

ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Jamalco/May Pen Bauxite Mine

Noble Group, Jamaica

ID: 93

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>

Jamalco/May Pen Bauxite Mine

Bauxite

General information 	
Indicator or criteria	Description and values
Name of mine	Jamalco/May Pen Bauxite Mine
Description of mining area	Jamalco currently mines bauxite of the karst type in Harmons Valley, Manchester and on the South Manchester Mount Oliphant plateau in the Southern part of Jamaica (Mining Atlas n.d.). Numerous small mines sites or open cast pits are located in a region of approximately 80 km ² west of May Pen township. mostly bound to solution hollows in bedrock with no overburden and on Tertiary limestones. The high grade bauxite is found in the highlands, from about 300 meter to 1000 m above sea level and consist mainly of gibbsite (up to 60 %) and boehmite (<5 %) (Madourie 2013).
Surface extension	24km ² 24.00 km ² (No area data can be derived from satellite images. Area assumption, based on internal statistics)
In operation since	1963 1963 (Jamalco 2019)
Operator	Jamalco
Owner	Noble Group
Closest town	Mining region approximately 20 km west of May Pen, Clarendon Province
Province	Manchester
Country	Jamaica
Longitude	-77.424622°
Latitude	17.950556°
Altitude	1000 m a.s.l. 200-1000 m

Main product and by-products	Main product: bauxite; by-products: none
On-site processing stages	Near surface deposits (<30 m of depth) and often without overburden are suitable for mining by simple opencast methods. No drilling or blasting is generally required due to the soft, earthy nature of the ore. Deposits are hosted in areas varying from gentle undulating to rugged, hilly terrain (Lancashire 2014)
Annual production	No recent data available; Total Production Jamaica (2016) : 8,540 Mt (Reichl et al. 2018)
Proven Reserves	No data available
Probable Reserves	No data available

Geology 				
Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	No specific information obtained. According to (Martens et al. 2003) bauxite mining, no acid rock drainage occurs. 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.	Low	B1 = medium, can be estimated on the basis of available information
Paragenesis with heavy metals	Chromium concentration in some locations of Jamaican bauxite deposits show range from 216 to 905 ppm. Also in high amount is	According to the measurement instructions, aluminium ores may be associated with zinc, copper and	Medium	B1 = medium, can be estimated on the

	vanadium and zinc ranging from 92 - 209 ppm and 29.8 to 71.6 ppm (Madourie 2013). According to the author, high heavy metal concentrations can be explained as being the result of bauxitization of volcanic ashes, however no Jamalco mine specific data area available.	chrome. In consequence of the descriptions of Madouri (2013) the release of Cr, Zn and V, also on sites of Jamalco, cannot be ruled out and the EHP is classified as medium in consequence.		basis of available information
Paragenesis with radioactive components	No indication of paragenesis with thorium (Th) and uranium (U) could be determined.	Bauxites formed by lateritic weathering of very different silicate and carbonate rocks (among others granite, gneiss, clay) are evaluated with a medium EHP, if no further information indicates otherwise. This class division is based on average thorium and uranium activity levels in Chinese bauxite deposits (Hua 2011; USGS 2015). Jamaican Bauxite are derived from limestones, which could justify a low EHP. It is presumed that the bauxites is a combination of volcanic parent material and carbonate rocks (Madourie 2013), thus justifying a medium EHP.	Medium	B1 = medium, can be estimated on the basis of available information
Deposit size	No data available	Assessment not possible	Assessment not possible	Y = Assessment not possible due to lack of data at the site, as there are no indications for an assessment and no general assessment rules are given in the method

Ore grade	45.2% Al ₂ O ₃ (estimation by pers. comm. with AB Gladjärnen 2019)	Considering other top bauxite deposits, Jamalco with an average grade of 45.2 % can be considered a rich bauxite deposit with reference to undisclosed data.	Low	B1 = medium, can be estimated on the basis of available information
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Technology



Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Mine type	Open-pit mining of unconsolidated weathered material.	The superficial excavation of the weathered bauxite horizon leads to a high surface consumption of the mining operation and is consequently evaluated with a high EHP.	High	B2 = medium, classified according to measurement instructions
Use of auxiliary substances	The extraction is done by open pit mining without auxiliary substances (Lancashire 2014). No further processing steps are carried out on-site. The ore is moved to the railhead at St Jago by trucks and from South Manchester by a rope conveyors system. From St. Jago it is moved by train to the refinery at Halse Hall, Clarendon (Mining Atlas n.d.).	The site-related ÖkoRess evaluation system is focused on the on-site processes. On-site no auxiliary substances are used. Consequently, the EHP is considered as low. The ore processing off-site with highly aggressive caustic soda in Bayer Al-refinery process of Jamalco Alumina Plant in Halse Hall about 20 km east is not part of the evaluation.	Low	B2 = medium, classified according to measurement instructions
Mining waste	Open cast mining with subsequent insertion of overburden in previously opened pits, avoiding the formation of stockpile (JBI n.d. a).	Open cast mining with subsequent insertion of overburden in previously opened pits and absence of stockpiles	Low	B2 = medium, classified according to

