

Mine Closure And Waste Environmental Earth

Latvia Mineral, Mining Sector Investment and Business Guide Volume 1 Strategic Information and Regulations

Guidelines for Mine Waste Dump and Stockpile Design is a comprehensive, practical guide to the investigation, design, operation and monitoring of mine waste dumps, dragline spoils and major stockpiles associated with large open pit mines. These facilities are some of the largest man-made structures on Earth, and while most have performed very well, there are cases where instabilities have occurred with severe consequences, including loss of life and extensive environmental and economic damage. Developed and written by industry experts with extensive knowledge and experience, this book is an initiative of the Large Open Pit (LOP) Project. It comprises 16 chapters that follow the life cycle of a mine waste dump, dragline spoil or stockpile from site selection to closure and reclamation. It describes the investigation and design process, introduces a comprehensive stability rating and hazard classification system, provides guidance on acceptability criteria, and sets out the key elements of stability and runoff analysis. Chapters on site and material characterisation, surface water and groundwater characterisation and management, risk assessment, operations and monitoring, management of ARD, emerging technologies and closure are included. A chapter is also dedicated to the analysis and design of dragline spoils. Guidelines for Mine Waste Dump and Stockpile Design summarises the current state of practice and provides insight and guidance to mine operators, geotechnical engineers, mining engineers, hydrogeologists, geologists and other individuals that are responsible at the mine site level for ensuring the stability and performance of these structures. Readership includes mining engineers, geotechnical engineers, civil engineers, engineering geologists, hydrogeologists, environmental scientists, and other professionals involved in the site selection, investigation, design, permitting, construction, operation, monitoring, closure and reclamation of mine waste dumps and stockpiles.

A perfect introduction to sustainable mining for those new to the subject or those who require some revision, this book provides a basic overview of international sustainable mining practices since 1992, with particular emphasis upon practices in the Americas, Asia and Europe. The text begins by addressing issues such as the volume of waste generated by mining, mine closure planning and the environmental impacts, and then goes into specific detail in the following areas: cleaner production practices in Australia; blasting impacts and their control in the US; minimizing surface water impacts; minimizing groundwater impacts; use of environmental indicators in mining; and emerging mining technologies that minimize environmental impacts. The text contains relevant examples and case histories for ease of revision, and also includes a chapter on Best Mining Practices for Sustainable Mining and sub-chapters on small-scale mining, tailings pond management and hazardous waste management.

The history of mining is replete with controversy of which much is related to environmental damage and consequent community outrage. Over recent decades, this has led to increased pressure to improve the environmental and social performance of mining operations, particularly in developing countries. The industry has responded by embracing the ideals of sustainability and corporate social responsibility. Mining and the Environment identifies and discusses the wide range of social and environmental

