POLLUTION IN COPPERBELT PROVINCE OF ZAMBIA:

CASE STUDY OF KANKOYO

1.0 Introduction

Zambia plays an important role in the global copper mining industry. The country contains the largest known reserves of copper in Africa, holding 6 percent of known copper reserves in the world. The country has been mining copper for over a century now, making the industry the main source of foreign exchange earnings for the country and an essential part of the country's development plans.

Although the sector has continued to register strong performance since privatization in the past two (2) decades, with growth averaging 12.7 percent per annum, there has been little development in the social and economic infrastructure of most mining towns. Despite the revival of the industry post-privatization, the mining industry's contribution to government revenues in Zambia has remained low. The industry accounts for 15-18 percent of GDP and exports over US$3 billion worth of copper per year, but contributes just 8 percent of total tax revenue.¹

With the focus of the mining companies remaining on profit making, environmental damage and land displacements on the surrounding communities is what has characterized mining in Zambia. Most communities suffer various environmental and social challenges including repeated pollution or contamination of their domestic water and land resources, unclean air causing a variety of lasting respiratory complications and damaged or run down social and economic infrastructure such as recreation facilities and roads due to heavy traffic of trucks carrying copper.

This write up therefore captures some of the major environmental and social challenges faced as a result of mining activities in some mining towns of Zambia’s Copperbelt province. The paper focuses its attention on mining in general and later narrows down to Kankoyo area, a community within a few meters of the Mufulira Mopani Mine site on the Copperbelt province of Zambia. The information under analysis was obtained through various methods including by way of interviewing the affected community members and documented information on the effects of pollution on human health, accessed from the Mufulira municipal council and the Mufulira district health office².

¹ World Bank and UKaid: July 2011, what would it take for Zambia’s copper mining industry to achieve its potential?
² See Annex 1
1.2. About the “Pay up, Clean or Get out Campaign!”

The Centre for Trade Policy and Development (CTPD) is a not for profit making organisation that has over the last few years been working with both local and European based NGOs on the negative economic, ecological and social consequences being experienced by communities as a result of certain operational activities by some Multi-national Corporations (MNCs). Thus Pay up, Clean up or Get Out! (PCG) campaign is basically “A public Interest Initiative whose aim is to empower communities to demand for environmentally sustainable and equitable benefits, resulting from the exploitation of natural resources and operational activities by Multinational Companies (MNCs) operating in selected communities in Zambia”.

The main Focus of the campaign is basically targeted at highlighting, exposing and following up on incidences and cases of environmental pollutions, degradation and damages within specific communities in Zambia but not exclusive to the Copperbelt areas of Zambia. Specific attention will be paid to environmental damages to Land, Air and Water Resources that the communities depend on for their livelihood.

1.3. Profile of Zambia

Zambia is a landlocked country, ranking among the smaller countries in the region with a surface area of 752,612 square kilometres. Zambia is bordered by Angola to the west, the Democratic Republic of Congo (DRC) to the west and north, Tanzania to the northeast, Malawi to the east, and Mozambique, Zimbabwe, Botswana and Namibia to the south. Zambia’s main river, the Zambezi, forms a natural border with Namibia, Botswana and Zimbabwe.

Zambia is known to be one of the safest countries in Africa with a population of 13,460,508 according to the preliminary 2010 census report. It has a population density of approximately 16 persons per square kilometre and presently just over a third of the population live in urban areas. The country is one of the most urbanized countries in the sub-Sahara Africa.

Zambia has massive potential for economic growth with its rich natural resources such copper and cobalt while good soils and large tracts of fertile, arable land and forest make agriculture another lucrative industry. At independence in 1964, Zambia’s economy was mainly dependent on the copper mining industry that accounted for 90 per cent of its export earnings (Republic of Zambia 1996). The leadership at that time under first President Kenneth Kaunda was committed to the promotion of economic development and
restructuring the economy. The government therefore, undertook rapid nationalisation of the economy shortly after independence, paving way for state-led development. Nationalisation enabled the state to control 80 per cent of the economy through parastatals that were involved in mining, energy, transport, tourism, finance, agriculture, trade, manufacturing and construction. Thus, the state became the engine of growth.

