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APPROACH RUASHI MINING PLANTS TRIED LUBUMBASHI (DR CONGO)
(Case of the company RUASHI MINING S.A.S)

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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.Sulfuricacid, 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 ofthe 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 Février 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 Integration into RUASHI Minining

A safety induction session at the factory was conducted in the small finance room by officer Juvénal KIZA for integration into the RUASH Mining company. And it was during this session that the methods of visit were noted. the important points of the operations to be carried out by the visit are:

:

- Visit the different process circuits (with sampling) including: :
  - ✓ The reduction, leaching and countercurrent decantation (CCD) circuit,
  - ✓ the solvent extraction (SX) and electrolysis (EW) circuit,
  - ✓ the precipitation circuit of iron and cobalt (+ dryer of cobalt hydroxides),
  - ✓ the sulfuric acid plant.

  .

- Check the status and functioning of the environmental monitoring in place.
- Evaluate the application of legal requirements.

Fig.1: Factory Induction RUASHI Mining Fig. 2 :Dry grinding the Foreman TSHIKANDA

Figure 3: Humic grinding with Foreman Donatien LUKELE

III.1. GENERAL INFORMATION CONCERNING THE CONCESSION

The Geographical location of the concession RUASHI Mining company is located in the annex commune which surrounds the city of Lubumbashi, on the side of RUASHI Commune. The site that is the subject of this study is located about 10 km from downtown Lubumbashi at 11 ° 36'26 " (Latitude South) and 27 ° 32'59 " (Longitude East).

On a customary basis, the concession is on the lands of Chef SHINDAIKA, the group of the same name. this group is located in the Territory of Kipushi.

Access to the concession is possible in two ways. The first passes through the city center, takes the Kasenga Causeway which is completely asphalted on the urban part, to the entrance to the south of the concession. the second part of the city center, passes by the road of the airport of Luano, takes the road that leads to the RUASHI commune, to the northern entrance of the perimeter.

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Figure 4: Top view of RUASHI Mining

IV. ACTIVITIES OF RUASHI MINING

IV.0. Introduction

The RUASHI MINING exploitation project carries out exploitation works of the RUASHI deposits.The steps of the ore process:

- Mineral extraction,
- ore transport to the site,
- dimensional reduction:
- primary crushing (150 mm),
- secondary and tertiary crushing (± 15mm),
- grinding in a ball mill (75µm: P80),
- leaching with sulfuric acid + addition of SO,
- liquid-solids separation,
- organic solvent extraction,
- electrolysis of copper,
- precipitation of cobalt (hydroxides) using lime and magnesium oxide and filtration + drying of hydroxides.

RUASHI Mining has erected a sulfuric acid production plant that is useful for the ore processing process.

IV.1. Mineral extraction

The project realizes the exploitation of the RUASHI deposits by the development in 3 open pit mines. All 3 pits evolve at an average depth of 60 meters.
The exploitation takes place as follows:

- Stripping;
- the actual Operation (drilling, mining, loading and transportation and embankment);
- dewatering;
- the constitution of the benches;
- control of slope stability;
- watering access roads in the dry season;

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The work at the mine is carried out by a subcontractor (NB Mining) who is required to comply with RUASHI Mining's operating policy. The dewatering water is given in part to REGIDESO, which processes it before distributing it. the rest is pumped into a retention pond (Coffer Dam: CD) to feed the mine. The project carries out the dewatering by filter wells, while the dewatering from a sump is mainly carried out during the rainy season. after the building of the benches, the project carries out the control of the stability of the slopes by means of the surveillance measurements carried out by laser beam. In order to facilitate visibility in the mine and traffic on the tracks, the project is watering the tracks to reduce the dust generated by the operation. the loading and the transport are carried out for the constitution on the one hand, a waste rock dump in the north-western part of the concession, and on the other hand, embankments of ores at the level of an area which ore by quality (called ROM PAD).The flow sheet of RUASHI Mining this to figure no 05.

