

ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Pingguo

Aluminium Corp. of China Ltd (CHALCO), China

ID: 87

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.

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

Pingguo

Bauxite

General information 	
Indicator or criteria	Description and values
Name of mine	Pingguo
Description of mining area	<p>Pingguo is the first karst accumulation type mine in the world. Karst exhibits a distinctive topography where the landscape is largely shaped by the dissolving action of water on carbonate bedrock (CHALCO 2019). The ore body is known to consist of shallow and thin layers spread throughout the site, resulting in a large area of operations (Caterpillar 2014).</p> <p>The bauxite is transported, via truck, to the Pingguo alumina refinery located 17 km away. The refinery, using a Bayer method is said to employ European technology and production equipment and is efficient in its use of water and energy (CHALCO 2019).</p>
Surface extension	136.75km ² 136.75 km ² (Image date: 08.04.2018; Viewing height: 5.85 km) (Google Earth)
In operation since	1994 1994 (Caterpillar 2014)
Operator	Aluminium Corp. of China Ltd (CHALCO)
Owner	Aluminium Corp. of China Ltd (CHALCO)
Closest town	Baise city – ca. 80 km south-east of the mine
Province	Guangxi Zhuang Autonomous Region
Country	China
Longitude	107.58333°
Latitude	23.55°

Altitude	460 m a.s.l. 460 m a.s.l.
Main product and by-products	Main product: Bauxite; by-product: none
On-site processing stages	There is no indication of on-site processing, the extracted bauxite ore is shipped to the nearby refinery.
Annual production	Bauxite: 5,674 kt Bauxite (53.47 % Al ₂ O ₃) (CHALCO 2019)
Proven Reserves	48.01 Mt bauxite (CHALCO 2019)– no separated figures for proven and probable reserves
Probable Reserves	No information obtained.

Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	No information on Pingguo could be obtained.	Bauxite mining does not produce AMD, while the alumina refining process alkaline waste materials, which are not linked to AMD. Moreover, aluminium is a lithophile element and is therefore associated with oxidic deposits (Dehoust et al. 2017b).	Low	B2 = medium, classified according to measuring instructions
Paragenesis with heavy metals	No indication of paragenesis with heavy metals could be determined.	The extraction of metallic raw materials is often connected to heavy metal- and/or arsenic-related problems. Accordingly, a medium Environmental Hazard Potential is estimated (Dehoust et al. 2017b).	Medium	B2 = medium, classified according to measurement instructions

Paragenesis with radioactive components	No indication for paragenesis with heavy metals could be determined.	In accordance with the measuring instructions, bauxite deposits are evaluated with a medium EHP, if no other information is available. This class division is based on average thorium and uranium activity levels in Chinese bauxite deposits (Dehoust et al. 2017b).	Medium	B2 = medium, classified according to measurement instructions
Deposit size	The mine started production in 1994 (Caterpillar 2014). Assuming today's production to be average, a total of ca. 5Mt of bauxite p.a have been extracted within in 24 years. Accordingly, 120 Mt has been mined and 48 Mt of reserves are left in the deposit.	According to Petrow et al. the deposit is classified as large. Therefore, the EHP resulting from the deposit size is high.	High	A = high, can be derived directly from available data
Ore grade	53.47 % Al ₂ O ₃ (CHALCO 2019)	A grade and tonnage model from 2004 comparing bauxite mines indicates that the median grade of active bauxite mines is 45.6 % Al ₂ O ₃ (Meyer 2004). The ore grade at Pingguo is approximately at the 90th percentile, indicating that the ore grade is high. Therefore, the EHP resulting from the ore grade is low.	Low	A = high, can be derived directly from available data

Technology				
Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality

Mine type	Open-pit mining over large areas (Caterpillar 2014).	The ore body is reported to be shallow and thin. Given that alluvial deposits require large surface areas to be disturbed, a High EHP is awarded (Dehoust et al. 2017b)	High	A = high, can be derived directly from available data
Use of auxiliary substances	No specific information obtained.	In the direct vicinity of the deposit several processing plants and smelters are visible also tailings storage facility (TSF) can be identified. Therefore, a wet processing circuit is probable that potentially uses auxiliary substances. Also, TSFs appear from visual examination to contain red mud leading to the conclusion that the Bayer-process is applied. Based on expert judgement a high EHP is estimated.	High	C= No concrete information, no general specifications of the measuring instructions, expert estimation.
Mining waste	A condensed pressure filtration method is used for mine waste, where remaining slurry after washing is compressed and filtered to become mud cakes. These are used for backfilling to the gob areas, and the filtered clean water is recycled in the washing processes (Viewpoint 2012). Generally little information is available. Satellite images indicate at least two areas that seem to be large tailings storage facilities.	Due to the limited amount of information the assessment is based on satellite image interpretation. The tailings storage facilities have a diameter of more than 1.5 km and therefore could be defined as large dams according to ICOLD's definition. Accordingly, the mine waste management is estimated to have a high EHP (Dehoust et al. 2017b).	High	C= No concrete information, no general specifications of the measuring instructions, expert estimation.
Remediation measures	A continuous reclamation process is undertaken, employing a systematic approach to blasting and biological reclamation using crop planting. Approx. 6,666 m ² of land is mined every day,	As of 2014, CHALCO Guangxi has reported an overall reclamation rate of 100 percent (Caterpillar 2014). It is thus given a Low EHP rating.	Low	A = high, can be derived directly from available data