issues pertaining to mining, with particular reference to mining in developing countries, from where many of the project examples and case studies have been selected. Following an introductory overview of pressing issues, the book illustrates how environmental and social impact assessment, such as defined in "The Equator Principles", integrates with the mining lifecycle and how environmental and social management aims to eliminate the negative and accentuate the positive mining impacts. Practical approaches are provided for managing issues ranging from land acquisition and resettlement of Indigenous peoples, to the technical aspects of acid rock drainage and mine waste management. Moreover, thorough analyses of ways and means of sharing non-transitory mining benefits with host communities are presented to allow mining to provide sustainable benefits for the affected communities. This second edition of Mining and the Environment includes new chapters on Health Impact Assessment, Biodiversity and Gender Issues, all of which have become more important since the first edition appeared a decade ago. The wide coverage of issues and the many real-life case studies make this practice-oriented book a reference and key reading. It is intended for environmental consultants, engineers, regulators and operators in the field and for students to use as a course textbook. As much of the matter applies to the extractive industries as a whole, it will also serve environmental professionals in the oil and gas industries. Karlheinz Spitz and John Trudinger both have multiple years of experience in the assessment of mining projects around the world. The combination of their expertise and knowledge about social, economic, and environmental performance of mining and mine waste management has resulted in this in-depth coverage of the requirements for responsible and sustainable mining. Negative environmental events make the headlines. Mining industry examples are the recent incidents at Summitville, Colorado, US, and the cyanide leak at Cambria Resource's Omai Operation in Guyana. In this volatile atmosphere, the publication of the Mining Environmental Handbook comes at an opportune time. It presents an objective, comprehensive and integrated examination of the effects of mining on the environment, and the environmental laws that deal with mining. Though stressing activities in the United States of America, it covers all of North America. North American environmental standards are currently being exported around the world. Consequently, this handbook will be of prime interest in countries that are now coming to terms with mining environmentalism. It should benefit working engineers and environmentalists, manufacturers, legislators, regulators, financiers and journalists. It has been selected as a university textbook. Finally, it will be an indispensable reference during serious discussions about mining environmentalism. Contents: Development of the Mine Environmental Precept and Its Current Political StatusThe Legal Bases of Federal Environmental Control of MiningEnvironmental Control at the State LevelEnvironmental Effects of MiningTechnologies for Environmental ProtectionEnvironmental PermittingSystems Design for Site Specific Environmental ProtectionOperations Environmental ManagementSolution Mining and In-Situ LeachingPlacer or Alluvial MiningCoalAcid Mine Drainage and Other Mining-Influenced Waters (MIW)Uses of Mines as Landfills and RepositoriesEconomic Impact of Current Environmental Regulations on MiningFinancial Assurances for Corrective Actions, Closure and Post ClosureInternational Environmental Control of MiningEnvironmental Case Studies from the Hard Rock IndustryCurrent and Projected IssuesDirectory of State Regulatory AgenciesGlossaryIndex Readership: Engineers, environmentalists and geologists. Keywords:History;Legal

Aspects;Problems;Technology;Permitting;Case Studies;Economic ImpactReviews:“... is a useful, and very readable, first point of reference for those needing to have a general overview of the various environmental issues arising from mining and mineral processing ... There is much to commend the book to wider international use, as it contains a considerable amount of universal 'best practice' which can be applied to mining situations in most countries seeking to adopt credible western standards.”MININGtechnology

Ecological Management of Mining: Achieving Environmental Compliance is a study and comparison - global in scope - of current practices used by mining firms striving for ecological management. The author takes an integrated and interdisciplinary approach in addressing, analyzing and working towards solutions regarding the complex challenges posed by managing the environmental impacts of mining. The issues addressed range from the ecotoxicological effects of metal residues to the land use effects of mining and from socioeconomic impacts to environmental regulation. The goal of this book is to assist mining companies throughout the world to achieve environmental compliance and improve competitiveness in the context of growing environmental regulation and technological innovation. It is an essential book for the wide variety of professionals working on issues in mining. Like the book and the research itself, the audience is integrated and interdisciplinary including engineers, planners, ecologists, policy makers and economists. Features

Since the dawn of civilisation until the last decades of the past century, mining activity, especially that concerning base and precious metals, represented a resource for human population, owing to its importance in many fields of interest. By the second half of the last century, however, mining activity declined until final closure in the face of developing countries, owing to decreasing mineral resources and to metal price drop. In this book, the effects of former mine activities and the related environmental problems are discussed, with the ultimate goal of investigating the fate of potentially toxic elements in the environment and their impact on the conterminous land.

Tailings and Mine Waste08 contains papers from the twelfth annual Tailings and Mine Waste Conference, held by Colorado State University of Fort Collins, Colorado. The purpose of this series of conferences is to provide a forum for discussion and establishment of dialogue among all people in the mining industry and environmental community regarding

