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Sustainable use of Waste Generated in Mining & Downstream Industry

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ABSTRACT

Mining operations consist of excavation (extraction in pits and underground mine workings) to remove ore; beneficiation units, such as mills and processing facilities for upgrading or concentrating the ore; refining facilities for further purification of the metal and manufacturing of finished products. However, mining operations generate large quantities of wastes as well.

Further, in the downstream industry, during the iron, alloy making and steelmaking processes, several by-products are produced, such as slags, dusts, mill-scales and sludges.

Ideally, the reuse and recycling of mine wastes, like all other recycling efforts, create financial assets, responsible consumption of natural resources, limit waste production, encourage innovation and local industries, create jobs and teach responsibility for the environment shared by all. In addition, the reuse and recycling of solid mining wastes and mine waters may also decrease the exposure of humans and ecological receptors to contaminated materials. Various reuse and recycling options have been proposed for mine wastes after numerous studies by stakeholders in line with Sustainable Development Framework (SDF) implemented by Ministry of Mines.

Over the last few decades, the downstream industries have focused its efforts on the improvement of by-product recovery and quality, based not only on existing technologies, but also on the development of innovative sustainable solutions. These activities have led the mining & metallurgical industry to save natural resources and to reduce its environmental impact, resulting in being closer to its “Zero-Waste” goal.

Keywords: Mining, Recycling, Sustainable development, Zero waste

BOTTOM ASH A FEASIBLE ALTERNATIVE TO SAND FOR STOWING IN AN UNDERGROUND COAL MINE

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ABSTRACT

River sand is recognized as the best stowing material due to its properties which are favourable for stowing and hydraulic sand stowing in underground coal mines has been popular due to its simplicity in operation. In India, the scarcity of river sand nowadays has made the sand stowing operation practically unfeasible and with its restricted availability in monsoon period as well as economical availability for use as a stowing material for underground mines is a matter of concern for every mining company. These very constraints not only stop production but also endangers safety of a mine, thus the necessity to explore alternate of sand as a stowing material is the need of the hour.

On the other hand, Bottom Ash, the coal combustion by-products (CCBs), which are generated from the thermal power plants are available in abundance, creates environmental problems and requires a safe disposal and utilization in bulk. Realizing the problems of both the mining and power sectors and studying the properties of Bottom Ash, the researchers have identified Bottom Ash as a suitable alternative to river sand for stowing in an effective manner. In India, initiatives have been taken and full-fledged stowing with Bottom Ash in two mines namely, RK 7 Incline of Singareni Collieries Company Ltd. (SCCL) and Surakachar 3 & 4 mine in the Korba area of South Eastern Coalfields Ltd. (SECL) is being carried out since 2014 & 2017 respectively. The stowing results of both the cases are highly encouraging; and this has been a driving force for Jitpur Colliery, Collieries Division, SAIL to try and establish the success of Bottom Ash. This paper deals with the suitability of Bottom Ash for stowing at Jitpur Colliery, SAIL with respect to Laboratory Investigation of coal Ash samples vis-a- vis trial stowing with Bottom Ash.

Keywords: River sand, Sustainable & Responsible mining, Bottom ash stowing, Strata control

Studies of Ilmenite Sand Along the Kerala-Karnataka Coastline in India

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ABSTRACT

The beach placer at the Arabian Sea's Kerala-Karnataka seashore (~900 km long) is rich in ilmenite, rutile, garnet, sillimenite, zircon, monazite etc. varies mainly due to the natural process (i.e., tidal wave) and the provenances of the deposit. These states are endowed with fairly rich mineral wealth distributed along the seashore. Specially, ilmenite rich major beach and dune sand deposits occur in the coastal stretches of Kerala (Chavara), and Karnataka. India has the world's largest ilmenite reserve of around 10%. The natural ilmenite ($FeOTiO_2$) as available in the beach sand deposited which mostly situated such as Kerala to Gujrat coastline in India. The main focusing points that collected of beach sand along the Kerala-Karnataka seashore from different stations and they are processed for the estimation of total heavy minerals (THM) content using bromoform ($CHBr_3$) chemical for separation followed by floating method and collected sink parts then dried. The results of THM have shown that collecting station in Karnataka like Bengre ~45%, Ullal ~34.6%, Someshwar ~42.5%, and Karwar ~14.6%, respectively. However, around 25-30 sample collecting stations had been chosen and mostly collected from sea-bed and also observed deposition feature on the spots. It is concluded that sand content mostly ilmenite and minor parts are rutile, zircon, sillimanite, monazite, garnet and quartz. The experimental part mainly focusing on roasting of THM part with coke powder (# +150 to -150) in tubular furnace at high temperature (900-1150^{o}C) in inert atmosphere and separated metallic-Ti, subsequently.

Keywords: Seashore, Ilmenite and Monazite Sands, THM, Roasting, Metallic-Ti.

Clay Mining in Gujarat

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Abstract

The presentation is an overview of value addition in Clay Mining, specifically in the region of Kutch, Gujarat. Considering the developments in the past 25 years, it is required to make a strategy about the development application for minerals based on their reserve, locality, market, etc., keeping conservation and value of minerals in mind. Industrial Clay can be categorized into four groups: High-Quality Clay, Unique Specialty Clay, Relatively low-technology Clay of moderate quality, and Variable quality clay. These categories are elaborated further in the presentation, their major suppliers, and their characteristics. Additionally, numerous statistics are given regarding the presence of Bentonite and China Clay, along with their production units.

After the industry's introduction, major clay minerals of Gujarat Bentonite and China Clay are introduced in the presentation. Their characteristics, flow sheets according to the industries, process, processing pattern, and market share in the current scenario are given. Besides these details, value change patterns, applications, enhancement, and up-gradation of these minerals and their uses are provided based on their rheological and absorption properties. All the investors, developers, exporters, clay experts and government officials need to come together to take advantage of the opportunities available in clays and make Kutch clay more valuable.

Keywords: Clay, Bentonite, Value added clay products

Limestone – A Review with Special Reference to Iron & Steel Industry

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Abstract

Limestone, Fluorite and Calcium carbide are the materials used as flux in steel making. For steel making superior grade of limestone is required to control slag volume and improves productivity. As per BIS specification the specifications of limestone for steel making are having CaO should be 53% minimum, MgO-1.5% maximum, Si02-1.5% maximum, total 4ulphur4e-2% maximum and Alkalies-0.2% maximum. This grade is available in some

quantities in Rajasthan, Himachal Pradesh and Sikkim. Mostly, these resources are far away from the existing Iron & Steel industries or plants, hence, movement from these areas involves high logistics cost and steel industry imports this material from UAE, Oman, Malaysia, Vietnam and Iran. India is having the limestone reserves in the states of Andhra Pradesh, Karnataka, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand and Odisha but steel grade limestone are limited to few states only. The limestone requirement is about 100 kg per tonne of liquid steel produced. At 255 MTPA crude steel productions, requirement is 25.50 MT. An attempt has been made in the paper to discuss about usage, applications, export & import and demand & supply of steel grade limestone in India.