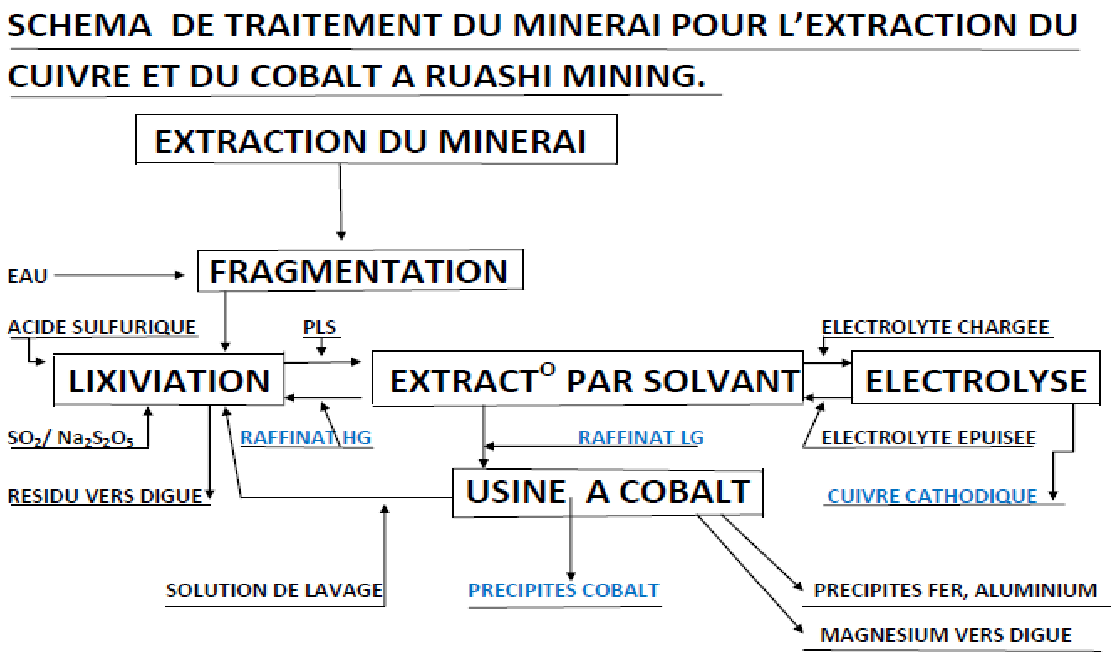

Figure 5: Flow-Sheet of RUASHI Mining

IV2. Dimensional reduction

From the ROM PAD, the project carries out the preparation of the load in quality (on average 3.5% Copper and 1.6% Cobalt). the ore thus prepared is fed at the level of the primary crushing. The project has two crushers, one of which runs on oil and is used in case of power failure. Minerals undergo primary and then secondary crushing. at the end of the latter, they are milled in a semi-autogenous mill in a humid environment. After this grinding, the pulp thus formed is pumped to a decanter-thickener before leaching.

Table1:Typical Composition of Ore

Elements	Contents
Copper	3,2-3,8
Cobalt	0,6-0,8
Iron	3,8
Manganese	0,2
Aluminium	4,2
Zinc	0,05
Nickel	0,05
Chromium	0,05
Magnesium	5,4

