

ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Huntly Bauxite Mine

Alcoa Mining, Australia

ID: 79

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>

Huntly Bauxite Mine

Bauxite

General information



Indicator or criteria	Description and values
Name of mine	Huntly Bauxite Mine
Description of mining area	Opened 1976 world's (second) largest bauxite mine (Alcoa 2018)
Surface extension	398.33km ² 398.33 km ² (Image date: 14.11.2018; Viewing height: 4.77 km) (Google Earth)
In operation since	1976 1976
Operator	Alcoa Mining
Owner	Alcoa Mining
Closest town	Located near Dwellingup (70 kilometres S-SE of Perth) (Alcoa 2018)
Province	Western Australia
Country	Australia
Longitude	116.168667°
Latitude	-32.562222°
Altitude	300 m a.s.l. Approx. 300 m.a.s.l.
Main product and by-products	Bauxite
On-site processing stages	Pinjarra alumina refinery, and via an overland conveyer and rail to Kwinana alumina refinery. The current crusher is located at Myara. (Alcoa 2018)
Annual production	26 Mt bauxite ore (Alcoa 2018)

Proven Reserves	Proven Reserves for the Huntly and Willowdale mines combined are 109.0 Mt ore (Australian Government Geoscience Australia 2013).
Probable Reserves	Probable Reserves for the Huntly and Willowdale mines combined are 34.7 Mt ore (Australian Government Geoscience Australia 2013).

Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	According to the Goldschmidt classification, aluminium (and thus also bauxite as Al ore) is a lithophile element and is mostly oxidic. No indication of acid mine drainage risks.	The measurement instructions suggests a low Environmental Hazard Potential (EHP) (Dehoust et al. 2017b).	Low	B2 = medium, classified according to measurement instructions
Paragenesis with heavy metals	No indication of paragenesis with heavy metals.	The main constituents of bauxite are Al hydroxides and Fe oxides (not heavy metals). The measurement instructions suggests a medium EHP.	Medium	B2 = medium, classified according to measurement instructions
Paragenesis with radioactive components	No indication of paragenesis with thorium or uranium could be determined.	Average data on Chinese bauxite deposits (16.3% of world production) suggest that in many cases aluminium is associated with slightly elevated concentrations of uranium and/or thorium. The measurement guidance suggests a medium EHP.	Medium	B2 = medium, classified according to measurement instructions
Deposit size	No information was obtained on this point.	Considering the annual production rate, the mine lies within the category of "gigantic mine" after Petrow classification (Dehoust et al. 2017b).	High	B2 = medium, classified according to measurement instructions

		The measure guidance suggests a high EHP.		
Ore grade	Bauxite mines in Darling Ranges have lowest grade bauxite ores (27-30% Al ₂ O ₃). (Australian Government n.y. b). Available alumina averages at Huntley are 32.9 % (Australian Government Geoscience Australia 2013).	No statement possible according to measure guidance.	No statement possible according to measure guidance.	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 on unconsolidated rocks. Bauxite is derived from the weathering of Archean granites and gneisses and Precambrian dolerite (Dehoust et al. 2017b).	The measure instructions open-pit bauxite mining with a high EHP as bauxite is a weathering product and therefore unconsolidated rock.	High	B2 = medium, classified according to measurement instructions
Use of auxiliary substances	No toxic auxiliary substances are used for processing at the mine site (Dehoust et al. 2017b).	The measurement instruction indicate a medium EHP.	Medium	B2 = medium, classified according to measurement instructions
Mining waste	According to Alcoa, the company plans a 100 % Reduction of landfill till 2030 (right now 44.1 %). In 2017, 155.2 thousand tonnes were produced from Alcoa in total (not specifically Huntly) (Alcoa 2018).	Settling ponds for red mud storage and mud thickeners at Pinjarra refinery, but no further information e.g. on tailing size.	Medium	A = high, can be derived directly from available data

	Also they have a Long Term Residue Management Strategy (LTRMS) for each site (Alcoa 2018).	The measurement instruction evaluates a medium EHP for tailings/ ponds.		
Remediation measures	According to company information, at the Huntly and Willowdale bauxite mines 600 hectares were mined and rehabilitated each year. Alcoa says, that the company does not mine in old grown forest. Alcoa has the key environmental objective to restore 100 per cent of the plant species diversity (Alcoa n.d.).	Rehabilitation is taking place and long term plannings are available. The measurement instructions indicate a low EHP.	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). 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 earthquake hazard is medium and for all other aspects such as landslides, tropical storms and floods or situation in arctic environment is negligible.	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	EHP for water stress is low and the mine is not situated in a desert area.	Low	B2 = medium, classified according to measurement instructions

	hazard level of the sub-indicators determines the total result.			
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 is not close to protected areas as defined in the ÖkoRess evaluation method (Dehoust et al. 2017b)	Low	B2 = medium, classified according to measurement instructions

State Governance

Indicators	
WGI 1 -Voice and Accountability	94.58 ^{ooo}
WGI 2 -Political Stability and Absence of Violence/ Terrorism	77.62 ^{ooo}
WGI 3 - Government Effectiveness	92.31 ^{ooo}
WGI 4 -Regulatory Quality	98.08 ^{ooo}
WGI 5 - Rule of Law	93.27 ^{ooo}
WGI 6 -Control of Corruption	92.79 ^{ooo}

EPI (Environmental Performance Index)	74.12
EITI membership	No
International Agreements	
ILO 176	Not ratified
Others	OECD member since 1971
Legal framework	

<p>Areas of Law: Environment</p>	<p>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).</p>
<p>Areas of Law: Occupational Health and Safety (OHS)</p>	<p>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).</p>

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 2018)
International Council of Mining & Metals (ICMM): Is the mine owning company a member?	No No (ICMM 2018)
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?	Not rated Not rated
Responsible Mining Index Company indicator „Working conditions“	Not rated Not rated

Responsible Mining Index Company indicator „Environmental sustainability“	Not rated Not rated
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 (Alcoa n.d.)
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?	Yes Yes (Australia)
ISO 26000: Does the mine implement ISO 26000?*	No information obtained No information obtained
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

Publisher:

German Environment Agency
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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).

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