Mitigation of Metal Mining Influenced Water is the "how to fix it" volume in a series of six handbooks on technologies for managing metal mine and metallurgical process influenced water. Unlike other texts that focus exclusively on acid drainage from coal mines, this comprehensive series examines both acidic and neutral pH waters from metal mining and metallurgical processes that may impact the environment. The authors take a holistic approach by considering all aspects of the mine life cycle, from planning and design to closure. In this book you'll learn how mining influenced water concerns can be prevented or reduced by disrupting the geochemical relationship that contributes to the release of metals and/or acidity. Industry experts provide insights into understanding a mine's physical environment and how it can influence waste and drainage quality. They outline key issues designers must address, including involving stakeholders who may be affected long after the mine closes. Case histories offer

valuable planning and design considerations by illustrating what works and what doesn't. You'll also benefit from a thorough examination of mitigating technologies in a host of mining and processing situations, as well as the latest arsenal of waste treatment options. *Mitigation of Metal Mining Influenced Water* is a must-read for planners, regulators, consultants, land managers, students, researchers, and others concerned about the environmentally sound management of metal mine and metallurgical processing wastes and drainage quality.

The research papers presented in these proceedings volumes cover the latest developments and findings in the fields of mine health, safety, energy, waste management, reclamation and rehabilitation, mine closure and environmental protection. Authors from over 20 countries with backgrounds in chemistry, engineering, technology and management, and hailing from the government, industry and academia, have contributed to this book. The contents of this book will be of interest to scientists, engineers, consultants and government personnel who are responsible for the development and implementation of innovative approaches, techniques and technologies in the minerals industries. It will also benefit academic researchers, as it addresses the latest advances in fundamental research.

Mine Waste Management bridges the gap between mine operators, regulators, and design engineers concerned with the safe design and operation of mine waste management units. It provides a comprehensive approach for determining the amount of engineered containment that needs to be provided to reduce the risk to water resources to acceptable levels. The approach considers all pertinent aspects, including the intrinsic properties of the waste, as well as site-specific conditions such as climate, geology, and distance to water resources. Topics covered in *Mine Waste Management* include an evaluation of the performance of waste containment at modern mining operations, the mine waste characterization, disposal facility liner and closure designs, ground water monitoring, heap leach operations, and an analysis of the cost impacts of mine waste disposal. The material presented contains technical discussions and information, as well as recommendations on how the technical issues can be accommodated in mine waste regulations. The book is brimming with technical design charts, tables, and equations to provide hands-on aid to designers. Furthermore, each chapter concludes with regulatory considerations that incorporate the proposed technical design approaches. *Mine Waste Management* is a valuable resource for mining industry professionals, regulators, mine waste facility designers, mine superintendents and managers, consulting engineers, and students in environmental engineering, mining, and metallurgy.

Winner of the 2007 E.B. Burwell, Jr. Award of the Geological Society of America Mining activity has left a legacy of hazards to the environment, such as waste, unstable ground and contamination, which can be problematic when redeveloping land. This book highlights the effects of past mining and provides information on the types of problems it may cause in both urban and rural areas. By way of example, the book also demonstrates how such problems may be anticipated, investigated, predicted, prevented and controlled. Furthermore, it shows how sites already affected by mining problems and hazards can be remediated and rehabilitated. Covering subsidence, surface mining, disposal of waste, problems resulting from mine closure and mineral processing, *Mining and*

its Impact on the Environment is an excellent reference for practising mining and geotechnical engineers, as well as students in this field.

The book is a comprehensive treatment of the application of geotechnical engineering to site selection, site exploration, design, operation and closure of mine waste storage facilities. The level and content are suitable as a technical source and reference for practising engineers engaged both in the design and operational management of mine waste s

This first Issue in the series contains nine articles written by experts from the mining industry, regulatory authorities, and academia, and incorporates the latest research.

Tailings and Mine Waste 10 contains the contributions from the 14th annual Tailings and Mine Waste Conference, held by Colorado State University of Fort Collins, Colorado in conjunction with the University of Alberta and the University of British Columbia. The purpose of this series of conferences is to provide a forum for discussion and establish

Companion to: Materials for a sustainable future. Cambridge, UK: Royal Society of Chemistry, 2012.