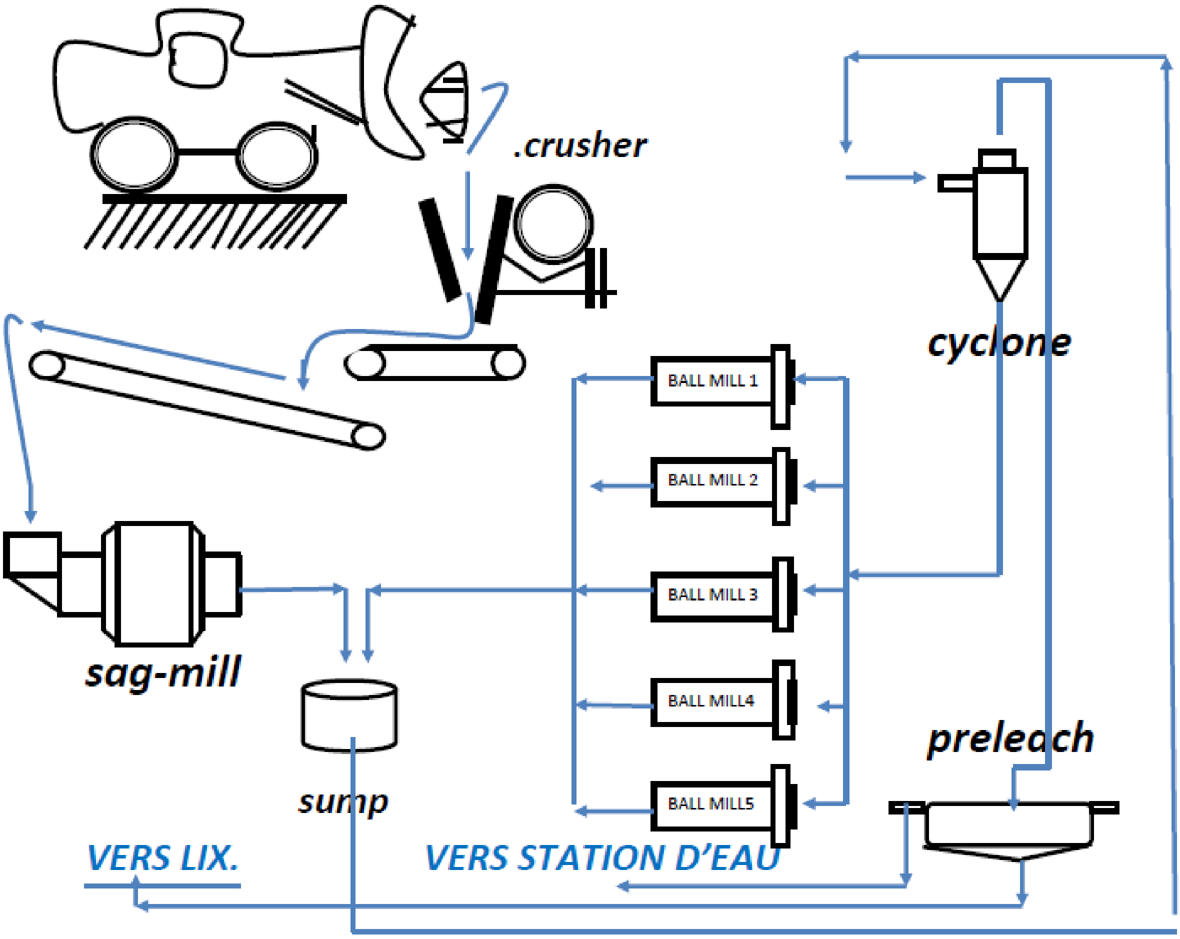

Figure 6 : Schematic of the fragmentation circuit

JAWS CRUSHERS:

- Maximum capacity: 200 tons of dry ore / h,
- upper opening: 2 to 2.5 m,
- bottom opening: 45 mm,
- tonnage often fed: 110 to 160 tons / hours.

SAG-MILL

- Pulp dilution at the landfill: 71 to 75% solid,
- density pulp discharge: 1800 to 1890,
- quantity of water added 0.25m3 / tonne of dry ore.

a) BALL-MILL

- Diameter: 3.66 m,
- length: 7.3 m,
- density pulp at the landfill: 1460,
- % solid pulp at the landfill: 50%,
- circulating load: 300%

b) HYDROCYCLONE

- OF density: 1200 to 1270,
- density UF: 1850 to 2020,
- injection feeding pressure: 70 to 80 kPa,
- granulometry: D80-125µ.

c) PRELEACH DECANTER:

- Density UF: 1450 to 1640 (Instructions 1540),
- charge: 0 to 60 (20Kg set point).

IV.3. leaching

The project carries out ore processing by hydrometallurgical means. After thickening, the pulp is pumped to the lixiviation tanks (with pneumatic agitation). The project has 6 of which 2 are used for storing the solution.

the leaching is carried out with sulfuric acid produced in a factory within the concession.

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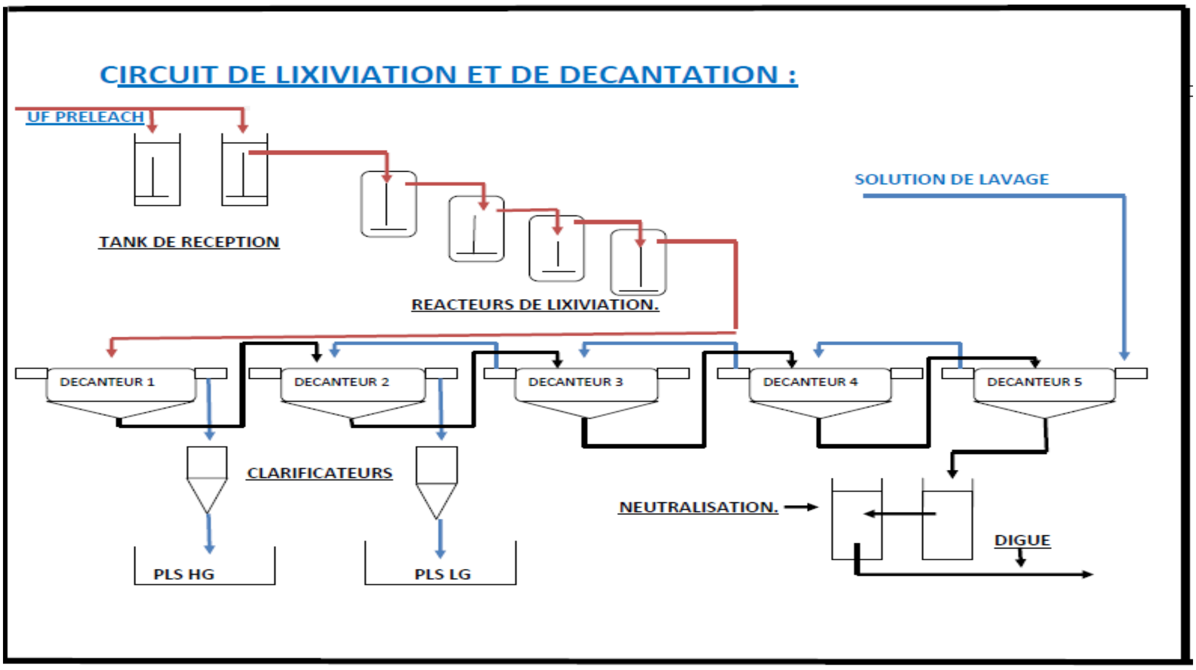


