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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT IN LUBUMBASHI (DR CONGO)
(Case of the company RUASHI MINING S.A.S)

Ph. CHISUNKA KAMPOLOBWE, M. SANGWA MWANA, M. KAYEMBE MUSALA, C. KAMANDA MBAYO and G. METO MALANGU

ABSTRACT

Mining and the assessment of compliance with environmental obligations, the process used by RUASHI Mining for the production of copper, cobalt hydroxides and the production of sulfuric acid produced on site within the concession, a impact Study Environmental and Social (ESIA) company RUASHI MINING SAS, a field visit to the assessment of the environmental status of sites, the physical, biological and sociological environments.

Hydrometallurgical production of copper by electrolysis and cobalt by magnesia precipitation, after leaching with sulfuric acid and extraction with organic solvent. To know the processes RUASHI MINING (the flows sheets), the communes RUASHI and Annex in quest for the social and the durable development, the environmental plans of the project taking care of the measures to be developed to avoid, to mitigate the unavoidable impacts, to rehabilitate the affected sites or offset the impacts of condemned sites.water management during periods of heavy rain, waste and unused reagents on its site and that of Févier 2018.

The environmental impact study according to article 463 litera c of the DR Congo Mining Regulation which stipulates the revision of the EIA and the Project Management Plan see if with the changes that may also intervene in the activities of RUASHI MINING, justify this said revision during this year 2019.that RUASHI MINING has considered techniques and technologies that take into account changing operating conditions in order to pursue its production objectives.

The 2006 and February 2018 RUASHI MINING Environmental Revisions are partially compliant with the ESIA guidelines when developing the Environmental Impact Statement and the Environmental Management Plan for the project as many steps are not not followed in practice.RUASHI MINING should ensure the establishment of environmental monitoring registers and the implementation of the environmental management measures freely granted in

its **EIA / EMPP**. Results after the samples taken are shown in APPENDIX this work Table A: Results of water samples Table B: Result of soil samples EIE/PGEP.

In addition to sulfuric acid production, the company has a project for sulphide roasting, so monitoring dangerous products is essential, climate management in the causes and effects of rainfall, water, soil and air its impacts; of the program of mitigation and rehabilitation measures, the measures of RUASHI MINING: Avoid, minimize, rehabilitate and compensate must be scrupulously respected. the respect of international agreements from the positive meaning in the Paris agreements to COP 21 in France in 2015 to COP 25 proposal in Brazil AMOZONE the first green after COP24 carbon industry countries in 2018.

Key words: Cobalt hydroxides .sulfuric acid ,Copper by electrosis,Water, soil, air, rains, climate.

I. Introduction

.In the framework of the Course of the Activities of the Engineer and Environment, we were asked to make an environmental and social impact study (EIES) of the company RUASHI MINING SAS. We conducted a field visit on August 16, 2019, in view of the evaluation of the environmental status of the RUASHI MINING project sites, and to see to understand the process used by RUASHI MINING for the production of coppercobalt hydroxides as well as sulfuric acid production.this study is made as part of the monitoring of the evolution of the mining activities and the evaluation of the respect of the environmental obligations.

In Lubumbashi, RUASHI MINING has been developing since 2006 a mining project in the eastern part of the city. it processes copper-bearing ore from the RUASHI mine, hydrometallurgically for the production of copper by electrolysis and cobalt by magnesia precipitation, after leaching with sulfuric acid and extraction with organic solvent. the sulfuric acid used is produced in a factory that is installed on site within the concession.

The Company carries out social actions within the framework of the sustainable development of the basic communities, mainly in the communes close to its facilities, in particular, the RUASHI and Annex communes.The activity and the presence of the project on this concession generate impacts against which it had defined the means and measures to be

developed to avoid them, to mitigate the inevitable impacts, to rehabilitate the affected sites or to compensate the impacts of the condemned sites. these measures and means are defined in the previously approved environmental plans of the project. These measures are supposed to apply to the physical, biological and sociological environment in which the project is located.

We had the objective on the one hand, to know the RUASHI MINING process in order to make the inventory of the impacts of this process on the environment.in the elaboration of the environmental impact study and the environmental management plan of the project, we had this concern to be aware of the directive on the environmental impact statement according to article 463 litera c of the Mining Regulation of the DR Congo which stipulates the revision of the EIA and the Project Management Plan see if with the changes that may also be involved in the activities of RUASHI MINING, justify this revision during this year 2019.

Is the revision the environmental study of Ruashi Mining of 2006, in order to solve the problems posed by water management during heavy rains, waste and unused reagents on its site and that of Févier 2018 where the company has considered developmentare mixed-sulphide ores mining techniques (extraction of these ores + installation of a flotation unit + roasting unit) consistent with the ESIA guidelines when developing the study? Environmental impact and plan environmental management of the project?these are the concerns that will help us to complete our work in the following lines.

