an internationally recognized expert in the management, estimation, audit, and public reporting of mineral resources, provides practical insights into this critical variable. YouOCOll learn about minimum cut-off grades, as well as those for deposits containing multiple valuable minerals. Dr. Rendu explains which costs should be included in cut-off grade calculations and considerations when planning open pit, underground, and block and panel caving operations. He shows how to optimize a copper mining project by changing grind size, and demonstrates the relationship between deposit modeling, ore control, and cut-off grades.

An Introduction to Cut-Off Grade Estimation

Springer

In this text, attention is focused mainly on those literature is accessible, however, it is to be expected countries in western Africa lying south of the Sahara, that teachers and lecturers will know of it and will be that is, between about SON and 15°N, and westward able to acquaint their students with it, where neces of about 15°E. Parts of the region as far north as sary. about 200N are considered from time to time, for A glossary of terms is

provided at the end of the purposes of correlation and cQntinuity. The map on volume, and there is a summary at the beginning of p. xiii indicates the approximate extent of the cover each chapter. age. This book is dedicated to the many colleagues and The principal aim is to provide a broad view of students with whom we have worked in West Africa West African geology as a whole, for undergraduates and who have stimulated and encouraged our teach who are studying for honours degrees in geology and ing and research in various ways. We hope also that it may help the work of international organizations who already have an understanding of basic geologi cal principles. It is increasingly important that such as AGID, CIFEG and UNESCO to encourage the growing trend towards geological co-operation geologists working in this region should see it as made up of geological 'provinces' which transcend and correlation between different countries in West national boundaries. Africa.

The Business of Mining Society for Mining Metallurgy & Exploration Statistical evaluations of exploration data are the basis for decisions to be made at various stages of an exploration project. In contrast to other geostatistical books, Statistical Evaluations in Exploration for

Mineral Deposits focuses not only on theory, but examples are also given, frequently originating from experience in mineral exploration by the author who worked worldwide for a mining company. Together with its companion volume, Economic Evaluations in Exploration, the book illustrates methods used in exploration campaigns and mining activities. It is intended as a vademecum for geologists who are forced to make quick decisions regarding an exploration project. It also addresses scientists and students involved in teaching or in mineral economic evaluations, recommendations or decisions.

Introduction to Clay Minerals Springer

Introduction to Industrial Minerals introduces the reader to the subject of the new mineral raw materials that our society demands. It emphasizes the way in which, in order to satisfy the consumer, the requirements of industry control mineral exploitation, and the way fundamental mineral properties are exploited for particular applications. It describes aggregates, industrial clays and raw materials for the chemical industry. The need for high temperature processing is addressed with a chapter on interpretation and use of mineralogical phase diagrams and time-temperature-transformation

diagrams. These are then applied in separate chapters on the manufacture of glass, cement, brick clays and refractories. Evaluation of geological reserves is described in the context of computer modelling of deposit quality, and the final chapter considers the use of a site after extraction, emphasizing the requirements for waste disposal.

Mineral Resources, Economics and the Environment Springer Nature

This extensive revision deals with the minerals talc, pyrophyllite, chlorite, serpentine, stilpnomelane, zussmanite, prehnite and apophyllite. The text has been completely rewritten and very much expanded to take account of the many advances that have been made in all aspects of the Earth sciences, not least mineralogy. Each chapter is headed by a brief tabulation of mineral data and ends with full references. Crystal structures are described and illustrated, followed by discussion of structural information gained from spectroscopic as well as X-ray and electron-optic methods. Chemical sections include many analyses and structural formulae, phase relations, igneous, metamorphic and sedimentary geochemistry, alteration and weathering. Examples are given of a range of mineral parageneses. Correlation between

the various aspects of mineralogy are emphasized in order to provide a scientific understanding of minerals as well as their description and identification. So great has been the expansion of research on layered silicates that a separate volume (3A, 2003) was devoted entirely to micas and another (3C), entirely for clay minerals will also be published. Rock-Forming Minerals is an essential reference work for professionals, researchers and postgraduate students in Earth science and related fields in chemistry, physics, engineering, environmental and soil sciences.