Figure 7: Leaching and settling circuit

Leaching reactions:(Copper oxide and cobalt oxides)

Azurite : $2CuCo_3.Cu(OH)_2+3H_2SO_4 \rightarrow 3CuSO_4+2CO_2+4H_2O$

Chrysocolla : $CuSiO_3.nH_2O+H_2SO_4 \rightarrow CuSO_4+SiO_2+(n+1)H_2SO_4$

Heterogénite : a CoO ; $bCo_2.O_3$;c CuO ;d H_2O with a, b, c and d varying stoichiometric coefficients.

$CoO+H_2SO_4 \rightarrow CoSO_4+H_2O$

$CuO+ H_2SO_4 \rightarrow CuSO_4+H_2O$

$Co_2O_3+H_2SO_4+SO_2 \rightarrow 2CoSO_4+Na_2SO_4+3H_2O$

instead of SO_2, it is also possible to use sodium metabisulphite:

$2Co_2O_3+Na_2S_2O_5+3H_2SO_4 \rightarrow 4CoSO_4+Na_2SO_4+3H_2O$

Malachite :

$CuCO_3,Cu(OH)_2+2H_2SO_4 \rightarrow 2CuSO4+CO_2+3H_2O$

Cuprite:

$Cu_2O+H_2SO_4+Fe_2(SO_4)_3 \rightarrow 2CuSO_4+H_2O+2FeSO_4$

Sphaerocobaltite :

$CoCO_3+H_2SO4 \rightarrow CoSO_4+CO_2+H_2O$

Table 2:Criteria for leaching

Variable	Minimum	Order	Maximum
pH 1st reactor	1,3	1,5	1,7
pH 4th reactor	1,6	1,9	2,1

IV.4 Liquid / Solid separation

At the end of the leaching, the solution undergoes a separation operation of the non-leached solids and the solution. This separation takes place in 5 decanters against the current of which the first two produce the solution called mother liquor.

Table3:Settling Criteria

Variables	Unit	Minimum	Order	max
Solide food	t/h	100	180	200
UF density	Kg/m^3	1450	1540	1650
UF flow	m^3/h	130	200	210
Charge	kg	5	40	80

- ✓ **Type of floculant**

MAGNAFLOC 1011
Dosage: 50g / T in the primary clarifier and 20g / T in the CCD clarifier.

The solids from the last decanter are sent to a lime neutralization tank before being pumped to the disposal dam. Liquids from the first copper-rich decanter are shipped to the organic solvent extraction.



Figure 8 : The researxhers in the fieldFigure 8': The RUASHI Mining Discharge Pool Figure 9: The Discharge Pool (TD, Tailing Dam dike

IV.5 Solvent extraction

The reactions associated with extraction and stripping are:

Extraction : $Cu^{2+}+2RH_{(org)}\rightarrow R_2Cu_{(org)}+2H^+$ (pH=1,7)
Stripage : $R_2Cu_{(org)}+2H^+\rightarrow Cu^{2+}+2RH_{(org)}$ (pH=1,3)
Where R represents the organic