II. General

II.0. Identification of the Holder

The mining project that is the subject of this study belongs to the company RUASHI MINING SAS. the administrative headquarters is located in Lubumbashi, within the RUASHI concession. RUASHI Mining has approximately eight mining squares in its concession (+ backfill and tailings: 3.00% Cu and 0.6% Co).

II.1. Project description

the metallurgical plant has a production capacity of 45,000 tons of cathodic copper with a content around 99.99% and 3,000 tons of cobalt hydroxides with a content ranging

from 25 to 32%. the sulfuric acid production plant is installed in the perimeter, with a production capacity of plus or minus 570 tons of acid per day, ie 460 tons of acid and 65 tons of sulfur dioxide (SO_2) per day.

The Company supplies its waterworks from the mine's mine water system and recycles liquids for the reduction of fresh water supplies through a combination of boreholes, pumps, pipes, drains and ponds retention.

A dike erected on an area of 64 hectares in the eastern part of the perimeter collects all hydrometallurgical plant discharges. An area prepared in the northwest, hosts the sterile materials of the mine and another in the central part receives the ore to be treated.

Mining takes place in an open-air exploration at 3 excavations (Ruashi1, Ruashi2 and Ruashi 3). The evolution of the project generates in its process some waste which presents a potential danger on the environment. this is the case of used oils and waste sulfur filtrates harvested at the sulfuric acid production plant ...This waste does not require all the conditions adapted to their management to preserve the environment. according to RUASHI MINING, the sulfur wastes would be salvaged at roasting to improve sulfation reactions.

III. Methodology

III.0.Analysis of the impacts of exploitation operations on the environment

In the identification of impacts, measures for identification and quantification :

- Review design, operation and development studies;
- analysis of objectives and orientation of the project in response to already defined ambitions;
- analysis of the impacts already caused and the related management measures applied;
- analysis of the effectiveness of the already defined and targeted mitigation and rehabilitation measures;
- Commitment taken by the project and efforts made to meet environmental obligations in an environment that has never before been rehabilitated;
- study of the sociological environment of the project;
- field visits to inspect the mine sector and assess the impacts of different mining activities.

The observable, observed and identified negative impacts of current project activities are summarized below:

- Clearing and deforestation on the areas comprising the project components, namely the access road, the camp, the factory and other facility installation sites and the communication routes within the sites;
- the action of dust and fumes produced by generators, mining machinery and vehicles, transport vehicles, ... on plants and humans in the region;
- air pollution from gaseous emissions from the use of chemical products and reagents, and chemical reactions to leaching, solvent extraction, electrolysis and the sulfuric acid plant;
- the effect of noise and vibration caused by the different gear used in the operation as well as the household action;
- presence of an excavation (mine created from 3 openings) and different piles of embankments;
- presence of buildings (factories, buildings, utility poles, etc.) as well as plant discharge and effluent areas to replace a natural landscape;
- reduction of the hydrostatic level of groundwater with dewatering phenomena;
- the existence of bricks by the presence and operation of the project;
- restriction in the displacement of local communities, residents and farmers in the region, with reduction of habitable and cultivable spaces.

The different impacts that will result from the implementation of project operations are :

1) The fumes,
2) dust,
3) gaseous fumes,
4) clearing and deforestation,
5) the alteration of the quality of the soil,
6) alteration of surface water,
7) alteration of the quality of groundwater and its disturbance,

8) the alteration of the landscape,
9) Noises and vibrations.

NB : The clearing has already been done on about 188 hectares and will continue until about 260hectares.Ses effects will remain during the entire life of the project.

The visit of the project facilities and sites, and the review of the basic environmental management documents of the project available to the Ruashi Mining Company have revealed the following:

At the administrative level:

1. The Company has set up and set up in departments a structure responsible for environmental management, workplace safety, hygiene, health and social actions;
2. a community liaison office has been set up at the communal office of the RUASHI Commune to facilitate contact with the population and to prevent the latter from traveling to the project site;

all documents required by law have been regularly submitted, including the Environmental Impact Assessment and the Environmental Project Management Plan (EIA / EMPP), the auditing and environmental monitoring.

In terms of environmental management:

For air quality control and noise monitoring:

1. Insufficient dust collectors have been installed around the disposal dyke, at the waste dump, around the mine, in the plant, along the traffic lanes within the perimeter and at the camp RUASHI Mining;
2. dust is collected once a month and mainly in the dry season. It is weighed and analyzed to provide indications used by the Department of Environment and Health and Hygiene;
3. the project performs irregular and inefficient watering of traffic lanes and ore storage and supply areas, to reduce the amount of dust;
4. grassy vegetation was planted on the outer walls of the tailings dam and on the sides of the infertile embankments. It helps to absorb the dust;

5. the sulfuric acid manufacturing plant has a 92 meter high chimney for the evacuation of gases into the atmosphere but which can have a negative impact on the surrounding populations.

