



Managing Minor Elements

GUIDING PRINCIPLES

Purpose

Base metal ores often contain low levels of potentially hazardous minor elements such as arsenic, antimony, bismuth, cadmium, mercury, selenium, tellurium, thorium and uranium. Even with companies operating within safe occupational exposure limits and within specified emission levels, trace level minor elements can aggregate to significant amounts in high volume operations over time.¹

Minor elements in the products going to customers can also aggregate to significant amounts on an annual basis, which can significantly add to our customers' waste disposal problems. As industry mines and processes hundreds of million tonnes of base metal ores each year, the accumulated mass of minor elements introduced into the environment is quite large. This makes it essential that these elements are managed in a sustainable manner.²

What happens to these minor elements in the customers operations?

What is their final fate?

Managing minor elements becomes a *product stewardship issue and opportunity*.

Guiding Principles

Data on the amount of minor elements being mined and introduced to the environment each year is limited and often insufficient for accounting purposes. Recently initiated research at the Centre for Sustainable Resource Processing (CSRP) is aimed at gathering the required data for developing predictive models to account for the dispersion of minor elements in various solid, liquid and gaseous streams. This is challenging, given that process streams generated during primary metal production are generally poorly characterised and the behaviour and deportment of trace to minor and trace components is often not well understood.

General principles IZA Member Companies can consider when managing the production and release of minor elements associated with their ores and products include:

- Apply a life cycle perspective;
- Explore ways of avoiding the dissipation of trace elements arising from their natural and passive occurrence in other materials;
- Assess potential impacts on material cycles and the associated level of human and environmental risks and benefits;
- Partner with governments, academia, NGOs and other organizations working to map out the flows of minor elements during various production processes, and optimize flow sheets and practices for treating mined minerals to final metal products (e.g., *Control of Minor Elements Project: The Centre for Sustainable Resource Processing*); and
- Collaborate with up and downstream value chain partners to identify dispersion rates, potential risks, opportunities for capturing, recycling, or appropriately disposing of dispersed elements.

¹ "The Mice that Roar – challenges and opportunities of the minor elements. Presentation by Dr. Joe Herbertson at the Centre for Sustainable Resource Processing. Sustainable Development Conference, Oct 2004.

² "Management of Minor Elements in the Production of Base Metals". Jahanshahi, S., W J Bruckard, C Chen and F R A Jorgensen. 2006.



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Benefits

Removal of minor elements from waste streams along the value chains may have positive business benefits. The removal of potentially hazardous minor elements may free up many of the industry's wastes for use in soils, building and construction products and other end uses, an important aspect of industrial ecology that will contribute to the sustainable development of mined resources by society.³ Removing minor elements in products before they are transported to the customer may also result in a preferred supplier relationship as customers will have reduced liability and lower waste management costs. Minor elements can also be sold for profit depending on the type recovered.

Helpful Resources

- The Control of Minor Elements Project by Centre for Sustainable Resource Processing - bringing together world-class expertise in mineral processing, hydro and pyrometallurgy to address growing industry interest in better control and management of toxic and hazardous elements dispersion. Visit: www.csrp.com.au/index.html



³ Maximizing Value. Guidance on implementing materials stewardship in the minerals and metals value chain. International Council on Mining and Metals. September 2006.