ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Sangaredi

Halco Mining Inc, Guinea

ID: 81

German Environment Agency

Umwelt Bundesamt

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

Sangaredi

Bauxite

General information

Indicator or criteria	Description and values
Name of mine	Sangaredi
Description of mining area	The lateritic bauxite deposits of Guinea occur at low levels (200 to 400 m a.s.l. MSL) in the flat-topped plateaus with practically negligible soil and overburden. In the Boke bauxite belt, laterites are typically between 10 m to 20 m thick on the upper part of the plateaus. An iron-enriched cap, between 1 m to 2 m, covers a highly leached sequence that is made up essentially of hydrated aluminium and iron oxides. Lateritic in-situ bauxites are formed from sedimentary rocks, mostly of Palaeocene age (Nandi 2017) The Sangaredi mine comprises several interconnected individual excavation areas/pits (Google Earth Image 2016-12.30).
Surface extension	41.87km^2 41.87 km2 (Image date: 30.10.2019; Viewing height: 10.52 km) (Google Earth)
In operation since	1973 1973 (Rio Tinto 2019a)
Operator	Compagnie des Bauxites de Guinée (CBG)
Owner	Halco Mining Inc
Closest town	3 km South of Sangaredi
Province	Boke
Country	Guinea
Longitude	-13.792797°
Latitude	11.086522°
Altitude	200 m a.s.l. 200 m a.s.l. (Google Earth)

Main product and by-products	Main product: bauxite; by-products: none
On-site processing stages	Stripping of thin overburden, followed by drilling and ore blasting and loading with hydraulic excavators into haul trucks for transport to the mine stockpiles (Mining Technology 2019).
Annual production	2018: 13.039 Mt (Rio Tinto 2019b p. 268)
Proven Reserves	278 Mt (Rio Tinto 2019b p. 271)
Probable Reserves	188 Mt bauxite (Rio Tinto 2019b p. 271)

Geology

Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	Bauxite is a supergene enrichment of Al forming oxidic ore deposits. Aluminium (Al), which is extracted from bauxite, is a lithophilic element and primarily occurs in the form of gibbsite, which is a stable mineral under weathering conditions. It is, thus, stable under exposure to weathering in tailing ponds and waste piles. In general, AMD requires the presence of sulphide minerals.	As Al is a lithophile element and bauxite forms oxidic ore deposits, bauxite mining and beneficiation the environmental hazard potential (EHP) for AMD is low (Dehoust et al. 2017b)	Low	B2 = medium, classified according to measuring instructions
Paragenesis with heavy metals	Cr content of 455 ppm, V of 544 ppm and Zr of average 838 ppm are reported from Boke/Sangaredi. The Ga content of tested bauxite is ranging between 40 and 80 ppm with no clear relation with depth (Bailly et al. 2015).	According to the measurement instructions, aluminium ores may be associated with zinc, copper and chrome. Under consideration of the findings of (Bailly et al. 2015), the release of Cr, V, Ga and Zr although little mobile in tropical weathering	Medium	B2 = medium, classified according to measurement instructions

		environment cannot be ruled out and the EHP is classified as medium in consequence. Hence, the EHP is classified as medium.		
Paragenesis with radioactive components	No indication of paragenesis with Th and U are reported from Sangaredi Bauxites. Th correlated positiveley with Zr, which occurs in significant concentrations (Bailly et al. 2015). No quantitative data however are available.	In accordance with the measurement instructions, bauxite deposits are evaluated with a medium EHP, if no further information is available. This class division is based on average thorium and uranium activity levels in Chinese iron ore deposits (Hua 2011; USGS 2015).	Medium	B2 = medium, classified according to measurement instructions
Deposit size	466 Mt bauxite (Rio Tinto 2019b)	The deposit size is estimated based on the total reserves of 466 Mt of bauxite, and a production since 1973 (45 years, 13 Mt bauxite /year) of about 585 Mt of bauxite. This sums up to around 1050 Mt of bauxite with an average content of 47.3 % Al2O3. Thus, the deposit size in total is about 497,1 Mt Al2O3 and it can be considered as gigantic(>100 Mt alumina) according to the measurement instructions (Dehoust et al. 2017b).	High	B2 = medium, classified according to measurement instructions
Ore grade	47.3 % Al2O3 (Rio Tinto 2019b)	Considering other top bauxite deposits, Sangaredi with an average grade of 47.3 % can be considered a rich bauxite deposit with reference to undisclosed data.	Low	n.d.

Technology

Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Mine type	Open-pit mining of unconsolidated weathered material. Bench heights of up to 8 m allow most of the ore to be mined in one horizontal pass (CBG 2019).	The impacts on the surface of mining projects are related to the mining method. The impact of open pit mines is usually limited to the size of the ore body. Accordingly, the environmental hazard potential resulting from the mining method is medium.	Medium	B2 = medium, classified according to measurement instructions
Use of auxiliary substances	CBG uses drilling and blasting excavation (CBG 2019).	The still reported use of explosives for blasting represents use of auxiliary substances that are not classified as toxic leading to a low EHP for this indicator.	Low	B2 = medium, classified according to measurement instructions
Mining waste	Mining waste is reported to contaminate the river which crosses the mine and represents an important water resource for the local population (Sidiki 2019 p. 2). Several tailing ponds with no or little safeguarding structures can be observed, also close to the river.	There is some evidence of instable mining waste, however most of the surface is flat and levelled. No information regarding mining waste management or clear evidence of surface levelling through filling of the mined-out strips nor other waste management measures could be found in GoogleEarth (Image date: 2016-12-30) analyses, thus classifying the EHP as high.	High	C = low, no concrete information, no general specifications in the measuring instructions, (expert) estimate