For the monitoring **of soil quality**:

1. the vegetation of the disposal dam and sterile embankments of a lawn helping to reduce erosion phenomena;
2. the sides of the embankments are stitched sticks at regular intervals to signal the beginning of erosion;
3. basins are covered with a HDPE geo-membrane to minimize soil contamination and infiltration phenomena.

For the monitoring of groundwater and surface **water quality**:

1. wells were drilled across the site for groundwater quality control and water supply. Depending on the hydrostatic level, the drilling is 30 to 80 meters deep;
2. some monitoring sites for the quality of surface water have been defined in different basins and along the LUANO river;
3. the project carries out the daily analysis of the quality of groundwater, surface water, drinking water and its effluents. quarterly results are reported in follow-up reports;
4. a collector drain was installed east of the plant to collect rainwater, leakage and runoff to a closed containment pond.

Figure 1: Main drain collector of factory water(Figure 1 : Storm Water Dam)

For monitoring **vegetation**:

The project has planted vegetation at the disposal dam, embankments and reforestation along the roads with acacias.

Figure 2: Reforestation along the road **Figure 3 : Storm Water Dam**

On the **social plan**:

1. In the field of energy and water:
2. the company drilled wells in the RUASHI and APPENDIX communes to supply water to the population, after handing over and resuming it with the local community committee;
3. it supplies REGIDESO with a portion of water taken from the dewatering system;
4. it has installed transformers and lines of force in the RUASHI Communes and Annex for access to electrical energy.

In the **agricultural field**:

1. The Company distributes seeds and chemical fertilizers to local agricultural cooperatives;
2. it builds farmers' capacity by providing training on agricultural practices.

Nevertheless, we noted some aspects **to improve in the management** of the environment and the implementation of the sustainable development plan of the basic communities, notably:

In terms of **air quality management**:

1. The insufficiency of the dust collectors mainly at the level of the inhabited sites and exposed to the dust following the activity of the project;
2. no dosimeter carried by an agent in a station for the monitoring of the quality and quantity of dust and gases at critical sites, such as at the acid plant, of a device for measuring the content of the constituents of the air, and of sound level meters. against noise, it is rare to meet an agent with ear protectors;the hydrometallurgical plant leaches in hermetic tanks (by pneumatic agitation) but the air pollution by SO_2 coming from the

preparation module of SMBS is observed and uses nonperforming pellets to cover the electrolytic bath in order to retain exhaust gases to electrolysis.

In terms of **soil management**:

Poor monitoring of soil quality;

1. Poor monitoring of soil quality;
2. the non-rehabilitation of polluted soils downstream of the Storm Water Dam;

Figure 4: polluted soil at the SWD

III.1 Field work

III.1.0 Climate, Precipitation and Sunshine

a) The precipitations

The climatic variations of recent years have played a very important role in mining and environmental management at RUASHI mining. the province of Upper Katanga is characterized by a subtropical climate manifested by an alternation of two seasons:

- The rainy season;
- the dry season.

The city of Lubumbashi enjoys this climate also referred to as the tropical climate type Sudanese. Like all of southern Katanga, Lubumbashi and their surrounding areas enjoy a dry tropical climate characterized by the alternation of two seasons: the rainy season from October to April and the dry season from May to September.

this tropical climate has a temperate and continental character linked to the altitude (average altitude 1200 m approximately) and to the relative distance with respect to the oceanic masses. in the dry season, predominates the south-east trade wind, cold and dry, which comes from the Indian Ocean with a maximum of regularity in mid-June. It can reach a speed of 7 m / s. in the

rainy season, the two northwestern components of the western Atlantic monsoon flow occur: these humid and fairly cool winds, of moderate speed in general, are responsible for most of the rainfall.

the intense rainy season runs from November to March and records about 130 mm of water on average daily, postponed in 114 days. If the annual diet is fairly stable, the pace and number of rainy days vary greatly from year to year. less intense rains (less than 10mm) are most frequent, but of moderate intensity (15 to 20 mm). They give most of the water received. Night showers (the most abundant) have their maximum between 18h and 1h. The daytime between 14 and 15h. the average annual rainfall varies between 1000 and 1400 mm of water collected for the last ten years. The rainiest months are December, January and February, with 378 to 412 mm of precipitation.

b) Humidity

Hygrometry varies greatly throughout the year, with a minimum of less than 70% at the end of the dry season, a maximum of more than 95% during the rainy season. The humidity of the air decreases sharply in the dry season. the monthly relative humidity is 40 to 60% from May to October and 80 to 90% from November to March. The hygrometry of the region has an air humidity of about 50 to 65% in the dry season and 70 to 95% in the rainy season. the humidity is relatively high between December and February, and it is lower between August and September.

c) Temperature

The average annual temperature in Lubumbashi is 20 ° C. the lowest temperatures are observed at the beginning of the dry season between mid - May and the end of July, ie an average temperature of 15.6 ° C in July. The months of October and November are warmer with an average daily maximum of 31 to 33 ° C and an absolute maximum of 37.8 ° C the night minimum is reached most frequently around 6 o'clock and the daytime maximum around 2 pm. The average daily temperature range is 12 ° C. It is strong in the dry season, where it slightly exceeds 15 ° C in a few hours, between 7:30 and 12:30. the average annual temperature observed in the country, the last ten years, is 23 ° C.the lowest monthly mean temperatures obtained during the same period are observed in the dry season (beginning of May until the end of July),

an average of 19 ° C in May, 17 ° C in June and July. September, October and November are the hottest months with average temperatures between 32 and 35 ° C.

