ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Kamoto Mine

Katanga Mining Limited , Democratic Republic of Congo

ID: 59

Note

The qualitative assessment of Environmental Hazard Potentials (EHPs) in this factsheet was conducted according to the method developed in the precursor project ÖkoRess I "Discussion of the environmental limits of primary raw material extraction and development of a method for assessing the environmental availability of raw materials to further develop the criticality concept"[1] (Dehoust et al. 2017a). The measurement instructions applied here are described in Dehoust et al. 2017b. The method is tested and further developed within this project (ÖkoRess III).

The information in this factsheet refers exclusively to publicly available, designated sources that have been classified as serious by the authors. It is specifically pointed out that no statement is made about the implementation and quality of agreements or standards that are applied. The implementation of agreements through memberships, certifications, etc. is the responsibility of the companies.

The surface extension of each mine area has been estimated based on publically accessible satellite images as official land-use plans from the public authorities or mine operators are not consistently available. It therefore only corresponds to the apparent area where mining, processing facilities, heaps, etc. and related infrastructure are clearly identifiable.

The fact sheets make no claim to completeness of all relevant voluntary standards. Mentioning a membership in one of the listed voluntary standards does not imply an assessment of the suitability of the standard in itself, nor does it make any statement about the member's success in implementation.

[1]TEXTE 87/2017 https://www.umweltbundesamt.de/publikationen/discussion-of-the-environmental-limits-of-primary

Kamoto Mine

Copper

General information

Indicator or criteria	Description and values
Name of mine	Kamoto Mine
Description of mining area	The Kamoto copper project is located adjacent to Katanga's other DCP (DRC Copper & Cobalt Project) and the company is looking to merge the two in the future. The Kamoto project includes an underground mine, two oxide open pit resources, as well as a concentrator and metallurgical plant on site (Katanga Mining 2019a) The mine is located at the western end of the Katangan copper belt; the deposits hosted by metasedimentary rocks. Mineralisation is indicated primarily for oxides of copper and cobalt, the most common being malachite and heterogenite, together with copper and cobalt sulphides including, but not limited to, bornite, chalcopyrite, chalcocite and carrolite (Katanga Mining 2018)
Surface extension	99.44km² 99.44 km² (Image date: 15.06.2019; Viewing height: 4.30 km) (Google Earth)
In operation since	1942 The mine started operations in 1942 as an open cast pit, with underground production commencing in 1969. A mine collapse in 1990 brought primary production to a halt. Following refurbishment, the mine restarted operations in 2007 (Katanga Mining 2018)
Operator	Kamoto Copper Company S.A.
Owner	Katanga Mining Limited
Closest town	Kolwezi – capital of Lualaba is about 20 km away from the mine
Province	Lualaba
Country	Democratic Republic of Congo
Longitude	25.40194°

Latitude	-10.72222°
Altitude	1466 m a.s.l. 1,466 m.a.s.l
Main product and by-products	Main Products: Copper; By-product: Cobalt
On-site processing stages	A concentrator and metallurgical plant form part of the mine complex (Katanga Mining 2019b)
Annual production	152,357 tonnes of copper cathode in 2018 and 11,112 tons of cobalt (in cobalt hydroxide) (Katanga Mining 2019b)
Proven Reserves	8.8 Mt; 3.55 % total copper; 0.55% total cobalt (Katanga Mining 2019b)
Probable Reserves	129.4 Mt; 3.13 % total copper; 0.51% total cobalt (Katanga Mining 2019b)

Geology

Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	According to the technical report waste and minerals contain sulphide that potentially could produce acid mine drainage. The report has ambivalent statements, on the one hand it states that the neutralization potential makes acid generation unlikely, on the other hand they indicate that tailings contain 1.6 % of sulphides and are likely to generate AMD (Katanga Mining 2018).	The technical studies makes ambivalent statements that point in the direction of a high risk of acid mine drainage. Preconditions are met since sulphide minerals are present. Accordingly, the EHP for AMD is high.	High	A = high, can be derived directly from available data
Paragenesis with heavy metals	Geochemical characterisation indicates the tailings as highly hazardous based on total chromium and lead content (Katanga Mining 2018).	Copper is a heavy metal itself. Moreover the tailings contain highly hazardous levels of lead and chrome.	High	A = high, can be derived directly from available data