Zambia has since transitioned from Dr Kenneth Kaunda’s leadership of a one party state to a multiparty democracy with a market economy that is becoming ever more open and competitive in the past 20 years or so. This period has also seen the end of two decades of rule by the Movement for Multiparty Democracy (MMD), following the victory of President Michael Sata and his party the Patriotic Front (PF) in the presidential elections of September 2011. The rule of the MMD was underpinned by the perception that the country’s economic growth was largely benefited the political elite and foreign investors. This has been evidenced by the government / parliament lifting the immunity from prosecution enjoyed by the former president, Rupiah Banda, in order to press corruption charges against him.

Currently Government focus is mainly centred on implementing ambitious developmental projects focusing on social infrastructure and gainful human capacities. It is hoped that this will be done through the stepping up of both human effort and financial resources in areas that have a direct impact on the enhancement of individuals’ quality of life, such as education and skills development, health care, agriculture support, employment creation and provision of social amenities. And to achieve all this, Government aims at creating additional fiscal space primarily by strengthening policy and administration of tax and non-tax resource mobilization. So of the major mining tax regime changes that can be noted in recent past include:

2012 Changes

- Increase of the mineral royalty’s tax from 3% to 6%;
- The Separation of hedging transaction from normal mining transaction; and
- Scrapping of VAT deferment.

2013 Changes

- Reduce to 25 per cent from 100 percent the applicable capital allowance in the mining sector;
- Introduction of a provision to subject interest payments on debt made by Mining Companies to Transfer Pricing rules;
- Provide for capital expenditure deductions claims on mining equipment, plant, machinery and such other capital expenditure, only to the time when such assets have been put into use; and
- Introduce Property Transfer Tax at ten (10) per cent on the transfer or sale of a mining right granted under the Mines and Minerals Development Act.

The Zambian Government in February 2013 also took over the operations of the controversial Chinese owned Column Coal mine citing among other reasons that the mining company had violated safety and environmental laws and its failure to meet statutory obligations such as the declaration of mineral production and payments of mineral royalty to the country.

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3 Source: Ministry of Finance Green paper 2013-2015 Medium Term expenditure Framework
In another effort to finance government’s ambitious development plans, the Zambian Government in September 2012 also issued a USD 750 Million inaugural Euro / international Bond which was over-subscribed 24 times by 425 Global Investors, thereby representing Sub-Saharan Africa’s largest ever book order, with Barclays and Deutsche Bank have been selected as the joint lead managers and book-runners.

In summary, Zambia’s development pattern and circle around the mining industry can be said to have undergone the following phases:

- **Phase One (1960s/70s)**
  
  This period was characterised by high mineral prices; and government was collecting high revenues for developmental projects.

- **Phase Two (1980s/90s)**
  
  This was the period of Low mineral prices; the debt crises, while at the same time, the World Bank and international Monetary Fund (IMF) came onto the scene with their structural adjustment programmes and the Zambian government started revisiting most of its policies (Mining tax laws). The key strategy was to attract private / FDI in the mining industry by lowering tax and tax concessions and this allowed for new investments / players to come into the mining sector.

- **Phase Three (2002-2008)**
  
  There was a sudden boom in commodity prices; more risk prone investors entered the industry for quick profits and eventually left. Government started reviewing mining tax law to enable it collect more royalties and tax on the higher sales and profits against the wishes of the mining companies, (the popular 2008 windfall tax).

- **Phase Four (2009-)**
  
  After the 2008 global financial crisis and the death of Zambia’s third republic president Dr Levy Patrick Mwanawasa in August 2008 saw the reversal of the 2008 mining tax regime changes made during the boom / putting on suggested new tax reforms mostly under pressure from mining companies, who argued that they could not operate under such conditions. Mineral prices have over this period been slightly volatile with sudden drops in prices but not to anticipated levels.

2.0 **Overview of Environmental and Social Problems in the Mining Towns of Copperbelt Province.**

Zambia’s mining sector has continued to register strong performance over the past decade, with growth averaging 12.7 percent per annum. At present, four companies own holding of about 80% of all copper output; and these are of Swiss (Glencore Ltd-majority owner of Mopani Copper Mines [MCM]), Canadian (First Quantum Minerals Ltd [FQML]-majority owner of Kansanshi5), Indian (Vedanta-majority owner of KCM) and Chinese (NFC Africa Mining PLC and several other companies, smaller operations and smelters).