NB: The meteorological risks observed in the region in recent years are the significant rainfall recorded during the rains. in a precipitation, the recorded height easily exceeds 250 mm of water.

d) Topography

The city of Lubumbashi is located at an average altitude of 1,232 meters, on a plateau whose contour lines are oriented from north-west to south-east. To the north, this plateau spreads along a slight ramp, which exceeds 5%. To the south, it descends steeper to the banks of the Kafubu River. The environment of Ruashi Mining is bounded on the north by the LUANO River, on the south by the KALUKULUKU District of the RUASHI Commune, on the East by a mining project of the Etoile mines and on the west by the District III of RUASHI Commune. Note that the RRUASHI Mining site is located in the area drained by the **LUANO River** and **LUWOWOSHI** (watercourse) .The LUANO River has its source in the concession and the LUWOWOSHI River collects the waters of the WASHENI and KIEBUMBA rivers. LUWOWOSHI River passes far south of the site in a west-easterly direction. The KIEBUMBA River has its source in the marshes on the eastern border of the RUASHI Mining concession near the Return water (RWD) basins in the swamps at the head of the KIEBUMBA River is a reservoir that is about 50 meters from the Return water basins. In the rainy season, this lake flows towards the KIEBUMBA River.

Fig. 5: Water from the canal to basins Return water Fig. 6: Factory Outlet Water to the Artificial Lake

Figure 7: Lake Water



Figure 8 and 8'': Artificial lake located behind the researchers and in the field Figure 9: State of the fields (Groundnut growing) next to the Return water basin in the CHEMAF concession




Figures 10: Different water sampling sites

Figure 11: Different sites for water sampling and soil in the garden

II.1Sol

The non-climatic soils with little alluvial input are present on the site precisely in the areas to the west and north of the RUASHI mine footprint, these soils are occupied by the vegetable crops of

the populations of the region, in the valley of the LUANO river, thus causing imbalances in the hydric regimes of these zones.

The RUASHI site is considered to be a low risk area, the land on which the factories are located is not located in an area of seismic activity. The concession is not located in areas of intense land movement such as convection zones and subduction zones and the soil character is clay. however, since the area has been and is still subject to mining operations with mining, the risk of landslides and landslides is not to be ruled out. this fact is further accentuated in the zone of the deposit as a result of the activities of the populations who settled there anarchically.

The superficial soil height is lateritic red color with in place a very thin organic layer (10 to 15cm). the soil is mainly suitable for corn, sweet potatoes and groundnuts. The concession soils are not naturally subject to erosion or desertification and are not located in an arid or semi-arid zone. landslides and landslides can not occur naturally.

At the site, the thickness of alteration materials is large, it commonly reaches 6 meters, or even 15 meters in some places depending on type of rock, such as dolomites and limestones. The clay content (from a grain size point of view) is high, ie 50 to 60%. The coloring of the soil generally remains homogeneous. in terms of chemical characteristics, the cation exchange capacity and saturation rate of ammonium acetate (pH 7) is less than 20 meq / 100 g and 40% respectively. From the physical point of view, the soils are of total porosity of the order of 51% up to the depth of 1.10m.

Table 1 : Soil types

Types of soil	% perimeter
Ground on breastplate	8
Red ocher soil	12
Clay soils	45
Clay sandy soils	33
Wetlands	2

The land use in the RUASHI concession was estimated as follows:

Table 2:Land use rate within the RUASHI concession

Activities	Rate (%)	Observation
Agriculture	1	Fields of local people in the LUANO River Valley, north of the plant.
Breeding	-	
Industry	80	the mine, factories and other project facilities (tailings dams, roads, ponds, etc.).
Trade	-	
Residence	16	Camps for residence of the project and dwellings of the local populations in the north and in the zones close to the mine.
Naturel State	3	Covered by vegetation and some roads.