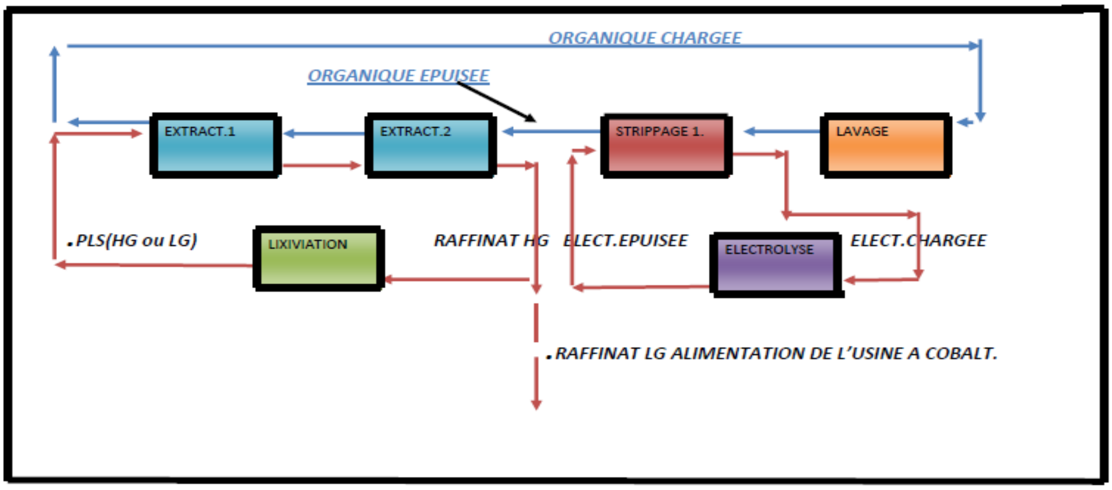
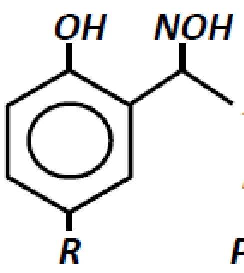


Figure 10: Schematic of Solvent Extraction

The copper-rich solution is shipped to the solvent extraction. The latter is responsible for copper in an organic phase. The solvent is recovered and the solution is sent to electrolysis. The solvent is conditioned with kerosene for fluidity. the low copper solution is sent to solvent extraction for cobalt. The raffinate obtained is sent to the cobalt circuit where it undergoes a precipitation of iron and aluminum. The precipitate is neutralized and sent to the dike.

- **Extractant reagent:**
- LIX984 NC

a mixture of 2-hydroxy-5-monolacetophenoneoxyme and 5-nonylsalicylaldoxime,
so a mixture of du LIX 84-I and LIX 860-I



$R = C_9H_{19}$ ou $C_{12}H_{25}$

Pour les salicyaldoximes A=H

Pour les cetoxymes $A = C_6H_5$, CH_3

Figure 1 : Structure of OXYMES

Thinning reagents :

- Paraffin,
- the kerozene

The lix is not volatile but the diluent is.

to lower the viscosity of the mixture here are the proportions::

- 30-35% LIX 984NC
- 65-70% Thinner

NB :

Crud formation is a stable emulsion composed of organic phase, aqueous and solids.

IV.6 Electrolyse d'extraction de cuivre et Précipitation du cobalt

Copper Mining Electrolysis and Cobalt Precipitation

a) **COPPER**

The copper-rich solution undergoes electrolysis of copper extraction in cells. With the passage of the current, the copper is deposited at the cathode and is recovered by stripping.

Table 4:Characteristics of the solutions

Type of solution	Copper content (g/l)	Acidity H_2SO_4 (g/l)
Charged electrolyte	50	135-150
Electrolyte exhausted	35	170-180
Electrolyte leaving section A	40-45	150-160

Parameters of the electrolysis room

- Current density: 250 to 400 A / m2,
- cycle time: 5 to 11 days,
- current yield: 85 to 95%,
- fumes control agent: plastic balls,
- smoothing agent: Guard Floc,
- temperature: 40 to 50C,
- cell size: containing at most 84 cathodes for 85 anodes.
- te