Critical Mineral Resources of the United States Springer Nature

This vivid introduction to economic geology not only describes the most important deposit types, but also the processes involved in their formation. Magmatic, hydrothermal and sedimentary processes as well as weathering and alteration are explained in the framework of plate tectonics and the history of the Earth. The chapter about fossil fuels includes unconventional deposits and the much-debated fracking. Other topics covered are exploration, mining and economic aspects like commodity prices.

Mineral Resource Estimation CRC Press

"Informed decisions concerning undiscovered mineral resources cannot be

made without an understanding of the technological, environmental, or economic difficulties that might be encountered. Quantitative Mineral Resource Assessments: An Integrated Approach offers a modern quantitative assessment that explicates the diverse factors that affect mineral-related decisions, so that potential consequences can be more easily assessed, uncertainty and risk reduced, and courses of action determined without bias. The integrated approach focuses on three assessment parts and the models that support them and is designed so that consequences of alternative courses of action can be examined with respect to land use, exploration, or mineral-resource development. Drawing upon newly developed deposit density models, frequency distributions, and previously unpublished experiments, the book provides an essential and practical approach for making critical decisions." "Written for governmental and industrial policy makers, managers of exploration, planners of regional development, and similar decision makers, the book brings together for the first time the widely scattered literature on the subject. It also captures the necessary ingredients of the diverse disciplines of economic geology,

statistics, mineral economics, and geology that are an integral part of quantitative mineral resource assessments. With this wealth of information, the book will serve not only as a guide for professionals but also as a comprehensive reference for those studying or researching mineral resources."--BOOK JACKET.

The World of Mineral Deposits Springer Science & Business Media

This book describes an innovative closed-loop concept that allows the feedback of online data from operational monitoring to create mining intelligence. The application of this concept promises significant improvements in economic and environmental key performance indicators for any mining operation. Combining theory with industrial case studies, the book guides readers through this process by providing theoretical background, addressing practical issues related to operational implementation, and illustrating the impact on selected examples. This new concept is presented using the example of a bulk and gold mining application, but is applicable at any mine where grade control is important. The book is of interest to industrial professionals involved in operational monitoring, mining intelligence, and mine planning optimization, as well as to

researchers and academics in the field of applied geostatistics.

An Introduction to Cut-off Grade Estimation, Second Edition Society for Mining, Metallurgy, and Exploration, Incorporated

Applied Mineral Inventory Estimation presents a comprehensive applied approach to the estimation of mineral resources/reserves with particular emphasis on the geological basis of such estimations, the need for and maintenance of a high quality assay data base, the practical use of comprehensive exploratory data evaluation, and the importance of a comprehensive geostatistical approach to the estimation methodology. Practical problems and real data are used throughout as illustrations. Each chapter ends with a summary of practical concerns, a number of exercises and a short list of references for supplementary study. This textbook is suitable for any university or mining school that offers senior undergraduate and graduate student courses on mineral resource/reserve estimation.

Mine Wastes Elsevier

“Everything” sums up what must be considered for a properly documented property evaluation. Less than 30% of the projects that are developed in the minerals industry yield the return on investment that was projected from the

project feasibility studies. The tools described in this handbook will greatly improve the probability of meeting your projections and minimizing project execution capital cost blowout that has become so prevalent in this industry in recent years. Mineral Property Evaluation provides guidelines to follow in performing mineral property feasibility and evaluation studies and due diligence, and in preparing proper documents for bankable presentations. It highlights the need for a consistent, systematic methodology in performing evaluation and feasibility work. The objective of a feasibility and evaluation study should be to assess the value of the undeveloped or developed mineral property and to convey these findings to the company that is considering applying technical and physical changes to bring the property into production of a mineral product. The analysis needs to determine the net present worth returned to the company for investing in these changes and to reach that decision point as early as possible and with the least amount of money spent on the evaluation study. All resources are not reserves, nor are all minerals an ore. The successful conclusion of any property evaluation depends on the development, work, and conclusions

of the project team. The handbook has a diverse audience: • Professionals in the minerals industry that perform mineral property evaluations. • Companies that have mineral properties and perform mineral property feasibility studies and evaluations or are buying properties based on property evaluation. • Financial institutions, both domestic and overseas, that finance or raise capital for the minerals industry. • Consulting firms and architectural and engineering contractors that utilize mineral property feasibility studies and need standards to follow. • And probably the most important, the mining and geological engineering students and geology and economic geology students that need to learn the standards that they should follow throughout their careers.