This is the second Environmental Performance Review (EPR) of Uzbekistan published by UNECE. The report takes stock of the progress made by Uzbekistan in the management of its environment since the country was first reviewed in 2001. It assesses the implementation of the recommendations in the first review (Annex I). It also covers nine issues of importance to Uzbekistan concerning policymaking, planning and implementation, the financing of environmental policies and projects, and the integration of environmental concerns into economic sectors, in particular water management, land management, energy and climate change. The report places particular emphasis on climate change and water, as the country gives a high priority to this issue.

Basics of Metal Mining Influenced Water is a must-read for planners, regulators, consultants, land managers, students, researchers, or others concerned about the environmentally sound management of metal mine wastes and drainage quality. The first of a series of six handbooks on technologies for managing metal mine and metallurgical process draining, this book offers a unique, comprehensive perspective on the subject. Unlike other texts that focus primarily on acid drainage from coal mines, the authors examine both acidic and neutral pH waters that can be hazardous to the environment. Planning a new mine in today's increasingly contentious regulatory and political environment demands a different philosophy. Basics of Metal Mining Influenced Water takes an innovative, holistic approach by considering all aspects of the mine life cycle, including closure. Written by a team of experts from state and federal governments, academia, and the mining industry, Basics of Metal Mining Influenced Water also discusses the major physical and chemical relationships between mining, climate, environment, and mine waste drainage quality. The authors have included an extensive glossary defining hundreds of technical terms for easier reading and understanding. For centuries, denuded landscapes, fouled streams, and dirty air were accepted by society as part of the price that had to be paid for mineral production. Even initial environmental legislation devised by industrialized countries in the 1960s and 1970s was largely designed without mining in mind. And developing countries had little in the way of environmental policy. With the advent of sustainability in the 1990s, times have changed. Today's economic development, many now feel, must not come at the expense of

an environmentally degraded future. Current policies toward mining are under rigorous review, and mineral-rich developing countries are designing environmental policies where none existed before. In *Mining and the Environment*, noted analysts offer viewpoints from Australia, Chile, the United Kingdom, the United States, and the European community on issues and challenges of metal mining.

By their very nature, mining operations generate significantly more waste than ore. For a large-scale mine, this can translate into several hundred million tons of waste rock and tailings that must be stored and eventually reclaimed. Waste storage on this scale requires vast land mass and significant expense for site reclamation once the mine is closed. For some mining operations located near a marine coast, underwater tailing placement can be an attractive alternative to land-based impoundment. Under the right conditions, deep sea tailing placement can be less costly and more environmentally friendly. *Underwater Tailing Placement at Island Copper Mine: A Success Story* documents an important case study on the use of deep sea tailing placement at the Island Copper Mine on Canada's Vancouver Island. It's the most extensive study on underwater tailing placement ever conducted. Over the course of 30 years, more than 400 million tons of tailing solids were deposited deep on the ocean floor with little environmental impact. The study examined all aspects of this innovative program, beginning with its initial implementation in 1971 to five years after the mine's closure. Given particular tailing and marine conditions, deep sea tailing placement can offer significant benefits. Tailing solids, once deposited on the ocean floor, are generally stable and have little or no impact on marine life. Because waste disposal occurs well below the ocean surface, aesthetics are never an issue. Underwater tailing disposal significantly reduces land use requirements for a mining operation. In addition, recent improvements in pipeline transport technology have made it feasible and cost-effective to implement underwater tailing placement for an inland mine up to 125 miles (200 km) from the shore. The study evaluated the relevant issues associated with the implementation of a deep sea tailing placement program, including engineering, chemical, biological, and environmental considerations. This text presents the successes and lessons learned from the largest program of its kind. It's an invaluable resource for mine operators who are considering the applicability of this cost-saving, ecologically sensitive alternative for mine tailing disposal.

