ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Amrun

Rio Tinto , Australia

ID: 99

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

Amrun

Bauxite

General information

Indicator or criteria	Description and values
Name of mine	Amrun
Description of mining area	Amrun is a bauxite mining project, expected to start operation in 2019 (Rio Tinto 2015). According to the latest annual review of Rio Tinto from 2018 (Rio Tinto 2019), Rio Tinto shipped the first tons of bauxite from Amrun 6 weeks before schedule in December 2018. The project site is located on aboriginal land of the Wik-Waya, on the western side of Cape York Peninsula in Queensland, Australia (Rio Tinto 2015). The mining site will consist of a bauxite mine, processing facilities, tailing storage facilities, roads, a ferry terminal on the Hey river and a port at Boyd Bay (Rio Tinto 2015). Amrun is a mine project, which should open up new deposits in the area of the existing Weipa mine. In the future, Amrun will replace the production from the depleting East Weipa mine (Rio Tinto 2019). However, there is no timeline available from the company (Rio Tinto 2017) (Rio Tinto 2019). The mining site is situated in the Australian Monsoon Zone, which is characterised by tropical climate with dry and wet seasons. The landscape appears relatively undisturbed by human activities (Rio Tinto 2011a). Ferruginous Duricrust, associated with laterized sandstone from the Bulimba Formation, is the geological unit of the project area (MDO Data Online Inc. 2019).
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	2018 Originally operation was planned to start in 2019 (Rio Tinto 2015), but operation started already in December 2018, some weeks before schedule (Rio Tinto 2019). Given the fact that operation started late in 2018, no information about the production value of 2018 has been mentioned in (Rio Tinto 2019).
Operator	RTA Weipa Pty Ltd
Owner	Rio Tinto

Closest town	The project area is located 40 km South of Weipa and 40 km North of Aurukun (Rio Tinto 2015).
Province	Cape York Peninsula in Far North Queensland, State of Queensland (MDO Data Online Inc. 2019)
Country	Australia
Longitude	141.62922°
Latitude	-12.93582°
Altitude	50 m a.s.l. As satellite imagery indicates, Amrun is located close to the sea, the altitude is thus expected to be approx. 10 to 50 m a.s.l.
Main product and by-products	Main product: Bauxite (Rio Tinto 2011a), by-product: none
On-site processing stages	Bauxite will be mined in an open-pit by front-end loader or excavator, loaded into 180 t trucks and transported to the benefication plant (Boyd beneficiation plant, Norman Creek beneficiation plant) (Rio Tinto 2011a), where bauxite is separated from the waste material (Rio Tinto 2013a).
Annual production	Initial production of 22.8 Mt bauxite; later increase in production up to 50 Mt bauxite depending on the market situation (Rio Tinto 2015). This production value is related to Amrun mine only. As mentioned in (Rio Tinto 2019), Amrun replaces the depleting East Weipa mine by 10 MT per year. When considering this transition, Amrun increases Rio Tinto's export capacity by approx. 10 MT per year. In fact, a total of 22.8 Mt of bauxite will be mined at Amrun.
Proven Reserves	286 Mt bauxite (53.1 % Al2O3) as at 2018 (Rio Tinto 2019)
Probable Reserves	818 Mt bauxite (53.3 % Al2O3) as at 2018 (Rio Tinto 2019)

Geology

Indicator or criteria	Description and values	Explanation	Assessment result	Data quality

Preconditions for acid mine drainage (AMD)	The geological unit of the project area covers laterized sandstone (oxidic ore) from the Bulimba Formation (MDO Data Online Inc. 2019).Aluminium, which is extracted from bauxite, is a lithophilic element.	According to the Goldschmidt classification in the measurement instructions, aluminium is a lithophilic element and is mostly mined in oxidic ore bodies. Accordingly, a low EHP is assigned.	Low	B2 = medium, classified according to measurement instructions
Paragenesis with heavy metals	Analyses of crude ore, product ore and tailings from neighbouring mines East Weipa and crude ore from the Amrun project area proof that the concentration of heavy metals (arsenic, chromium, copper, zinc) is very low in comparison to other Australian bauxite mines. For Amrun, the following element contents have been determined according to two sample analyses: Arsenic: < 5 mg/kg; Copper: < 5 mg/kg; Zinc: < 5 mg/kg; Nickel: < 2 mg/kg; Lead: 7 mg/kg; (Rio Tinto 2013b).	Regarding the measurement instructions, potential joint products of aluminium ore are zinc, copper and chromium. Certain heavy metals could be deteced but only in low concentration. Accordingly, the indicator is assigned with a low EHP..	Low	A = high, can be derived directly from available data
Paragenesis with radioactive components	No indication of paragenesis with radioactive components.	Bauxites formed by lateritic weathering of very different silicate rocks (among others granite, gneiss, clay) are evaluated with a medium EHP, if no further information indicates otherwise. For comparison: Carbonate bauxites would be evaluated with a low EHP. For	Medium	B2 = medium, classified according to measurement instructions
Deposit size	Amrun is a mining project with proven reserves of 286 Mt bauxite with a grade of 53.1 % Al2O3 and probable reserves of 818 Mt bauxite with a grade of 53.3 % Al2O3 (Rio Tinto 2019).	Due to the fact that operation started in late 2018 and no information about the production value for 2018 has been mentioned in (Rio Tinto n.d.), reserves only have been considered for the evaluation of the deposit size. Proven and probable reserves indicate a large deposit site > 100 Mt ore,	High	A = high, can be derived directly from available data