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5 EUI Zambia Economic and Political Outlook 2013 country report
To date, over US$6 billion has been invested into mining projects, in the form of rehabilitations of old mines, new mining projects and processing plants and growth in the sector is expected to soar in 2014-15 as investments at the Kansanshi, Lumwana and Konkola mines, as well as First Quantum's new Trident mine, approach completion. From the time privatisation of mining assets was completed in 2000, copper production has increased from 257,000 tonnes to over 700,000 tonnes and is expected to increase to over 1,000,000 Mt per annum, on account of increased investment activities contingent on high international demand and prices. The sector is also expected to benefit from the mineral diversification which includes production of other minerals such as nickel, gold, manganese, iron and uranium.

These mining operations are mostly centered around the Copperbelt and north-western regions of Zambia and issues of environmental and social problems in the mining towns cannot be over emphasized. In Zambia, it has been observed that the focus of Government has mainly been on attracting foreign investment (FDI) through lower tax rates and an assortment of incentives, while, experience has shown that the presence of the mining industry in an area often breeds underdevelopment, land displacement, violation of human rights, poverty, environmental degradation, health, and other social problems. This part of the document presents an outline of environmental and social problems faced in the mining towns of the Copperbelt. “Mining communities on the Copperbelt and Solwezi are experiencing a lot of problems with getting access to health care facilities as well as other services, while infrastructures like roads; housing and basic necessities like water and sanitation are also a huge problem”6, relieved a study by the Catholic Diocese of Solwezi.

Prior to the privatization of the mines in the 1990’s, Zambia Consolidated Copper Mines (ZCCM) was seen as a reflection of the state’s developmental philosophy and it supplied amenities much wider in scope than those offered during the colonial period. The mines under ZCCM managed the environment in the mine townships, maintained the roads, collected refuse and also supported and maintained recreation centers dotted around the townships.

However, the now privately owned mining companies have been involved in serious incidents of environmental mismanagement that have compromised the health of the local people. The three most prominent environmental problems are sulphur dioxide emissions from smelters, heavy-metal effluents being released into the water and silting of local rivers and other water bodies7.

The excess emission of sulphur dioxide from smelting may be associated with some of the human respiratory diseases and acid rains which apparently cause damage to houses and the natural vegetation in some areas. Recently the Chinese owned Chambeshi Copper Smelter Limited was closed early in the year following complaints by farmers that a variety of their crops had been damaged by acid rain caused by sulphur dioxide fumes suspected to have been coming from the copper plant8.

It has further been observed that because of acidic rains, most crops do not grow except mangoes, avocados and cactus. This is a problem particularly common for communities downwind of Mufulira smelters9. In addition to emissions, heavy metals being discharged

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6 Catholic Diocese of Solwezi / Caritas Solwezi: The impact of Corporate Social Responsibility by Kansanshi Mine on the surrounding communities of Solwezi
7 Fraser A and Lungu J: For whom the wind falls, winners and losers in the privatization of Zambia’s copper mines
9 See pictures in Annex 2
into rivers and water bodies that supply drinking water are another form of risk posed to human health in the mining towns of the Copperbelt\textsuperscript{10}.

In most cases, where communities have no access to piped water, they draw water for their drinking and other domestic purposes directly from rivers and other nearby water bodies and as a corollary, they may also use polluted water to water crops, in which toxicity of chemical pollutants are concentrated. Besides, silting of local rivers has notably been another challenge with the risk of killing off plant-life and fish stocks\textsuperscript{11}. This has been the case for Mufulira, with specific reference to Kankoyo and other communities within close proximity of Mopani Copper Mine site\textsuperscript{12}. On the social aspect, some of the major challenges associated with mining towns are access to land and housing, inadequate health care services and violation of employees legal rights. The development agreements that entered into force between the government and new owners of the mines at the time of privatization included conditions which disadvantaged both employed and retrenched mine workers and their families.

It has been reported that while jobs have been created over the years, there are also many cases of job losses and wage cuts in the sector over the past 20 years. For example, during the 2008-09 global economic crisis, there was reduced demand for copper which led to a sharp fall in global copper prices, from a high price of US$8,985 per tonne in July to below US$3,000 by the end of 2008. During this period, MCM among other companies carried out a two-phased redundancy exercise in the first and second quarter of 2009 that resulted in the loss of 1,150 jobs that were directly employed aside from the contractors. In December 2008 the company management further issued a report to the company’s Board of Directors, recommending the closure of Mufulira shaft and placing the Nkana shaft on care and maintenance.\textsuperscript{13} It can therefore be said that since privatization, the impact of mining companies on employment has tended to be negative, from both a qualitative and quantitative point of view. It can further be noted that Mopani’s priority is to maximize profits and minimize costs; hence, jobs are dependent on the price of copper, a highly variable factor.