		classifies the EPH for mining waste management as low.		measuring instructions
Remediation measures	Lands are generally returned to pasture after mining. Mined-out areas are first reshaped and replaced with top-soil that was first stripped off. The area is then restored by planting the reclaimed area with pasture grasses, primarily to prevent erosion (JBI n.d. a). Through implementation of the Bauxite Community Development Programme (BCDP), conversion of mined-out pits to water catchment ponds and the enhanced access to lands around these ponds to help farmers in bauxite areas to significantly increase their production and incomes.	Creation of certification standards and 4- step certification process for mine restoration within an established time frame of mine reclamation of two years (if the area meets the standard, a certificate of compliance is issued and can then be used for farming, housing, community centers, schools or for light industrial building sites), allow the expectation of well established and efficient restoration measures , thus justifying a low EPH.	Low	B1 = medium, can be estimated on the basis of available information

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). 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 earthquakes and landslides is high which determines the evaluation result. Additionally, the mine has a medium EHP for tropical storms. All other sub-indicators have a low EHP.	High	B2 = medium, classified according to measurement instructions

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 it is not situated in a desert area, which results in a low EHP.	Low	B2 = medium, classified according to measurement instructions
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 mine site is situated in a designated protected area, which results in a medium EHP.	Medium	B2 = medium, classified according to measurement instructions

State Governance

Indicators	
WGI 1 -Voice and Accountability	69.46 ^{ooo}
WGI 2 -Political Stability and Absence of Violence/ Terrorism	56.19 ^{ooo}
WGI 3 - Government Effectiveness	69.23 ^{ooo}
WGI 4 -Regulatory Quality	60.1 ^{ooo}
WGI 5 - Rule of Law	49.04 ^{ooo}

WGI 6 -Control of Corruption	50.48 °°°
EPI (Environmental Performance Index)	58.58
EITI membership	No
International Agreements	
ILO 176	No
Others	No information obtained
Legal framework	

<p>Areas of Law: Environment</p>	<p>Jamaica’s environmental legislation is implemented by the Nacional Environmental and Planning Agency NEPA. The Natural Resources Conservation Authority Act (NRCA) from 1991 as a central instrument gives the power to directly request EIAs from mining companies. The Permits & Licensing Regulations of 1996 details the Act (NEPA 2019), delegating the responsibility for environmental management in bauxite mining to the Jamaica Bauxite Institute (JBI n.d. b). Opportunities for public/community involvement and consultations are foreseen in the Act and Regulations and are additionally supported by the Access To Information (ATI) Act of 2002 (JET 2015). Public Sewage and effluent discharges, waste management as well as air emissions are also addressed by special acts and regulations (Nacional Natural Resources Conservation Authority Act (effluents and wastewater) 2013; Nacional Solid Waste Management Act 2001; NRCA Stack Emission Standards). Under the new regulations the polluter pays principle is incorporated (NEPA 2019). The Mining Act and Mining Regulations from 1947 and amended in 2005 is implemented by the Commissioner of Mines, Mines and Geology Division. The norms regulate prospecting and mining rights and establish rules and requirements for mine restoration and compensation. Certification of compliance is mandatory after mine restauration which has to occur within a three years period. Non-compliance with these requirements results in fines (JET 2015).</p>
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<p>Areas of Law: Occupational Health and Safety (OHS)</p>	<p>Despite Jamaica being a signatory to the International Labour Organisation (ILO) Convention on Health and Safety and reaffirmed its commitment to achieving the UN's sustainable development goals, the Jamaica Occupational Safety and Health Bill is yet to be passed (JOHSPA 2018). According to ILO (2016) several Acts contain provisions in relation to occupational safety and health, however, none specific on mining. The Mining Act (Art.62) gives Labour officers and Commissioners the power to take and request measures to eliminate hazards.</p>
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Corporate Social Responsibility (CSR)

Voluntary Standards	
<p>Aluminium Stewardship Initiative (ASI): Is the mine owning company a member?</p>	<p>No No</p>
<p>Aluminium Stewardship Initiative (ASI): Is the mine certified?</p>	<p>No No</p>
<p>International Council of Mining & Metals (ICMM): Is the mine owning company a member?</p>	<p>No No</p>
<p>Towards Sustainable Mining (TSM) Is the mine owning company a member of the Mining Association of Canada (MAC)?</p>	<p>No No</p>
<p>Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?</p>	<p>No No</p>

Initiative for Responsible Mining Assurance (IRMA): Is the mine owning company a member?	No No
Initiative for Responsible Mining Assurance (IRMA): Is the mine certified?	No No
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
Responsible Mining Index Company indicator „Working conditions“	No No
Responsible Mining Index Company indicator „Environmental sustainability“	No No
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 No information obtained

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 information obtained No information obtained
Equator Principles (EP): Is the mine financed to a major extend by a bank adherent to the EP?	No information obtained No information obtained

*by companies own account.

Sources

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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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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)