

JOINT STUDY GROUPS' REPORT



International Copper
Study Group



International Lead & Zinc
Study Group



International Nickel
Study Group

Solid Wastes in Base Metal Mining, Smelting and Refining: A Comprehensive Study for the Copper, Lead, Zinc and Nickel Industries 2019

This research project report presents the results from a study commissioned on behalf of the International Copper, Nickel and Lead-Zinc Study Groups by a team of experts coordinated by RMIT University, Melbourne. The primary aims of the study are to examine mine and smelter and refinery solid residuals (wastes), to quantify and assess a range of issues related to these wastes and to improve the ability of governments to set policies which reduces the impact and maximises the benefit of mining projects and activity.

The study focusses on six key areas: quantifying mining, smelting and refinery waste, risk assessment, lessons learned and experience gained by the industry, the economics of mine waste management, regulation and policy for base metals mineral waste management, and technology and innovation for solid waste management. In summary, it is a major global study of mine-smelter-refinery wastes in the Cu-Pb-Zn-Ni sectors and, provides a comprehensive and quantitative assessment of mineral wastes, within the context of industry and regulatory best practice.

The study synthesizes the results of numerous previous studies, starting with mineral resources and incorporates an extensive new analysis of mining production including detailed project-by-project data and configuration. The study reviews and discusses numerous examples and case studies, develops quantitative mass balance models for the global

production of every one of the four metals, and compiles available data on the composition of base metal concentrates and solid mine wastes. It also discusses some key technological innovations for mine waste management, and finally reviews some key solid waste policy ideas, that could be further explored to continue to improve the environmental, social and economic performance of the base metals mining industry and by-products.

A detailed review of the composition of mineral tailings offers valuable information for decision makers at a time when copper, lead, zinc and nickel mine tailings management presents historic challenges. Tailings composition data and analysis is presented in the mine tailings section of the report.

There is a lack of availability of accurate data about the quantities of mine wastes currently produced and the composition of such wastes, especially at a global scale.

This report allows industry and Study Group member countries to understand the continually growing nature of mine production to meet increasing global demand for raw materials. This, combined with declining ore grades, has resulted in increased output of tailings waste rock.

The completed research project funded and coordinated by the Study Groups presents the most updated and detailed analysis of the solid wastes associated with the mining, smelting and refining of copper (Cu), lead (Pb), nickel (Ni) and zinc (Zn) worldwide.

The study contains extensive data on mineral resources, mining production, smelting and refining data as well as quantitative mass balance models for each metal and associated waste burdens. The study also synthesizes a comprehensive range of studies on the geochemical composition of various wastes across the supply chains for Cu, Pb, Zn and Ni, highlighting the often site-specific nature of these wastes, but also the need to assess each site individually for its waste management and environmental risks. Finally, various case studies and industry examples are discussed throughout the report to highlight the role that regulation and policy play in helping to achieve a reduction in environmental impacts and more sustainable waste management outcomes.

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