In some cases, most of the people living around or near mining operation usually suffer from what may be termed “Double Tragedy”. This is due to the fact that some pieces of land which people used for subsistence farming belong to mining firms who hold exploration and mining rights in some of the areas where communities live. The communities are eventually either evicted or relocated to other places. Mining operation expansion projects have hence often resulted in land conflicts\textsuperscript{14}. For example in 2006 about 120 families representing about 600 individuals were evicted from their land in Mufulira and relocated to other settlements within the town by Mopani Copper Mine\textsuperscript{15}.

On the health front, although curative and preventive health care provision for permanent pensioned workers of mining companies and their dependents is guaranteed by most development agreements, the wider community has suffered a decline in the standards of care and increase in the prices placing services beyond the budget of many local residents. Moreover, some mining companies have not devised policies that target alleviating the

\begin{thebibliography}{9}
\bibitem{10} See pictures in Annex 2
\bibitem{11} This link is to articles further highlighting this \url{http://newaction.tigweb.org/article/precious-zambian-copper-poisons-kafun-river} & \url{http://www.postzambia.com/post-read_article.php?articleId=3470}
\bibitem{12} Caritas Ndola: Research Report in Mufulira’s Kankoyo Township on the effects of Sulphur Dioxide on Human and Natural Environment
\bibitem{14} Fraser A and Lungu J: For whom the wind falls, winners and losers in the privatization of Zambia’s copper mines
\bibitem{15} The Umuchinshi Initiative: Can The OECD Guidelines Protect Human Rights on the Ground? A Case Study: The Evictions at Mufulira by First Quantum Minerals / Mopani Copper Mine
\end{thebibliography}
effects of high malaria, TB and HIV infection rates which pose a great risk on human life around mining towns.\textsuperscript{16}

In general these are the challenges which mining towns encounter in Zambia and there is therefore need for collaboration among all the stakeholders to resolve the challenges which the communities around mining activities face.

3.0 Specific Findings

Mufulira meaning “land of abundance” has a long standing legacy of sulphur dioxide stunning from the time the Mufulira Smelter was initially commissioned in 1937. The smelter was later upgraded in 1952 with further upgrades in 1971, 1973, 1977 and the last being in 1991\textsuperscript{17}. Upon acquiring the Mufulira mine, MCM was required to develop a proposal to bring the Mufulira smelter into compliance with the Zambia Environmental laws subject to all the provisions of “famous Development Agreements (DAs)” signed between the mining company and Zambian Government at privatization. And in 2006, MCM embarked on a smelter up-grade programme with an aim of capturing 97\% of sulphur dioxide emission and meeting the long term emissions limits by June 2015, in accordance with the expiry of the stability period provided for in the DAs.\textsuperscript{18}

Phase 1 and 2 of the project were completed in 2007 and 2009 respectively and it is reported that they are capturing about 50\% of the emissions. Implementation of phase 3 which is the final stage of the smelter up-grade project commenced in December 2010 and is scheduled to be completed ahead of schedule in December 2013 and not the earlier stated June 2015. “We are on course and ahead of schedule with the project and come December 2013, Mufulira will have no more sulphur dioxide emissions as we will be capturing 97\% of the emission” a Mopani Company Mines official said.

This section will mainly focus on Mopani Copper Mines (MCM) highlighting specific findings of the negative effects (both environmental effects and the social effects) of its mining operations and activities past and present on the environment, vegetation, animals and humans in Kankoyo. “The mining industry is seriously causing havoc to the environment leading to serious problems\textsuperscript{19}”, as cited by former Minister of local government and Environmental protection, Prof Nkandu Luo.

3.1 Environmental effects

The environmental effects of mining activities can essentially be grouped into three categories namely Air, Water and Land or Soil pollution. These effects are hereby outlined one by one in this section.