The main impacts that affected the soil of the site environment:

- Modification of the landscape and the topography by erection of the project infrastructures,
- contamination of runoff by ore particles and eroded soils resulting from rainwater,
- destruction of the flora and fauna found on the erection space of factories and other infrastructures.Modification du paysage et de la topographie par érection des infrastructures du projet,

III.1.1Surface water

The LUBUMBASHI hydrographic network consists of streams whose direction of flow and direction are influenced by the stratigraphy and the structure of the formations traversed. These courses run on Kundelungu formations. the hydrographic network around Lubumbashi consists of the basins of Luiswishi in the north-east, that of Lubumbashi in the northwest, that of Ruashi in the east, that of Kafubu in the center and finally that of Munama in South. all these streams are the tributaries of the Kafubu River which rises near the Congolese-Zambian border (11 ° 39 'S, 27 ° 14' E) and flows into the nearby Luapula from the border town of Kiniama.

the watercourses around Lubumbashi have calci-magnesian carbonate waters. SYMOENS pointed out that the Kafubu water has a rather high content, unusual even for the waters of the region, in SO42-, Cl-, Na + and SiO2.

The area of the Ruashi concession is drained by the Luano River, taking into account terrain and topography of land, sloping towards the northeast. This river passes north of the concession. It presents a steady state that varies significantly with the seasons

The area of the RUASHI concession is drained by the Luano river, taking into account the relief and terrain topography, sloping to the northeast. This river goes north of the concession. It presents a steady state that varies significantly with the seasons.Its valley is very disturbed by the market gardening that takes place there all the year.

The LUANO River is isolated from the facilities of the company from which it is not in contact but can be easily polluted in case of water discharge from sewage ponds (Stormwater Dam: SWD).

Figures12 : Water discharge, Stormwater Dam (SWD)

Note also to the east of the concession the presence of the KEBUMBA river which forms

Also a long marshy ground. let's add according to Ruashi, the waters of these rivers (Luano and KIEBUMBA) were basic and that Kiebumba water was particularly tough. It presented potability standards from the point of view of acidity. It required a correction before use for consumption purposes. In the dry season, concentrations of contaminants in natural waters must be more removed possible.

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Figure 13: Groundwater quality monitoring wells at Storm Water level Dam

Table 3: Maximum Thresholds for Contaminants in Mine Releases (Schedule IX of the Regulations Mining who deals with the classification of mining discharges and their categories in DR Congo).

Parameter	Cyanamid	Hg	Pb	Zn	Fe	Cu	As	U	NO_3^- et NO_2^-	Benzene	Ethyle-Benzene	Xylene
Threshold (Mg / l)	0,01	0,002	0,5000	10,000	6,000	1.5	0,400	2,0	1000,0	0,5	5	5

In Article 4 of the same Annex, the discharges are considered as acidogenic mines containing sulphides in quantities greater than 0.3%. Moreover, living conditions aquatic species are presented in Table 4 below:

Table 4: Threshold of the Aquatic Life Indicator

Parameter	T°C	pH	CEC ms/cm	TDS mg/l	Ca mg/l	SO_4^{2-} mg/l	Cl^- mg/l	NO_3^- mg/l
Threshold	≥25	5-9	≥1,5	≥15	≥150	≥250	≥250	≥5

Influential on aquatic life and can alter the BOD of natural waters. Whatever the case at low levels, it will be necessary to note in these analyzes the detection of lead and mercury in samples taken from the Luano River. these elements have very negative impacts in the aquatic life and community that lives in the contaminated surroundings. Along the LUANO River, agricultural activities take place there with the practice of irrigation in the dry season.

III.1.2Groundwater

The presence of wetlands in the concession area is a direct reflection of the existence of runoff or groundwater in the area. The local geology in RUASHI provides information on the presence of groundwater in the region. the hydrostatic level of the groundwater is 30 to 80 meters. The water table around Lubumbashi is located in the area of surface alteration.

III.2Air quality

However, field observations indicate that the RUASHI air quality is disturbed in the dry season by the intensity of road traffic on the runways of the region, dust whirlpools that extend to very large areas, fumes that result from the generatorsas well as gases emanating from the manufacture of sulfuric acid, iron precipitation, leaching and electrolysis.

The main impacts created by fumes:

- Alteration of air quality in the immediate vicinity of production sources following the particles that make up these fumes,
- the constituent compounds of gaseous emissions are among the gases that contribute to the greenhouse effect of the planet earth,
- especially the fumes from the sulfuric acid plant are pungent and suffocating for man and for wildlife.

Figure 14 : Sulfuric acid plant chimney (shutdown due to Annual Shutdown)

The main impacts generated by dust:

- Soil alteration due to dust deposits carried away by the winds,
- alteration of the quality of surface water following the pollution of run-off waters laden with dust after leaching from the soil,
- deterioration of air quality following suspended solid particles,

- disruption of plant metabolism as a result of dust deposits on leaves thus compromising their growth and reproduction mechanism,
- irritation of the eyes and respiratory tract living creatures in the area of passage of charged winds.

We could not characterize the air and the gaseous effluents because of the lack of materials.

Vehicle traffic is classified as one of the aspects of a mining operation having a significant contribution to the increase of:

- CO, CO_2 ,SO_2,
- inhalable particles (<10µ ou PM_{10}),
- particules suspended.