		Accordingly, the EHP for paragenesis with heavy metals is high.		
Paragenesis with radioactive components	In 2018 cobalt exports and sales at Kamoto have been suspended after uranium in cobalt hydroxide exceeded acceptable limits (Katanga Mining 2019b)	Uranium present in finished products indicates that radioactive components are present. Therefore, a high EHP is assumed for the indicator.	High	B1 = medium, can be estimated on the basis of available information
Deposit size	Prior to restart of production by Katanga Mining the mine had produced a total of 59.3 Mt of with an average ore grade of 4.21 % Cu [ca. 2.5 Mt Cu] (Katanga Mining 2019c). Adding the reserves the deposit size adds up to approximately 7 Mt of copper.	According to the measurement guidance, this project is classified as a large project and is hence given a high EHP.	High	A = high, can be derived directly from available data
Ore grade	3.55 % Cu 0.55% Co (Katanga Mining 2019b)	Priester et al. indicate that copper grades above 3 % Cu to be high grades, therefore the ore grade poses a low EHP (Priester et al. 2019).	Low	A = high, can be derived directly from available data

Technology

Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Mine type	Underground, operating on a room and pillar approach with a cemented hydraulic backfill (Katanga Mining 2018)	Underground mining operations disturb a rather small surface area compared to other types of mining. Accordingly, the	Low	A = high, can be derived directly from available data

		EHP resulting from the mining method is low.		
Use of auxiliary substances	Conventional crushing, grinding and flotation processes, using reagents (Katanga Mining 2018)	The process involves a flotation circuit where potentially toxic reagents are used. Therefore, extraction and processing pose a high EHP.	High	B1 = medium, can be estimated on the basis of available information
Mining waste	A variety of tailings storage facilities are visible in satellite images. The technical report mentions the Near West TSF and Mupine OP TSF(Katanga Mining 2018). One of the TSF covers an area of ca. 3 km^2. It is highly likely that this TSF is a large dam as defined by ICOLD (Dehoust et al. 2017a)	Satellite images suggest that at least one TSF is large as defined by ICOLD. Accordingly the EHP resulting from mining waste management is high.	High	B1 = medium, can be estimated on the basis of available information
Remediation measures	Kamoto Mine rehabilitation costs are to be shared between the two owners, and closure costs were calculated as recently as 2017 (Katanga Mining 2018)	Since financial provisions are provided for remediation, the EHP for the indicator is Medium.	Medium	A = high, can be derived directly from available data

Framework conditions natural environment

Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Accident hazard due to floods,	The rating system for the 4 sub-indicators uses georeferenced data from publicly available risk maps (see measurement	The EHP for all sub-indicators (earthquakes, flood, landslide, tropical	Low	A = high, can be derived directly

earthquake, storms, landslides	instructions (Dehoust et al. 2017a)). Metrics are directly taken from the given risk assessment. The indicator total is determined by the highest hazard level of the sub-indicators.	storm, arctic region) is low for all sites of the mining area.		from available data
Water Stress Index (WSI) und desert areas	The WSI by Pfister et al. (2009) provides characterization factors on the relative water availablility at watershed level. Absolute water shortages in dry areas is supplemented by desert areas. The highest hazard level of the sub-indicators determines the total result.	The water stress for the mining area is low and is not situated in a desert area, which results in a low EHP.	Low	A = high, can be derived directly from available data
Protected areas and AZE sites	Georeferenced data for designated protected areas are used to assess hazards posed by mining extraction. The metric to evaluate EHPs corresponds to the method first described in the draft standard of the Initiative for Responsible Mining Assurance (IRMA 2014).	The mining area is not situated in designated protected areas and AZE sites, which results in a low EHP.	Low	A = high, can be derived directly from available data

State Governance

Indicators	
WGI 1 -Voice and Accountability	7.39 °°°
WGI 2 -Political Stability and Absence of Violence/ Terrorism	4.76 °°°
WGI 3 - Government Effectiveness	5.77 °°°

WGI 4 -Regulatory Quality	5.77 °°°
WGI 5 - Rule of Law	2.88 °°°
WGI 6 -Control of Corruption	3.85 °°°
EPI (Environmental Performance Index)	30.41
EITI membership	Yes, yet to be assessed
International Agreements	
ILO 176	No
Others	None
Legal framework	