\textsuperscript{16} Life in Kankoyo in the shadow of the Mopani copper mine in Zambia; www.osisa.org/.../mines-and-misery-zambia-click-first-photo-launch
\textsuperscript{17} Mopani Copper Mines Mufulira Smelter Upgrade Project: - http://www.isasmelt.com/EN/Publications/Technical\%20Papers/XTpaper_Mopani_MSUPyromet05.pdf
\textsuperscript{19} Luo Warns of Climate Change Effects: - http://allafrica.com/stories/201202230899.html
a) Air Pollution

The pollution of air in Kankoyo is due to sulphur dioxide emission from the smelter. Although efforts are being put in place to develop technology of trapping sulphur dioxide, there has been little improvement over the years. It was established that Mopani Copper Mines’ (MCM) purification method allows sulphur dioxide way above the world health Organisation (WHO) minimum amount of 600 micrograms per cubic meter. “There are no set limits of pollutions to measure against because currently the agreement between the mining company and government allows the company to release controlled emissions into the atmosphere until the smelter up-grade project is collected” according to a ZEMA official. This poses a serious risk of respiratory diseases because inhaling sulphur dioxide causes inflammation of the lower airways further causing primary irritation of the nose, eyes, throat, coughing and chest complications. “Just the other week, most of the area including the central business district (CBD) was covered in a cloud of white fumes of sulphur dioxide”, a Mufulira resident said. Annex 1 contains a table with emission readings in Mufulira for parts of 2009; these were the only available figures. “We do monitor the quality of air / emissions on a regular basis using our own equipment and also get readings from the air monitoring equipment that Mopani procured and installed in various points around the township” a ZEMA official said. They however still show the large amounts of pollutants emitted by Mopani. There has been a large outcry by members of communities around the mine concerning these emissions. These high levels of pollutants in the air put miners and residents at a greater risk of contracting devastating respiratory illnesses. A resident of Kankoyo is quoted below as he narrates his experience of inhalation of Sulphur Dioxide that is emitted into the air by MCM; “you can’t move outside when it (Sulphur Dioxide) is emitted, the eyes get irritated, the nose gets irritated, skin becomes itch and the coughing starts as a result of the choking cent of the emissions.”

b) Water Pollution

Mopani Copper Mines (MCM) in Mufulira uses the acid leaching method of mining. The technique involves injecting a sulphuric acid solution into the ground to dissolve the copper ore directly in the deposit. The solution is then pumped to the surface and processed to separate copper from the acid. In the case of Mopani, the acid is injected into a copper ore deposit underground while underground water is a major source of domestic water supply in Mufulira provided by the local water utility company, Mulonga Water Company. “These pipes that you see lined from mine plant carries water pumped from underground to the water treatment plant on the other side of town as you coming into Mufulira which is further redistributed for domestic use by the water company”, a Mufulira residents narrates. It is worth noting that not all the acid dissolve the copper, there is residue acid that remains in the rock formation which may filter into the ground water reservoirs around the mining area.

This contaminates ground water with the acid, contrary to the environment protection act as this kind of mining results in water pollution. This system of extracting copper was also attributed as direct cause of the 2008 domestic water acid pollution and other subsequent pollutions which has gone unreported. “We believe that there are certain isolated cases when

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20 Caritas Ndola: Research Report in Mufulira’s Kankoyo Township on the effects of Sulphur Dioxide on Human and Natural Environment
21 The following is a link to an article from The Post Newspaper http://www.postzambia.com/post-read_article.php?articleId=24895
23 You can watch the documentary Zambia: Good Copper Bad Copper on the following link http://www.youtube.com/watch?v=UamzrLswJk.
the water is polluted but the community is not informed more especially when water supply is disrupted for over a day and if we are fortunate, our friends working underground would inform us that there has been an acid spillage and that is why there is no water in the compound” said a Kankoyo resident.

Furthermore, the large scale use of sulphuric acid which is transported on rather bad road infrastructure poses a risk of accidents. In December 2009 one of the trucks transporting the acid overturned and its sulphuric acid spilled into Tukula Mutima River, a tributary of the Kafue River, the Copperbelt’s main water source. The fish immediately died and the plant life was burnt by the acidity.

c) Soil/Land pollution

The sulphur dioxide emitted in the air sometimes forms acid rain in the rainy season and this endangers plant life. The gas also affects the soil and inhibits the growth of vegetation. It was observed that the area has open spaces without vegetation, with only trees such as avocado and mango that are resistant to sulphur dioxide. “Look at the surroundings here, nothing much grows here in Kankoyo not even grass apart from this wild shrub and afew fruits trees. But go to the other side of the town, you would think you are in a different town because the sulphur dioxide emissions do not the reach that side” described a Kankoyo resident. In addition, the pipes that evacuate mining waste (toxic tailings) leave the mine, cross several townships and are totally unprotected. The danger with this is pollution of the land in case of leakages.