Table1: Threshold of air pollution inside the perimeter (Annex IX of the Mining Regulation)

Nature of the contaminant	Pollution thresholds (mg / l)
Ag	0,5
Co	29
Cu	1
Free silica	5,0
Hydrogen cyanide	11
Hydrogen sulfide	14
NO_2	6
Solid particles	10
SO_2	5
Pb emissions and fumes	0,15

Table2: Pollution thresholds outside the perimeter (Annex IX of the Mining Regulations)

Nature of contaminants	Pollution thresholds (µm/m^3)
Particles of matter (<10µm) Annual arithmetic mean Maximum average over 24 hours	 100 500
.nitrogen oxide as NO_2 Annual arithmetic mean Maximum average over 24 hours	 100 200

Sulfur dioxide SO_2	
Annual arithmetic mean	100
Maximum average over 24 hours	200

Table3: European and French standards for limit concentration of heavy metals in soil

Heavy metals	mg / kg of waste (dry matter)	Heavy metals	mg / kg of waste (dry matter)
As	(40)	Hg	2
Cd	10	Ni	500
Co	(30)	Pb	300
Cr	200	Zn	1000
Cu	500		

Quantities in () indicate French standards

the issues associated with the activities of the RUASHI Mining project considered in the air quality assessment include:

- Emission of particles (dust) by the construction and clearing activities of the site;
- exhaust gases from heavy vehicles and construction machinery;emission of particulate matter from ore extraction and processing activities (raised dust from waste rock ore embankments, material handling, drilling and blast shaking), and vehicular traffic associated with these activities;
- particulate emissions from pools of dried waste;
- particulate emissions from ore leaching, solvent extraction and electrolysis reactions;
- particle emission at the sulfuric acid plant;
- possibly fumes coming out of the roasting unit.

NB : The expected emissions from the use of the gear used in the mining operations could have an impact up to 10 km under the winds at extreme speeds. the scope area for the air quality assessment includes the entire Ruashi Mining concession focused on the open pit and the treatment plant. it should be noted that emissions are produced in a discontinuous manner, that is to say only in the case of commissioning of the production units.

Table4: Estimation of current emissions during development

Source	EMISSIONS								
	SO_x	H_2S	CO_2	CO	NO_x	PM_{10}	MST	COV	Poussières
Acid plant	√		√	√	√				
Leaching	√								
Solvent Extraction	√							√	
Electrolysis	√							√	
Flotation if engageable		√	√	√	√				
Toasting if engaging	√	√	√	√	√	√	√	√	√

The project could affect the flow of surface watercourses, due to several activities:

- diversion and disruption of natural drainage lines;
- drawdown of the water table and subsequent reduction of flows;
- discharge of treated wastewater;
- accidental releases and spills;
- containment of certain areas to confirm contaminated runoff;
- leaks on the pipes;
- rehabilitation and closure of the site.

I.I.3Noise and vibration

Figure 15 : EDGE / 3M Sound Level Meter

They pose a risk of loss of hearing if the frequency reaches 1000Hz for noises of more than 90 decibels with long exposure time. .At the site, mainly the plant which uses vibrating bodies, the noise will be of the order of 80 decibels for a frequency of 350 Hz. At the level of local communities whose closest to the site are at more than 150m, the noises coming from of the concession are estimated to be less than 60 dBfor the same frequency during the activities of the plant.for mining equipment in activity:

- Sound level at 250m LA eq dB(A) :52-71Db,
- sound level at 30m LA eq dB(A) :74-80Db.

Outside of these sources, noises of such intensity, we find only natural noises, caused by human voices, bird chirps,

Table5 : Noise level of activities of daily living

Source	Noise level [dB A]
Lawn mower	95
Scream or howl	90
Motorcycle that passes 15m away	85
Vehicle at 100km / h at a distance of 15m	80
Vacuum	75
Robinet	62
Normal conversation	60
Normal rain	50
Quiet lounge	50
Whisper	40
Chuchotement	40
Normal noise level in a rural environment during the night	35

III.4Fauna and Flora

Their situation in an urban agglomeration led to the degradation progressive ecosystems. This site already knows about development work and mining. It is largely dominated by project

infrastructure and dwellings of the populations of Commune Ruashi, that it encloses in the northeastern part a small fringe of vegetation.

Table 10: Animal Species Reported in the Environment

Common names	Scientific name
Mammals (rodents)	
Rats	Ratus ratus
Taupe	Cryptomys hottentotus
Reptiles	
lizard	Lecerta jacksonie
Bitis	Snakes
Birds	
Nightjar	Caprimulgus ruficollis
Passerines	Passer diffusus
Rollers	Coracias Abyssinica
Pics	Picus viridis
Swallow	Falco subbuteo subuteo

At the level of the marsh, we meet snakes, rats, moles, fish ...

the Ruashi Mining site is in areas naturally covered by a wooded savannah. The project area once had an important diversity of species animal. This area has been occupied for a very long time and large bird populations and mammals have been impoverished because of impacts related to human activity. We do not have could not visit the aquatic fauna for lack of time. Swamps present some humidity that growers crave for vegetable crops.