	with the mine land is reclaimed immediately. After one or two years of soil fertility improvement, the reclaimed land is returned to farmers (Caterpillar 2014).			
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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 (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.	The EHP for the sub-indicator earthquakes is low and medium for storms. The sub-indicators for floods and landslides are both high, resulting in an overall high EHP.	High	A = high, can be derived directly from available data
Water Stress Index (WSI) und desert areas	The WSI by Pfister et al. (2009) provides characterization factors on the relative water availability 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	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

	Initiative for Responsible Mining Assurance (IRMA 2014).			
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State Governance

Indicators	
WGI 1 -Voice and Accountability	8.87 ^{ooo}
WGI 2 -Political Stability and Absence of Violence/ Terrorism	36.67 ^{ooo}
WGI 3 - Government Effectiveness	69.71 ^{ooo}
WGI 4 -Regulatory Quality	48.08 ^{ooo}
WGI 5 - Rule of Law	48.08 ^{ooo}
WGI 6 -Control of Corruption	45.67 ^{ooo}
EPI (Environmental Performance Index)	50.74
EITI membership	No
International Agreements	

ILO 176	No
Others	'Enhanced engagement' status at OECD since 2007 (OECD 2019)
Legal framework	
Areas of Law: Environment	<p>The Environmental Impact Assessment Law of the People's Republic of China (2002) and the Technical Guidelines for Environmental Impact Assessment (2011) are the main environmental regulations impacting mining activity in China. The Environmental Protection Law requires an EIA for any mining project that has a significant impact on the environment. In addition, 'Accelerating the Construction of Green Mines of Ministry of Land and Resources (2017)' is also an important document impacting mining practices in China.</p> <p>Chinese EIA regulations (2012) are considered to be increasingly aligned with international standards and include upfront stakeholder engagement and broad participation, as well as strengthening requirements for feasibility study, social impact assessment, environmental mitigation and management, assessment of project alternatives and mass load control (ERM 2012)</p>

Areas of Law: Occupational Health and Safety (OHS)	<p>The Law on the Prevention and Control of Occupational Diseases (2001) regulates safety in Chinese mines. Additionally, the Law of People's Republic of China on Safety in Mines (1992) is applicable (Wu / Li 2019)</p> <p>Under these regulations the employers must ensure working conditions meet national standards which include: Guarantees for Safety in Mine Construction; Guarantees for Safety in Exploitation of Mines; Safety Management of Mining Enterprises; Supervision and Control over Safety in Mines and Disposition of Accidents at Mines (Safety in Mines, 1992). (EI SourceBook 2019)</p>
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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)?	No No (MAC - The Mining Association of Canada 2019)
Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?	No No (MAC - The Mining Association of Canada 2019)

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“	Not applicable Not applicable
Responsible Mining Index Company indicator „Environmental sustainability“	Not applicable Not applicable
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 (Viewpoint 2012)

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 (OECD 2019)
ISO 26000: Does the mine implement ISO 26000?*	No information obtained Not mentioned in company documents
Banking Standards	
WB Standards / IFC Performance Standards: Is the mine financed to a major extend by the world bank?	No information obtained Not mentioned in company documents
Equator Principles (EP): Is the mine financed to a major extend by a bank adherent to the EP?	No information obtained Not mentioned in company documents

*by companies own account.

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A Glossary

Table 1 Legend

Environmental hazard potential



low



medium



high

Data quality



low



medium



high

- 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.

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

- 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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German Environment Agency
Section III 2.2
PO Box 14 06
06813 Dessau-Rosslau, Germany
Tel: +49 340-2103-0
info@umweltbundesamt.de
www.umweltbundesamt.de

Contact:

Jan Kosmol – jan.kosmol@uba.de

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Contractor:

Projekt-Consult GmbH
Eulenkruogstrasse 82
22359 Hamburg, Germany
T +49 (40) 60306-740
F +49 (40) 60306-199
www.projekt-consult.de

Contact:

Dr. Aissa Rechlin – aissa.rechlin@projekt-consult.de
Christopher Demel – christopher.demel@projekt-consult.de

Project Partners:

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