Figure 11 : Geomembrane depleted electrolyte pool

Reaction at the cathode:
Deposition of copper,

To $Cu^{2+}+2e \rightarrow Cu\downarrow$

Reaction to the anode:
Decomposition of water and release of oxygen

To $2H_2O \rightarrow 4H^{+}+O_2+4e$

Global reaction:
$Cu^{2+}+H_2O \rightarrow 2H^{+}+1/2O_2+Cu\downarrow$

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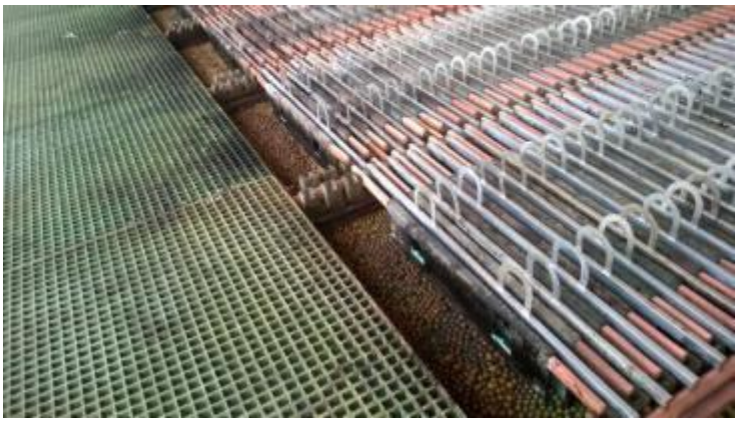

Figure 12: Pellets against gassing at electrolysis.

b) COBALT

- Chemical reactions: The chemical reactions associated with the oxidation and / or precipitation of iron, Aluminum and Manganese are:

- **Iron :**

Oxidation of iron (III): :$2Fe^{2+}+SO_2+O_2 \rightarrow Fe^{3+}+SO_4^{2-}$
the overall reaction: $2FeSO_4+SO_2+O_2+3CaO+9H_2O \rightarrow 2Fe(OH)_3\downarrow+3CaSO_4.2H_2O\downarrow$

- **Aluminium :**

Precipitation :
$Al_2(SO_4)_2+3CaO+3H_2O \rightarrow Al_2O_3\downarrow+3CaSO_4.H_2O\downarrow$

- **Manganese :**

Oxidation at pH<4 :$MnSO_4+O_2+SO_2+2H_2O \rightarrow MnO_2\downarrow+2H_2SO_4$
The global precipitation reaction:
$MnSO_4+O_2+SO_2+2CaO+2H_2O \rightarrow MnO_2\downarrow+2CaSO_4H_2O\downarrow$
Oxidation at pH 5-7 : $2MnSO_4+O_2+SO_2+3H_2O \rightarrow Mn_2O_3\downarrow+3H_2SO_4$
The global precipitation reaction:
:
$2MnSO_4+O_2+SO_2+3CaO \rightarrow Mn_2O_3\downarrow+3CaSO_4\downarrow$