Closed Loop Management in Mineral Resource Extraction

Cambridge University Press

Introduction to Mineralogy and Petrology, second edition, presents the essentials of both disciplines through an approach accessible to industry professionals, academic researchers, and students alike. This new edition emphasizes the relationship between rocks and minerals, right from the structures created during rock formation through the economics of mineral deposits. While petrology is

classified on the lines of geological evolution and rock formation, mineralogy speaks to the physical and chemical properties, uses, and global occurrences for each mineral, emphasizing the need for the growth of human development. The primary goal is for the reader to identify minerals in all respects, including host-rocks, and mineral deposits, with additional knowledge of mineral-exploration, resource, extraction, process, and ultimate use. To help provide a comprehensive analysis across ethical and socio-economic dimensions, a separate chapter describes the hazards associated with minerals, rocks, and mineral industries, and the consequences to humanity along with remedies and case studies. New to the second edition: includes coverage of minerals and petrology in extra-terrestrial environments as well as case studies on the hazards of the mining industry. Addresses the full scope of core concepts of mineralogy and petrology, including crystal structure, formation and grouping of minerals and soils, definition, origin, structure and classification of igneous, sedimentary and metamorphic rocks Features more than 250 figures, illustrations and color photographs to vividly explore the fundamental principles of mineralogy and petrology Offers a holistic approach to

both subjects, beginning with the formation of geologic structures that is followed by the hosting of mineral deposits and the exploration and extraction of lucrative, usable products that improve the health of global economies Includes new content on minerals and petrology in extraterrestrial environments and case studies on hazards in the mining industry **Mineral Resource and Ore Reserve Estimation** Cambridge University Press Applied Mineral Inventory Estimation presents a comprehensive applied approach to the estimation of mineral resources/reserves with particular emphasis on the geological basis of such estimations, the need for and maintenance of a high quality assay data base, the practical use of comprehensive exploratory data evaluation, and the importance of a comprehensive geostatistical approach to the estimation methodology. Practical problems and real data are used throughout as illustrations. Each chapter ends with a summary of practical concerns, a number of exercises and a short list of references for supplementary study. This textbook is suitable for any university or mining school that offers senior undergraduate and graduate student courses on mineral resource/reserve estimation. Mineral Resources

Springer Science & Business Media Developments in Geomathematics, 2: Geostatistical Ore Reserve Estimation focuses on the methodologies, processes, and principles involved in geostatistical ore reserve estimation, including the use of variogram, sampling, theoretical models, and variances and covariances. The publication first takes a look at elementary statistical theory and applications; contribution of distributions to mineral reserves problems; and evaluation of methods used in ore reserve calculations. Concerns cover estimation problems during a mine life, origin and credentials of geostatistics, precision of a sampling campaign and prediction of the effect of further sampling, exercises on grade-tonnage curves, theoretical models of distributions, and computational remarks on variances and covariances. The text then examines variogram and the practice of variogram modeling. Discussions focus on solving problems in one dimension, linear combinations and average values, theoretical models of isotropic variograms, the variogram as a geological features descriptor, and the variogram as the fundamental function in error computations. The manuscript ponders on statistical problems in sample preparation, orebody

modeling, grade-tonnage curves, ore-waste selection, and planning problems, the practice of kriging, and the effective computation of block variances. The text is a valuable source of data for researchers interested in geostatistical ore reserve estimation. Introduction to Mineralogy and Petrology Geological Society of London This comprehensive textbook covers all major topics related to the utilization of mineral resources for human activities. It begins with general concepts like definitions of mineral resources, mineral resources and humans, recycling mineral resources, distribution of minerals resources across Earth, and international standards in mining, among others. Then it turns to a classification of mineral resources, covering the main types from a geological standpoint. The exploration of mineral resources is also treated, including geophysical methods of exploration, borehole geophysical logging, geochemical methods, drilling methods, and mineral deposit models in exploration. Further, the book addresses the evaluation of mineral resources, from sampling techniques to the economic evaluation of mining projects (i.e. types and density of sampling, mean grade definition and calculation, Sichel’s estimator, evaluation methods – classical and

geostatistical, economic evaluation – NPV, IRR, and PP, estimation of risk, and software for evaluating mineral resources). It subsequently describes key mineral resource exploitation methods (open pit and underground mining) and the mineral processing required to obtain saleable products (crushing, grinding, sizing, ore separation, and concentrate dewatering, also with some text devoted to tailings dams). Lastly, the book discusses the environmental impact of mining, covering all the aspects of this very important topic, from the description of diverse impacts to the environmental impact assessment (EIA), which is essential in modern mining projects.