Areas of Law: Environment	Environmental Law is governed by the Law on Fundamental Environmental Protection Principles (Law No. 11/009 9. July 2011) which is also addresses public participation in decision making (MineHutte 2019). There are detailed environmental requirements for both exploration and production of mining projects in the Mining Regulation of the DRC. Applicants for production permits are required to provide an Environmental Impact Assessment as well as a draft environmental management plan. Moreover a draft rehabilitation plan needs to be submitted to the relevant authorities. Holders of permits need to provide financial guarantees in high enough amounts to cover environmental rehabilitation (Le Roux / Bustin 2019). The main administrative bodies regarding environmental aspects of mining projects are the Environmental Agency and the Directorate for the protection of the Mining Environment (MineHutte 2019).
Areas of Law: Occupational Health and Safety (OHS)	General Health and Safety is regulated under the Labour Code. The mining code, specific rules for mining projects are outlined. Mining permit holders are obliged to disseminate safety guidelines, to their staff that are in reference to t ILO Convention on the Safety and Health in Mines (C176). The Directorate of Mines is responsible for inspections and monitoring of mining safety and hygiene (Le Roux / Bustin 2019). Different rules apply to artisanal mining (Elenge et al. 2013).

Corporate Social Responsibility (CSR)

Voluntary Standards	
Aluminium Stewardship Initiative (ASI): Is the mine owning company a member?	No No (ASI 2019)
Aluminium Stewardship Initiative (ASI): Is the mine certified?	Not applicable Not applicable
International Council of Mining & Metals (ICMM): Is the mine owning company a member?	No No (ICMM 2019)
Towards Sustainable Mining (TSM) Is the mine owning company a member of the Mining Association of Canada (MAC)?	No No (MAC 2019)
Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?	Not applicable Not applicable
Initiative for Responsible Mining Assurance (IRMA): Is the mine owning company a member?	No No (IRMA 2018)
Initiative for Responsible Mining Assurance (IRMA): Is the mine certified?	No No (IRMA 2018)
Responsible Copper (RC): Is the mine owning company a member of RC?	No information available No information available
Responsible Copper (RC): Is the mine certified?	No information available No information available
Responsible Mining Index (RMI): Has the mine been rated?	No No (RMI 2018a)
Responsible Mining Index Company indicator „Working conditions“	No No (RMI 2018b)

Responsible Mining Index Company indicator „Environmental sustainability“	No No (RMI 2018b)
Responsible Steel (RS): Is the mine owner a member of the RS?	Not applicable Not applicable
Responsible Steel (RS): Is the mine certified?	Not applicable Not applicable
Australian Steel Stewardship Forum (ASSF): Is the owner a member of the ASSF?	Not applicable Not applicable
Australian Steel Stewardship Forum: Is the mine certified?	Not applicable Not applicable
ISO and CSR reporting	
ISO 14001 (ISO 14004): Is the mine ISO 14001 certified?	No information obtained Not identified
CSR-directive 2014/95/EU: Does the mine owning company have its headquarters in an EU country?	No No
OECD Guidelines: Does the company have its headquarters in a signatory state?	No No
ISO 26000: Does the mine implement ISO 26000?*	No No
Banking Standards	
WB Standards / IFC Performance Standards: Is the mine financed to a major extend by the world bank?	No No
Equator Principles (EP): Is the mine financed to a major extend by a bank adherent to the EP?	No No

*by companies own account.

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A Glossary

Table 1 Legend

Environmental hazard potential

low

medium

high

Data quality

low

- No concrete information, no general specifications of the measurement instructions, expert estimation.
- Assessment not possible due to lack of data at the site, as there is also no evidence for an assessment and there are no generalized assessment rules.

medium

- Assessable on the basis of available information.
- Generalized classification according to measurement instructions.

high

- Can be derived directly from available data.

B Abbreviations

EHP	Environmental hazard potential
FY	Financial year
kt	Kilo tonnes
m a.s.l.	Meters above sea level
Mt	Million tonnes
OHS	Occupational Health and Safety
t	tonnes
TSF	Tailing Storage Facility
WGI	World Governance Indicators
WHS	Work Health and Safety

C Imprint

Publisher:

German Environment Agency

Section III 2.2

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Project period: 03/2018 –02/2021

The research project has been commissioned by the German Environment Agency as part of the Environmental Research Plan of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) and funded by the Federal Government (FKZ: 3717 35 306 0).

Project Partners:

- ifeu – Institut für Energie-und Umweltforschung Heidelberg gGmbH (Institute for Energy and Environmental Research)
- Öko-Institut e.V. (Institute for Applied Ecology)