The Directive 2006/21/EC3 on the management of waste from the extractive industries ("the Directive" or "EWD") provides minimum requirements, procedures and guidance to prevent or reduce as far as possible any adverse effects on the environment and any resulting risks on human health from the management of extractive waste. The Directive requires the competent authority to demand a financial guarantee (FG), prior to commencement of any operations involving the accumulation of extractive waste. In this context, the EWD requires the Member States (MS) to ensure that the operator draws up an Extractive Waste Management Plan (EWMP). The EWMP must include a closure plan, including site rehabilitation, after-closure procedures and monitoring. For waste facilities that require a permit, the EWMP is part of the permit application. The FG is to be established in accordance with procedures to be decided by the MS. The guarantee is lodged at the pre-operational phase and based on anticipated closure measures and their implementation cost, e.g. as specified in the EWMP. Since the operational phase of a mine might last for

several decades, there is a degree of uncertainty associated with the FG. The EWD addresses this issue by requiring a review of the EWMP every 5 years and the FG periodic adjustment in accordance with any rehabilitation work needed to be carried out as described in the EWMP. For the closure and after-closure phase, the EWD requires MS to ensure that the operator requests an authorisation to start the closure procedure. This request is based on the latest periodic review of the EWMP taking into account the actual environmental impact of the waste facility and elaborates in detail the closure tasks and programmes including expected costs. Some MS require a separate closure plan. The Commission has adopted a Decision on technical guidelines for the FG establishment in accordance with the EWD. Some MS suggested to provide additional technical guidance for the implementation of the FG provisions. The present guideline document (GD) aims to support the EWD implementation by elaborating technical guidance for - Collection and description of the Closure Best Practices by Mining Typology - FG calculation prior to the commencement of waste deposit, and FG periodic adjustment; - Elaboration of updated closure plans taking into account the environmental impact of the operations; and - Approaches for determining the cost of the respective activities to implement the closure plan.

These volumes convey what daily life is like in the Middle East, Asia and Africa. Entries will aid readers in understanding the importance of cultural sociology, to appreciate the effects of cultural forces around the world.

The publication is targeted at all persons concerned with ensuring improved environmental performance, including industry managers, government administrators, professionals & academics as well as community organisations. Readers will find examples which demonstrate that good environmental performance is not only possible in theory, but can be achieved in practice through good management & improved techniques.

This book offers the guidelines on long-term confinement of fine particulate waste products in a safe and environmentally acceptable location. It seeks to present the state of the art, drawing on combined experience from within the European Union (EU), on good international practice where relevant and on lessons learnt from recent untoward incidents. These guidelines have been developed in parallel with the development of the European Standard on Earthworks (prEN 16907) and the contents have been influenced by the well-publicised need for guidance to all stakeholders on both technical and regulatory aspects of the permitting, design and construction of extractive waste facilities in Europe. The Extractive Waste Directive (EWD) imposes a duty on all operators and regulators to ensure the competent design, operation and closure of such facilities. However, though some guidance has been published on a limited number of related technical elements, the relevance of these contributions has been diminished by the lack of an integrated approach. It is now evident to both regulatory bodies and operators alike that a unified and comprehensive document providing guidance to all stakeholders is required if the future of mining within the EU is to be assured and further untoward incidents avoided. These guidelines seek to address all technical stages of the development of a hydraulic fill project in the context of the EWD, with an emphasis on waste and facility characterisation and on the risk-based assessments which underwrite them. They are intended for use by all stakeholders involved in those European industries which involve the

generation, transport and storage of fine particulate waste products requiring long-term confinement in a safe, stable and environmentally acceptable location.

This book provides comprehensive, up-to-date overview of the accumulation of wastes at mine, including sulfidic mine wastes, mine water, tailings, cyanidation wastes of gold-silver ores, radioactive wastes of uranium ores, and wastes of phosphate and potash ores. The updated second edition includes new case studies; presents crucial aspects of mine wastes as scientific issues; reflects major developments and contemporary issues in mine waste science; additional figures; and an updated reference list.