The different biodiversity in the environment could be threatened by phenomena such as The various biodiversities in the environment could be threatened by phenomena like:

o Mining operations with moving materials and training

embankments;

o pond sedimentation with accumulation of metalliferous sediments;

o infrastructure installation and maintenance works (roads, drains, pipes,buildings, ...) ;

o production and spreading or deposition of metalliferous dusts.

III.5 Sociological environment

he sociological environment of the RUASHI site includes the populations of the Common RUASHI and those of the Commune ANNEX to the city of Lubumbashi. Given the concession is on the lands of the SHINDAIKA group, the latter is also part of the sociological environment of the site. The RUASHI Mining project settled in an urban-rural environment of the city of Lubumbashi. The sociological environment presents populations of the KALUKULUKU district and those of the LUANO district of common RUASHI. In this zone, people give themselves to agriculture as source of income. They practice market gardening in river valley valleys often in the dry season. the main religion is Christianity. Corn and or cassava is the staple food and the main traditional drinks the MUNKOYO and the LUTUKU and modern drinks. A LUANO cemetery is right next to the site about 130 m from the factory sulfuric acid ...

IV. MINING ACTIVITIES PRIOR TO THE PROJECT

The RUASHI area experienced mining activities at the time Colonial. The site went out of business due to the unsuitability of ore quality with the processing technology used in factories at the time. Let's add that the deposit RUASHI Mining was used by UMHK (Union Minière du Haut-Katanga) from 1919 to 1963 exploiting malachite and ores for the feeding of water jackets Lubumbashi, in 2000 he had an artisanal exploitation and it is in 2004 that RUASHI Mining gets deposit. This deposit occupies the southern part of the Lufilian arc formed during of the orogenesis. The liberalization of the mining sector has encouraged the invasion of the site by artisanal miners. Since 2004, this site knows the operations of the company RUASHI MINING to this day.

On the social plan :

1. Insufficient monitoring of social works;
2. The action of the mining committee set up by the various partners has made it possible reduce the impacts formerly **caused by mining on homes around the mine.**

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1. Insufficient monitoring of social works;
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V. Analysis of samples(in appendix works)

Taken 2 Tables.

VI. Recommandations

The company must: Comply with environmental legislation and regulations at least perspective of environmental performance and seek to adopt the best practices on all aspects;

- Manage operations to minimize or eliminate negative impacts on the environment where possible;
- deal with service providers and contractors engaging in the same environment and adopting its environmental policy;
- seek to make the most efficient use possible of energy, water, to avoid polluting and minimize waste and recycle where possible;
- further improve sampling in the perspectives of reliable data from better and better in confrontation with international weather data;
- approaching the effects of climate change with the record of rainfall that make an impact, the global environment is really a problematic towards the agreements of Paris in continuation of which of COP 25 soon this year 2019 ;
- recognize that each generation is the guardian of the environment for future generations, and therefore, to rehabilitate its sites in accordance with internationally accepted standards;
- Socio-economically, society must respect local culture and customsand to integrate into the environmental community through its social development.

Measures to minimize the effects of noise on nearby receivers must be :

- respected:requiring employees and other visitors to wear ear protection devices against high-intensity noise at workstations with high-intensity noise sources;;
- periodic hearing tests of workers most exposed to noise;
- rotation of teams and replacement of workers exposed to noise for a long time.

The company must also solve problems or complaints presented by the public (environmental communities).

With regard to noise and vibration, the measures that must be recommended and followed to the letter are:

- ✓ All diesel powered mining equipment must be of good quality, preferably new and subject to a regular maintenance program,
- ✓ regular inspection is carried out on the gears whenever irregular noise is detected, and on the vehicle exhaust system.

VII.CONCLUSION

As part of our work, we reviewed the Environmental Impact Statement Directive and saw how RUASHI Mining revised its EIA and Project Management Plan as a result of changes in its operations but however, first guaranteegood management of the environment with regard to old activities.and we have also understood that RUASHI Mining has considered techniques and technologies that take into account the evolution of the operating conditions in order to pursue its production objectives but we are sure that it will guarantee the protection of the environment because its standards inenvironmental matters are falling day by day.RUASHI Mining's 2006 and February 2018 environmental review were partially compliant with the ESIA guidelines in their preparation of the Environmental Impact Statement and the Environmental.

Management Plan for the project as many of the steps are not followe inconvenient:Practice,application,patronage,practical,handy,virtual,businesslike,doable ; sampling enough must the nature is talking Human don't listen says Victor HUGO. Serviceable thus, the RUASHI Mining Project must ensure the establishment of environmental monitoring registers and the implementation of the environmental management measures freely granted in its EIA / PGEP. The company must take care of its own project, which can have a direct negative impact on the health and well-being of local people and employees. In addition to the manufacture of sulfuric acid, the company has a sulphide roasting project, so the monitoring of hazardous products is essential. It must avoid pouring the waters of the Return water basin into the KEBUMBA River and those of the wastewater basins into the LUANO River. It must regularly follow instructions on environmental measures to protect its environment.The company must set up production yield optimization systems in each section to avoid further

pollution.Finally, as part of the program of mitigation and rehabilitation measures, RUASHI Mining measures: Avoid, minimize, rehabilitate and indemnify must be scrupulously respected.