Remediation measures	No remediation measures were reported for the mine site. Riparian forest along the E-W running river shows no signs of reforestation, nor can observed in other parts of the mine.	No evidence of systematic renaturation of the mine could be found neither in GoogleEarth (Image date: 2019-12-30) analyses nor in the information available. For this reason, the EHP is classified as high.	High	C = low, no concrete information, no general specifications in the measuring instructions, (expert) estimate

Framework conditions natural environment

Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Accident hazard due to floods, earthquake, storms, landslides	The rating system for the 4 sub-indicators uses georeferenced data from publicly available risk maps (see measurement instructions by Dehoust et al. (2017b)). Metrics are directly taken from the given risk assessment. The indicator total is determined by the highest hazard level of the sub-indicators.	Since the flood hazard is high accompanied by a medium land-slide hazard, a high composite Accident hazard is assigned.	High	n.d.
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 it is not situated in a desert area, which results in a low EHP.	Low	n.d.

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	n.d.

State Governance

Indicators	
WGI 1 -Voice and Accountability	26.11 °°°
WGI 2 -Political Stability and Absence of Violence/ Terrorism	30.95 °°°
WGI 3 - Government Effectiveness	14.9 °°°
WGI 4 -Regulatory Quality	19.23 °°°
WGI 5 - Rule of Law	8.65 °°°
WGI 6 -Control of Corruption	14.9 °°°
EPI (Environmental Performance Index)	46.62

EITI membership	Yes; current status is “meaningful progress”
International Agreements	
ILO 176	Guinea is part of ILO
Others	Signature of the Paris Agreement on Climate Change, Minamata Convention on Mercury (InforMEA 2019)
Legal framework	
Areas of Law: Environment	The first Mining code was promulgated in 1986. The new Mining Code (Rüttinger et al. 2015) took effect in September 2011 and was amended in 2013 containing more detailed environmental and rehabilitation obligations. Decree D/2014/014 regulates environmental and social impact assessment for mining operations. Environmental impact notice must be filed to obtain Exploration permits. Exploitation permits and Concessions require environmental and social impact studies and the funding of environmental rehabilitation trust accounts to guarantee the rehabilitation and closure of the mining site, including restoration of vegetation, land productivity and risk elimination. The Ministry of Mines and the Ministry of the Environment issue a notice of discharge after inspection (Law Business Research 2018). In accordance to Article 7, title-holders must comply with applicable provisions of the Public Health Code, the Environment Code, the Water Code, the Employment Code, the Wildlife Code, the Livestock Code, the Real Estate Code, the Forestry Code, the Pastoral Code and the Local Communities Code”, using the highest standards applicable in the country and comply in accordance with the provisions of the Environment Code or international best practices

	in the area (Law Business Research 2018). According to (Rüttinger et al. 2015) the implementation of the National Action Plan for the Environment from 1994 is very limited due to unstable social and political situation.
Areas of Law: Occupational Health and Safety (OHS)	Guinea has adopted a new Labour Code in 2014, containing very general provisions in relation to occupation safety and health (Rüttinger et al. 2015), including for instance the handling of hazardous substances and operation of heavy machinery as well as the responsibilities and obligations of owners, employers, managers and employees (ILO 1996). The Ministry of Labour is the competent national authority for safety and health at work. Labour inspectors have the power to take and request measures to eliminate hazards. The application of sanctions and penalties by courts is foreseen (ILO 1996). The New Mining Code from 2011 (Chapter VIII) defines the holder of Mining Permits as responsible for the implementation of safety measures. According to the Code, Article 143, The implementation of a Health Adjustment Plan to be submitted to the National Mining Authority is mandatory (New Mining Code 2011) (Law Business Research 2018)

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?	No No (ASI 2019)
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)?	Not applicable Not applicable
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?	Not applicable Not applicable
Responsible Copper (RC): Is the mine certified?	Not applicable Not applicable
Responsible Mining Index (RMI): Has the mine been rated?	No No (RMI 2018)
Responsible Mining Index Company indicator „Working conditions“	No No (RMI 2018)

Responsible Mining Index Company indicator „Environmental sustainability“	No No (RMI 2018)
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?	Yes Yes (CBG 2019)
CSR-directive 2014/95/EU: Does the mine owning company have its headquarters in an EU country?	No No (Halco Mining Inc. is a corporation organized under the laws of the State of Delaware, U.S.A) (Halco Mining 2006)
OECD Guidelines: Does the company have its headquarters in a signatory state?	Yes Yes (OECD 2019)
ISO 26000: Does the mine implement ISO 26000?*	No information obtained No information available

Banking Standards

WB Standards / IFC Performance Standards: Is the mine financed to a major extend by the world bank?	Yes Yes (IDI 2019)
Equator Principles (EP): Is the mine financed to a major extend by a bank adherent to the EP?	No information obtained No information available

*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

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