Legislation, Technology and Practice of Mine Land Reclamation contains the proceedings of the Beijing International Symposium on Land Reclamation and Ecological Restoration (LRER 2014, Beijing, China, 16-19 October 2014). The contributions cover a wide range of topics: - Monitoring, prediction and assessment of environmental damage in mining areas - Subsidence land reclamation and ecological restoration - Soil, vegetation and biological diversity - Mining methods and measures for minimization of land and environmental damage - Solid wastes and AMD treatment - Contaminated land remediation - Land reclamation and ecological restoration policies and management - Surface mined land reclamation and ecological restoration - Case study on mining reclamation and ecological restoration Legislation, Technology and Practice of Mine Land Reclamation will be of interest to engineers, scientists, consultants, government officials and students involved in environmental engineering, soil science, ecology, forestry, mining, and land reclamation and ecological restoration in mining areas.

Waste Management and the Environment VIII contains papers present at the 8th International Conference on Waste Management and the Environment, organised every two years by the Wessex Institute. The contents were contributed by professionals, researchers, government departments and local authorities and cover the current situation of waste management. Waste Management is one of the key problems of modern society due to the ever-expanding volume and complexity of discarded domestic and industrial waste. There is a need to establish better practices and safer solutions for waste disposal. This requires further investigation into disposal methods and recycling, as well as new technologies to monitor waste disposal sites, clean technologies, waste monitoring, public and corporate awareness and general education. Unfortunately many of the policies adopted in the past were aimed at short-term solutions without regard to the long-term implications on health and the environment, leading in many cases to the need to take difficult and expensive remedial action. The development of sustainable strategies is the preferred trend for Waste Management. The approach which has emerged as the most promising has been called 4Rs, where reduction, reuse, recycling and recovery (including the sale of waste as Secondary Raw Materials (SRM) and of Refuse Derived Fuel (RDF)) are seen as

the best actions. This largely decreases the volume of waste that needs final disposal. Contents cover such topics as: Environmental impact; Reduce, reuse, recycle and recovery (4Rs); Waste incineration and gasification; Energy from waste; Industrial waste management; Hazardous waste; Agricultural waste; Wastewater; eWaste; Landfill optimisation and mining; Remote sensing; Thermal treatment; Emergent pollutants; Environmental remediation; Direct and indirect pre-treatment of MSW; Disposal of high-level radioactive waste; Legislation; Behavioural issues.

Mining Can Be Environmentally and Socially Responsible—and Still Profitable Even in this regulated, environmentally aware world, running a mine can be done safely, with combined goals of maximizing both the return on investment from extraction and the positive environmental and social impact that a well-run, responsible mine can offer. Responsible Mining is your comprehensive guide to addressing social and environmental risks at mines in the developed world. This book gathers case studies of best practices across the full range of issues. With examples from four continents, you can learn from both your home territory and around the world. Seventy-two leading mine engineers, forestry scientists, conservationists, environmental consultants, sustainability professionals, and geologists from prominent universities, extraction businesses, nongovernmental organizations, and governments have come together within these pages to lead you safely and profitably toward socially, environmentally, and economically beneficial mining practices. Organized around ten sustainability principles required of International Council on Mining and Metals members (including some of the largest extraction businesses in the world), the book addresses nearly every environmental and social consequence of mining in developed countries, including:

- Protecting biodiversity
- Minimizing negative impacts on climate change
- Interacting appropriately with indigenous peoples
- Enhancing the local community and reducing poverty
- Reusing and recycling materials
- Recovering energy
- Recapturing and reusing water
- Managing proper storage, reclamation, and disposal of tailings
- Restoring the land after ceasing mining operations

You will want to make this book required reading for all members of your team who are responsible for environmental compliance, resource recovery, sustainability, energy management, and marketing/public relations to facilitate cross-departmental discussions about how to incorporate best practices into your business plans.

Subject of the book is Uranium and its migration in aquatic environments. The following subjects are emphasised: Uranium mining, Phosphate mining, mine closure and remediation, Uranium in groundwater and in bedrock, biogeochemistry of Uranium, environmental behavior, and modeling. Particular results from the leading edge of international research are presented.

This book represents an important new contribution to the literature that presents practical and comprehensive solutions to mining activities. Its timely content has been prepared by several experts from around the world and its practical format

addresses the major environmental predictive techniques required for the extraction and processing of metal resources. Packed with reviews and case studies, it covers current methods used to forecast environmental effects of metal mining.

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