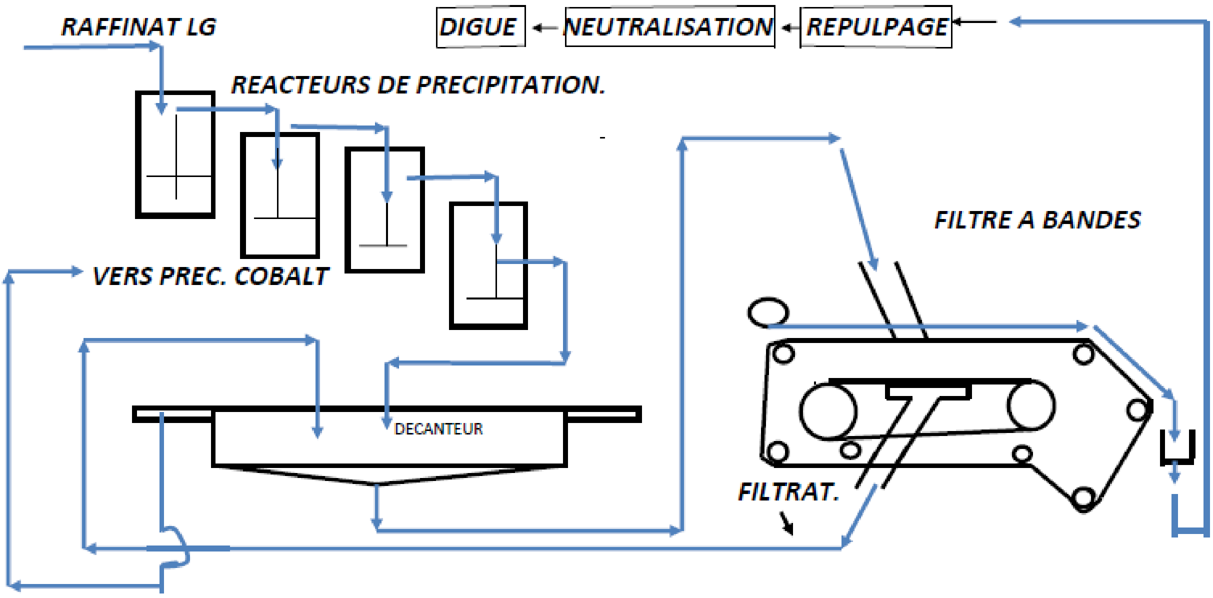

Figure13:Iron-Aluminum precipitation circuit

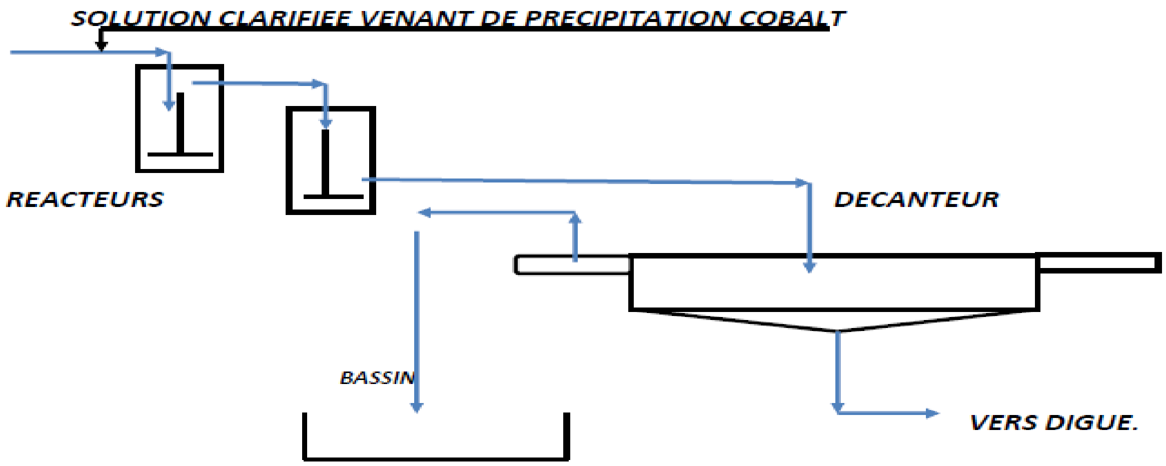

Figure 14 : Magnesium precipitation circuit

Working parameters:

- **Iron-Aluminum Precipitation**
- **PH condition**
  - 1st reactor: 2,5
  - 2nd reactor: 3,0
  - 3rd reactor: 3,5
  - 4th reactor : 4,5
- **Temperature condition**: 45-50°C
- **Reagent used**: Lime milk to regulate pH
- **Oxidizing agent**: O2 / SO2 mixture in the ratio of 5.7-6.0 to 1
- PH condition
- 1st reactor: 7.0
- 2nd reactor: 7.5
- 3rd reactor: 8.0
- 4th reactor: 8.5

- **Cobalt precipitation**
  - **PH condition**
    - 1st reactor: 7,0
    - 2nd reactor: 7,5
    - 3rd reactor: 8,0
    - 4th reactor : 8,5
  - **Temperature condition:** 50 ° C
  - **Reagent used** :
    - Caustic soda
    - Sodium carbonate
    - Magnesia

The raffinate after precipitation of iron and aluminum is precipitated from cobalt to magnesia.

- **Precipitation magnesiumCondition de pH**
  - 1st réactor: 9
  - 2nd réactor: 10
  - **Temperature condition**: 45-50°C
  - **Reagent used** : whitewash.

IV.7 Water used

The water used in the ore treatment works comes from a pond designed to recover mine water. This basin occupies an area of approximately 4 hectares. It is covered with a geomembrane to reduce infiltration that can bring water back into the mine.

The workers' supply water comes from a well drilled within the concession. This water is treated before distribution on the site.

II.8Sulfuric acid plant

Figure 15 : View of the sulfuric acid plant

The sulfuric acid plant was designed to produce 560 tons of acid per day, ie 450 tons of sulfuric acid and 50 tons of sulfur dioxide (SO2) per day. it aims to produce sulfuric acid for its own consumption and that of its partners, it produces sulfur dioxide for the leaching section, and it provides the low and the high pressure for the cobalt section to the dryer .

The sulfuric acid plant has three sections that are:

- The section sulfur and vapor,
- the gas and air section,
- the acid and water section,
- she also has two sub sections,
- the water treatment plant,
- acid storage.