		whereby the EHP is considered to be high.		
Ore grade	52.3 % Al2O3 (Geoscience Australia / Geoscience Australia 2017).	The last update of the measurement instructions suggests a low EHP for ore grades > 52 %. Amrun with an average grade of 52.3 % is just to be considered a rich bauxite deposit, the EHP is thus evaluated as 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	The bauxite layer is less than 1 m below earth surface and approx. 3.4 m thick. Bauxite will be mined in an open-pit mine (Rio Tinto 2011c).	The superficial stripping of the weathered bauxite horizon leads to a high surface consumption of the mining operation and is consequently evaluated with a high EHP.	High	A = high, can be derived directly from available data
Use of auxiliary substances	The bauxite is mined by front-end loaders or excavator, loaded into 180 t trucks and transported for further treatment. The crude ore is then crushed to components < 90 mm. Following, the crushed ore is processed in a beneficiation plant. Thereby, bauxite is first watered in order to seperate oversize chunks and high-silica fines from the bauxite, subsequently the bauxite is dewatered and	Taking into account that no auxiliary substances are applied, the EHP is considered to be low.	Low	A = high, can be derived directly from available data

	stockpiled. During beneficiation, no auxiliary substances are used (Rio Tinto 2011c).			
Mining waste	The amount of tailings is expected to be about 0.4 Mt for every 1 Mt of product bauxite. The type of tailings ranges from sandy silt to clayey silt. As no chemicals have been added, tailings are expected to be non-hazardous (Rio Tinto 2011c). There will be two TSF's (Boyd TSF and Norman Creek TSF). Each TSF has a capacity of 182 or 204 Mt, a spatial extent of 580 ha and a height of 22-25 m (Rio Tinto 2011c).	Even tough the bauxite tailings are considered to be non-hazardous (Rio Tinto 2011c), they will be classified with a high EHP due to the fact that Amrun TSF's represent large volume TSF's.	High	A = high, can be derived directly from available data
Remediation measures	During mine operation, the mine will be progressively rehablitated. Some infrastructure beneficial for ongoing use will stay, whereas other infrastructure such as buildings will be removed, concrete broken up and buried. Subsequent rehabilitation consists of the establishment of a vegetation community with local species. With respect to soil management, overburden will be directly placed back on the mining area or stockpiled. Concerning revegetation, the disturbed areas will be ripped, topsoil will be spread and seeding and fertilizing will take place (Rio Tinto 2011c).	As varisous remediation measures take place progressively during mine operation, the EHP is considered to be low.	Low	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, 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. 2017b)). Metrics are directly taken from the given risk assessment. The indicator total is determined by the highest hazard level of the sub-indicators.	The Amrun mining project has a high EHP for floods and landslides which determine the evaluation result. The other sub-indicators have a low EHP.	Low	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 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 project area is low and it 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 Amrun mining project 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	94.58 °°°
WGI 2 -Political Stability and Absence of Violence/ Terrorism	77.62 °°°
WGI 3 - Government Effectiveness	92.31 °°°
WGI 4 -Regulatory Quality	98.08 °°°
WGI 5 - Rule of Law	93.27 °°°
WGI 6 -Control of Corruption	92.79 °°°
EPI (Environmental Performance Index)	74.12
EITI membership	Other (has announced its commitment to join the EITI)
International Agreements	
ILO 176	Not ratified
Others	OECD member
Legal framework	

Areas of Law: Environment	All stages of mining require environmental authorization. Depending on the kind of operation, varying degrees of public consultation appeal. Projects involving environmental issues require an Environmental Impact Assessment. Projects or waste storage facilities that might have impact of national environmental significance might require approval under the Environmental Protection and Biodiversity Conservation Act (projects affecting, e.g. World Heritage, threatened species etc.). Projects with significant impact on water resources require the Commonwealth minister to get advice from the Independent Experts Scientific Committee before approving any proposal. Some states have specific legislation concerning mining waste; e. g. In Victoria, Western Australia and Queensland guidelines for the design and operation of TSFs have been issued. Holders of mining rights are liable for the rehabilitation of mining areas. Liability is only discharged once all obligations as stated in the mine closure plan have been fulfilled (Woods / Rifici 2018).
Areas of Law: Occupational Health and Safety (OHS)	Following the Work Health and Safety Act (WHS), most jurisdictions in Australia provide a balanced and nationally consistent framework to health and safety of workers at workplaces (Safe Work Australia 2018). New South Wales, Queensland and Western Australia have laws directly addressing the health and safety in the mining sector including penalties for non-compliance. WHS laws impose obligations on ensuring the safety of all persons working on site, this requires officers and directors of corporations to exercise due diligence to ensure compliance with WHS laws (Woods / Rifici 2018).

Corporate Social Responsibility (CSR)

Voluntary Standards	
Aluminium Stewardship Initiative (ASI): Is the mine owning company a member?	Yes Yes (ASI 2018)
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?	Yes Yes (ICMM 2019)
Towards Sustainable Mining (TSM) Is the mine owning company a member of the Mining Association of Canada (MAC)?	Yes Yes, Rio Tinto Canada (MAC 2019)
Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?	No information available Not specifically mentioned
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“	0.570 0.570 (RMI 2018)

Responsible Mining Index Company indicator „Environmental sustainability“	0.447 0.447 (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?	No No, but Weipa's Health Safety and Environment Management is ISO 14001 certified, this existing management system will be adapted for the project (Rio Tinto 2011a).
CSR-directive 2014/95/EU: Does the mine owning company have its headquarters in an EU country?	Yes Yes, London and Melbourne (Rio Tinto n.d. p. 0)
OECD Guidelines: Does the company have its headquarters in a signatory state?	Yes Yes (World Population Review 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?	No information obtained No information available

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

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