4.0 Conclusion

There is a need to establish the relationship between the pollutants or contaminants and the suffering occasioned to the surrounding communities and the environment. Secondly, a number of tests need to be carried out to verify the chemicals that are contained in the pollutants or contaminants and their effect on the environment, people and vegetation. Finally, a study will have to be carried out to examine the damage done and the cost of rectifying such damages and maybe compensation to the affected communities.

5.0 Recommendations

The CTPD “Pay up, Clean up or Get out” campaign recognizes that the majority of the community in the Copperbelt are either vulnerable or suffer from ongoing negative health conditions and risks due to the environmental damage caused by the activities of Multinational Companies (MNCs) such as MCM in this case. The livelihood of thousands of these households and that of their future generations is impaired due to loss of productive land, water, and air because of past and ongoing pollution. As a result, these impoverished communities are prevented from exercising their right to economic activity. Thus, it can be recommended that following actions be undertaken:

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24 More detailed story can be found on the following links:

25 See pictures in Annex 2

26 See pictures in Annex 2

[9]
i. The government should revisit the contract / agreement with MCM and ensure that it benefits the residents of Kankoyo Township and improve the emission system as soon as possible.

ii. There is need to assess the kind of mining system conducted by the Mopani Copper Mines as the acid that is used as a leaching agent is highly mobile and hence may end up mixing with underground water that is later on supplied to the local communities through Mulongo Water and Sewerage limited. This is evident in the cases of 2nd January 2008, where about 756 residents of Mufulira mainly Kankoyo and Kantanshi townships drunk tap water alleged to have been contaminated with sulphuric acid from Mopani Copper Mines and suffered several abdominal pains. And these residents were taken to the two hospitals namely the government run “Malcolm Watson Hospital” and Ronald Ross Mine Hospital, and the recent instance of 2011. It is evident that this kind of mining led to water pollution that is consumed by people, animals and vegetation that can lead to loss of lives and impairment of health on the people living in these communities.

iii. We are informed that the pumping system that Mopani uses to pump water has the capacity to read sulphuric acid and to shut down supply automatically if the levels of sulphuric acid are detected. However, it has been noted that the system proved to be ineffective or unreliable owing to water contamination or pollution on 2nd January 2008 and 1st September 2011 respectively. Therefore, we recommend that MCM either employ a pumping system that is more accurate and effective in its reading of the presence of acid in the water being pumped to the local community or engage Mulongo Water and Sewerage limited at a few to supply water to these local that is pure and uncontaminated, that is pure natural water.

iv. The mining company should invest in environmental protection programmes that will help mitigate some of the environmental concerns raised by the communities around the mine site and various other stakeholders.

v. ZEMA and the local should be adequately equipped and have enough information to provide the various stakeholders on the state of the environment and various sources of pollution that a community may be experiencing.
ANNEX 1: Emission Readings on The Mufulira Site, June-September 2009

ALFRED K NIGHT (ZAMBIA) LIMITED: Metallurgy Department


Table of computed average pollutant concentrations

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Project No: MM2287 Stack Emissions Compliance Audit Mufulira Smelter for August 2009 - Report No: 8

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Project No: MM2287 Stack Emissions Compliance Audit Mufulira Smelter for September 2009 - Report No: 9

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ANNEX 2: Photo Gallery

1. Trucks waiting to be loaded with acid at Mopani Copper Mines plant.

2. Drainage carrying waste material in Kankoyo township near Mopani Mine.

3. Vegetation is affected by the pollution, only selected plants can resist their effects of the pollution from the Mine.

4. A child playing on a tailing pipeline.

5. Sulphur Dioxide emissions by Mopani Copper Mine.

6. More Sulphur Dioxide emissions by Mopani Copper Mine.
7. Plants struggle to survive the effects of the pollutants.

8. Tailings Dam used by Mopani Copper Mine.

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