Mineral Resources Economy 1 Society for Mining, Metallurgy & Exploration

This new, up dated edition of Introduction to Mineral Exploration provides a comprehensive overview of all aspects of mineral exploration. Covers not only the nature of mineral exploration but also considers other factors essential to successful exploration, from target evaluation to feasibility studies for extraction and production. Includes six detailed case studies, selected for the range of different problems and considerations they present to the mineral explorationist. Features new chapters on handling mineral exploration data and a

new case study on the exploration for diamonds. Essential reading for upper level undergraduates studying ore geology, mineral exploration, mining geology, coal exploration, and industrial minerals, as well as professional geologists. Artwork from the book is available to instructors online at www.blackwellpublishing.com/moon.

Principles of the Mineral Resource Classification System of the U.S. Bureau of Mines and U.S. Geological Survey OUP USA

The Business of Mining complete set of three Focus books provides readers with a holistic all-embracing appraisal of the analytical tools available for assessing the economic viability of prospective mines. Each volume has a discrete focus. This third volume commences with "Our Earth, its Minerals and Ore Bodies", followed by a review of mineral exploration and sampling of mineral deposits. It continues with detailed sections covering the reporting of mineral resources and reserves in Australia, and concludes with the basic principles and application of the various methods of estimating the in-situ mineral resources and ore reserves. The books were written primarily for undergraduate applied geologists, mining engineers and extractive metallurgists and those pursuing course-based postgraduate programs

in mineral economics. However, the complete series will also be an extremely useful reference text for practicing mining professionals as well as for consultant geologists, mining engineers or primary metallurgists.

Mine and Mineral Economics Elsevier

In order to really see the forest, what's the best way to count the trees? Understanding how the economy interacts with the environment has important implications for policy, regulatory, and business decisions. How should our national economic accounts recognize the increasing interest in and importance of the environment? Nature's Numbers responds to concerns about how the United States should make these measurements. The book recommends how to incorporate environmental and other non-market measures into the nation's income and product accounts. The panel explores alternative approaches to environmental accounting, including those used in other countries, and addresses thorny issues such as how to measure the stocks of natural resources and how to value non-market activities and assets. Specific applications to subsoil minerals, forests, and clean air show how the general principles can be applied. The analysis and insights provided in this book will be of interest to economists, policymakers,

environmental advocates, economics faculty, businesses based on natural resources, and managers concerned with the role of the environment in our economic affairs.

Introduction to Mineral Exploration PHI Learning Pvt. Ltd.

This book provides a wealth of geomathematical case history studies performed by the author during his career at the Ministry of Natural Resources Canada, Geological Survey of Canada (NRCan-GSC). Several of the techniques newly developed by the author and colleagues that are described in this book have become widely adopted, not only for further research by geomathematical colleagues, but by government organizations and industry worldwide. These include Weights-of-Evidence modelling, mineral resource estimation technology, trend surface analysis, automatic stratigraphic correlation and nonlinear geochemical exploration methods. The author has developed maximum likelihood methodology and spline-fitting techniques for the construction of the international numerical geologic timescale. He has introduced the application of new theory of fractals and multi fractals in the geostatistical evaluation of regional mineral resources and ore reserves and to study the spatial distribution of metals in rocks. The book also

contains sections deemed important by the author but that have not been widely adopted because they require further research. These include the geometry of preferred orientations of contours and edge effects on maps, time series analysis of Quaternary retreating ice sheet related sedimentary data, estimation of first and last appearances of fossil taxa from frequency distributions of their observed first and last occurrences, tectonic reactivation along pre-existing schistosity planes in fold belts, use of the grouped jackknife method for bias reduction in geometrical extrapolations and new applications of the theory of permanent, volume-independent frequency distributions.

(blood And Ash Series)
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