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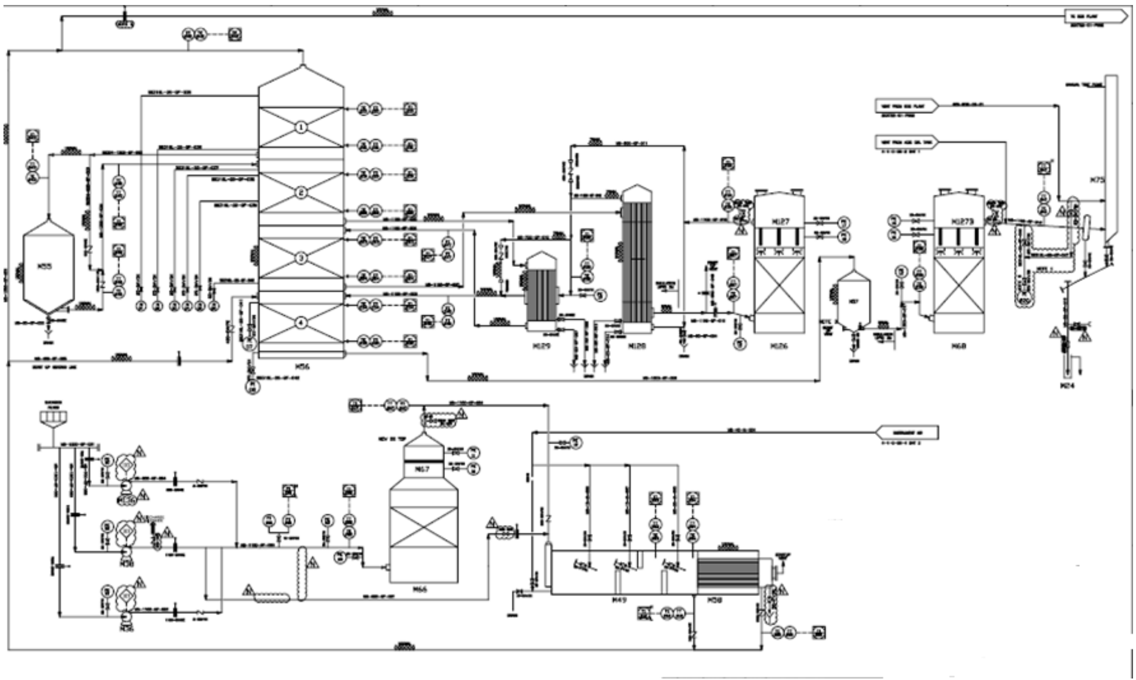

Figure 16 : Flow-sheet of the sulfuric acid plant

PROCESS USED

In the contact process SO_2 is oxidized to sulfur trioxide (SO_3) at high temperature (about 450 ° C) in the presence of a vanaduium hemipentoxide (V_2O_5) catalyst. SO_3 is then dissolved in concentrated Sulfuric Acid to form fuming sulfuric acid (Oleum). This can then react safely with water to produce concentrated sulfuric acid.

Ruashi Mining Sulfuric Acid Plant produces 98.5% industrial sulfuric acid according to the DCDA process;

And this process comprises three main operations namely:

- Combustion of sulfur in the furnace and obtaining SO2;
- the catalytic conversion or oxidation of SO2 produced in the furnace after combustion by obtaining SO3;
- the absorption of SO3 to obtain sulfuric acid ;

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1. **Combustion of sulfur** to produce sulfur dioxide gas**:**:

$S + O_2 \rightarrow SO_2 \Delta H = -70{,}92$ kCal/mole,

2. **Tthe conversion of sulfur dioxide** to sulfur trioxidein the presence of a catalyst a formula based on vanadium hemipentoxide**:** :

$SO_2 + 1/2\ O_2 \xrightarrow{V2O5} SO_3 \Delta H = -23{,}50$ kCal/mole,

3. **The absorption of sulfur trioxide** in sulfuric acid and the reaction of the water contained with sulfur trioxide to form sulfuric acid:

   $SO_3 + H_2O \rightarrow H_2SO_4 \Delta H = -31{,}14$ kCal/mole.

III.Sociological environment

Their situationFauna and Florain 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 a potential view to Animal Species Reported in the Environment,estimation of current emissions during development , noise level of activities of daily living**,** pollution thresholds outside the perimeter (Annex IX of the Mining Regulations) to finish at threshold of air pollution inside the perimeter (Annex IX of the Mining Regulation) as start.

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**,**Land use rate within the RUASHI concessionsampling and soil in the garden and surface water,air quality approached by seaxons.

. 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…

V. Analysis of samples(in appendix works)

Taken 2 Tables.

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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 customs and 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,

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- ✓ 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 followedinconvenient: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

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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.

VIII. APPENDIX Table A: 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

	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

VIII. APPENDIXTable B: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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