The remark made on the abundance of rains growth in RUASHI, in safeguard of the environment and ecology followed by an economic evaluation of the cost of production, the respect of international agreements of the positive sense in the Paris agreements to COP 21 in Francein 2015, Application for COP 22 in Morocco in 2016 and COP 23 in 2017 in Germany, COP24 in Poland to COP25 trend in Brazil with AMAZONE the first green in 2019 for applications meaning preservation of the planet's climatic equilibrium ; R.D Congo is the 2nd green causesalas!Unfortunately!Unhappily!and environmental effects are global, fighting the greenhouse effects.

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VII. APPENDIXTableA: Results of water samples Table B: Result of soil samples

		ppm		mg/L						
Samples	**PH**	**TDS**	**Cond**		**Ca**	**Mg**	**S**	**K**	**Na**	**P**
			µs/Cm							
Dyke entrance	5,9	1014	2058		368,8	2702	27,37	73,13	2799	0,012
Entrance dike water basin	7,79	681,9	1393		401,3	1716	24,17	52,87	1571	<0,001
Well swamp land 1	5,72	766,6	1563		85,93	138,1	3,55	1,02	32,27	<0,001
Kebumba River Source	5,65	493,8	1008		295,7	994,8	24,87	15,38	1223	<0,001
Effluent Factory	7,47	987,3	1964		75,5	332,1	8,126	12,71	203,2	<0,001
Well swamp land 2	7,6	1229	2507		152,7	248,2	4,919	3,321	50	<0,001
Outlet basin dike	5,17	864,2	1764		256,7	2021	28,93	70,62	1947	<0,001

	mg/L									
Samples	**Cu**	**Co**	**Zn**	**Pb**	**Cd**	**As**	**Se**	**V**	**Cr**	**Ni**
Dyke entrance	8,512	219,2	1,98	0,263	0,044	0,039	5,157	<0,001	0,278	3,502
Entrance dike water basin	0,322	4,544	0,01	0,068	0,005	<0,001	0,027	<0,001	0,108	0,078
Well swamp land 1	0,004	3,001	0,092	0,01	0,008	<0,001	<0,001	<0,001	0,004	0,036
Kebumba river source	0,842	62,08	0,825	0,096	0,01	0,026	<0,001	<0,001	0,044	0,749
Effluent Factory	0,161	14,24	0,026	0,039	0,012	<0,001	<0,001	<0,001	0,028	0,077
Well swamp land 2	0,035	0,028	0,003	0,016	0,009	0,012	<0,001	0,001	<0,001	<0,001
Outlet basin dike	8,233	116,7	0,644	0,356	0,026	<0,001	<0,001	<0,001	0,148	1,626

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	mg/L									
Samples	**Ba**	**Sb**	**Mo**	**Fe**	**Al**	**Be**	**Mn**	**Hg**	**U**	B
Dyke entrance	0,116	0,004	<0,001	1,304	3,071	<0.001	2,712	2,712	<0,001	1,259
Entrance dike water basin	0,12	<0,001	0,028	0,319	0,843	<0.001	6,488	6,488	<0,001	<0,001
Well swamp land 1	0,095	0,012	<0,001	0,292	1,284	0.001	8,007	8,007	<0,001	<0,001
Kebumba River Source	0,013	<0,001	<0,001	1,052	19,24	0.006	8,493	8,493	<0,001	0,237
Effluent Factory	0,123	0,008	<0,001	0,033	0,158	<0.001	9,243	9,243	<0,001	0,014
Well swamp land 2	<0,001	<0,001	0,017	0,023	0,042	<0.001	0,115	0,115	<0,001	<0,001
Outlet basin dike	0,132	<0,001	<0,001	0,868	5,397	0.002	4,107	4,107	<0,001	0,705

VII'. APPENDIXTableB: Result of soil samples

	Eléments Total %									
Sample	**Cu**	**Co**	**Fe**	**Al**	**Mn**	**Ni**	**Pb**	**Zn**	**Ca**	**Mg**
SOL after Retention Basin	**0,032**	**0,002**	**1,875**	**3,154**	**0,001**	**0,004**	**<0,01**	**<0,01**	**0,182**	**0,139**
GIF rated DIGUE	**<0,01**	**<0,01**	1,913	2,243	0,001	0,003	**<0,01**	**<0,01**	0,190	0,144
ROMPAD	1,291	0,369	5,182	0,966	0,596	0,021	0,006	0,015	0,217	0,882

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