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IMPACT OF MINING, MINE OPERATION AND SMELTING OF METAL ORES ON ENVIRONMENTAL QUALITY

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ABSTRACT

Too much impact occurs in mining, mines operation and smelting of metal ores an environmental quality. During mining and mines operation, a large quantity of waste is generated because the ore have only a small fraction of the total volume of the mineral material. In the metal industry, production of pig iron, Al, Cu, Pb and Zn causes very high degradation of the environment.

Copper mining produces large amount of mines waste and tailings. Zinc and Lead smelters release large amount of Cd and Lead into the environment. Smelting and refining of these metals produces gaseous (CO, CO₂, SO₂, NO₂ etc.) and particulate matter emission, sewage waters and solid wastes, soil contamination with trace metal like Cu, Zn, Mn, Fe is causes a serious problem related to smelting.

However, mining, mines operation and smelting are not main sources of global metal input into soil. Many other sources viz. Coal ash, agriculture waste and discarded manufactured product take a lead role for soil contamination. Blast furnace and smelters are the main sources of emissions of As, Cu, Cd, Sb and Zn in the atmospher on a global scale on quality of environment.

A quantitative evaluation on impact of mining, mines operation and smelting on environmental quality is difficult because so many factors involved and lack of proper methodology.

Keywords- Mining, Refining, Smelting, Quality, Impact, Global.

I. INTRODUCTION

Mining, mines operation and smelting section are responsible for some of the largest releases of heavy metals into the environment. These sectors also releases other air pollutants including Sulfur dioxide (SO₂), Nitrogen Oxides (NO₂), Carbon dioxide (CO₂) etc. in addition to leaving behind tons of waste tailings, slag and acid drainage occupational and environmental exposure to heavy metals, Silica and asbestos can occurs during mining and mining operations Zinc and Lead smelters release large amount of Cd and Pb into the environment.

Heavy metals like lead, cadmium and mercury having hazardous effect on human health. These metals badly affect neurological deficits in both children and adult in addition to a range of other system to effects exposure to air borne silica and asbestos can cause lung cancer, pneumoconish and numbers others health effects.

Lead and Mercury Emissions From Mining, Mines Operation, Smelting And Refining

Global release of lead from mining, mines operation, smelting and refining of non ferrous metal like gold, silver, lead etc total over 28,000 metric tons/year¹. Global releases of mercury from smelting and refining non-ferrous metals total 710 metric tons/year. The global releases of mercury from smelting and refining non-ferrous metals is second largest source after power plant². Estimates of releases of mercury into environment from artisanal/small scale gold mining ranges from 400 to 1102 metric tonn/years^{2,3}.

Some of the world best environmental controls countries like Australia, Canada and the US, airborne emission from metal mining, mines operation, smelting and refining are 980 metric tons of lead and 9 metric tons of mercury annually (2008/2009). These lead emissions amount more than 80% of lead production in these countries^{4,5}.

Pollution controls can minimize exposures to workers and surrounding communities, these safeguards are often absent in mining, mines operations ,smelting and refining operations in developing countries. Even relatively efficient mining operations result in enormous waste, emissions to air and water and a legacy of environmental contamination in nearby communities. All over the world, unsafe mining, mines operation, smelting and refining practies have been responsible for a continuing series of environmental and human health disasters which cause great human tragady and undermine social stability, economic development and sustainability goals. For example, more than 400 children died in Zamfara, Nigeria in 2010 from acute lead poisoning caused by unsafe mining and processing lead containing gold ore. People gridding the ore, often in and around their home, contaminated at least 180 villages over a large area. Even large scale gold mining has significant amount of mercury release during ore processing. It is well known that significant amount of mercury emission occurs during cyanid leading and even from mine tailings where no mercury has been added⁶.

In African countries manual mills are use to grind ore from which gold is then recovered by mercury and amalgamation. This is a very inefficient process that recovers less than 30% of the gold. Small scale gold mining

utilizes significant quantities of mercury to extract gold from the ore. Exposure to mercury in these operations not only endangers miners and their families but it also detrimental to the environment when deposited into the water supply. Artisanal gold mining employ an estimated 10-15 million miners in more than 55 countries⁷. Estimates are that these small operations produce about 20% of world gold supply.

Children Are Most Susceptible To Mining Pollution

Children suffer a disproportionate share of the disease burden imposed by mining pollution. The International Labour Organisation (ILO) estimates that 250 million children are involved in child labour and that over 70 percent of them face hazardous conditions⁸. Children in Africa, Asia and South America participate in the mining of gold, lead, tin and precious metals. According to the United Nations Environment Program (UNEP) small scale gold processing operation in developing countries employ on million children are more susceptible to the impacts of heavy metals, tend to have higher exposures and generally accounts for the majority of death and disease associated with mass poisoning incidents from these operations. Children involved in mining have higher exposures to mercury, lead and other metals and suffer lead and mercury intoxication. Grinding and crushing operation in gold processing result in unsafe exposures to lead, arsenic and silica dust.

Outsourcing Hazardous Processing -- A Growing Problem

In recent decades the US has gradually shifted the most polluting aspects of the mining industry to developing countries. This shift is particularly clear in the case of lead ore processing. Today the US exports almost all of the lead ore it mines for processing in countries with weaker environmental and occupational regulations and limited resources for enforcement. This trend has accelerated since the last primary lead smelter in the US closed in 2013.

The pie charts below show the destination of mined lead ore from 2000 to 2009. In 2000 75% of lead ore mined in the US was used domestically but in recent year more than 70% was exported to China for processing.

The graph below shows that lead ore exports from the US to China doubled between 2007 and 2014. China has reported more than 30 Lead poisoning incidents around lead smelters and battery recycling plants since 2009.



Source: U.S. International trade Commission

Moreover, Changes in the global economy threaten to increase the harm cause by unsafe mining and smelting practices. Growing demand for metals and increasing commodity prices are encouraging expansion of both formal and small scale mining and recycling around the world.

In addition, initiatives aimed at reducing global carbon emissions can have the unintended consequence of increasing lead poisoning in developing countries. For example, the adoption of solar, wind power and electric vehicles is increasing demand for lead batteries. The development of new applications for larger lithium ion batteries is significantly increasing the demand for lithium, Cobalt, Manganese and other metals. This trend may continue if plans to accelerate the production of electric and hybrid vehicles are realized.

The response to the reported mass poisoning incident surrounding mining, mines operation, smelting and refining operations is predictably similar from country to country. Shock upon discovery of the problem medical treatment of survivors and a call for huge sums to remediate environmental contamination. In most cases no one is left

to cover the costs of environmental cleanup or even to compensate workers harmed on the job. A new approach is needed to prevent these human health impacts and environmental contamination before the damage is done.

II. CONCLUSION

A global campaign is needed to end dangerous mining, mines operation, smelting, refining and recycling practices that poison children, workers and their families in developing countries and leave adjacent communities devastated by widespread contamination. These efforts will instead encourage the adoption of improved practices in most hazardous mining, mines operation, smelting and refining operations. This global campaign would engage technical experts, create multi stakeholder partnerships develop and promote consensus standards and link safety, health and environmental concerns with economic development. The campaign's final goal should be to change the norms of unhealthy mining, mines operation, smelting and refining practices to prevent environmental contamination before starting medical treatment and costly cleanup operations.

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