

# ÖkoRess III

## Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

**Al' Ba'itha**

**Ma'aden, Saudi Arabia**

ID: 42

## 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"<sup>1</sup> (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.

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

# Al' Ba'itha

## Bauxite

General information	
Indicator or criteria	Description and values
Name of mine	Al' Ba'itha
Description of mining area	Al Ba'itha is a bauxite mine in the Middle East. It is an open pit mine with an annual capacity of over 4Mt of bauxite ore. The bauxite ore is refined in the Gulf Cooperative Council's (GCC) first alumina refinery at Ras Al Khair to produce 1.8 million tonnes of alumina per year, which is processed in the smelter to produce 740 kt of aluminium. It is connected by railway to the refinery (Ma'aden 2018).
Surface extension	25.14km <sup>2</sup> 25.14 km <sup>2</sup> (Image date: 16.07.2011; Viewing height: 7.77 km) (Google Earth)
In operation since	2014 2014 (Ma'aden 2018)
Operator	Ma'aden Bauxite and Alumina Co. LLC (MBAC)
Owner	Ma'aden
Closest town	140 km N from Buraydah
Province	Qasim
Country	Saudi Arabia
Longitude	44.005631°
Latitude	27.672508°
Altitude	587 m a.s.l. 587 m.a.sl (Google Earth)
Main product and by-products	Main product: Bauxite; by-product: none



On-site processing stages	The product is extracted as direct shipping ore and is taken to the refinery via a railway line (Ma'aden 2019a)
Annual production	4.6 Mt bauxite (Ma'aden 2019a)
Proven Reserves	69 Mt of bauxite ore (Ma'aden 2019a)
Probable Reserves	123.2 Mt of bauxite ore (Ma'aden 2019a)

## Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	No information on Al Ba'itha could be obtained.	Bauxite mining does not produce AMD, 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 specific information on Al Ba'itha obtained. Aluminium ores are associated with the heavy metals, chrome, zinc and copper (Dehoust et al. 2017b).	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 specific information on Al Ba'itha obtained.	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 2014. At the current production level a total of ca. 20 Mt of bauxite have been mined. Adding the reserves the deposit could contain a total of ca. 210 Mt of bauxite.	According to the measurement instructions the deposits size is large (Dehoust et al. 2017b). Therefore the EHP is assessed as high.	High	A = high, can be derived directly from available data
Ore grade	49.7 % Al <sub>2</sub> O <sub>3</sub> (Ma'aden 2019a)	A grade and tonnage model from 2004 comparing bauxite mines indicates that the median grade of active bauxite mines is 45.6 % Al <sub>2</sub> O <sub>3</sub> (Meyer 2004). The grade at Al Ba'itha ranges at the 90th percentile meaning that the ore grade is high. Therefore, the EHP resulting from the ore grade is low.	Low	B1= Assessable on the basis of available information.

## Technology



Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Mine type	Open-pit mining on alluvial deposit	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	The extraction of bauxite involves truck & shovel/loader techniques. No auxiliary substances are used (Ma'aden 2019b).	The extracted ore is directly shipped to the refinery in Ras Al Khair. Therefore no auxiliaries are used at Al Ba'itha and a low EHP is awarded (Ma'aden 2019b).	Low	B2 = medium, classified according to measurement instructions

Mining waste	No specific information on Al Ba'itha obtained. Also satellite images have very low resolution and are therefore not suitable for interpretation.	While it remains unclear how the overburden removed is managed, the extracted bauxite ore is transported directly to the refinery and is unlikely to produce significant mining waste. Since no other information is available a Medium EHP is awarded.	Medium	C= No concrete information, no general specifications of the measuring instructions, expert estimation.
Remediation measures	No specific information on Al Ba'itha obtained, apart from a commitment to follow international standards. Financial provisions for rehabilitation are formed (Ma'aden 2019a)	There are no clear indications of any remedial measures being undertaken in parallel to the production. The annual report states financial provisions for rehabilitation. Accordingly, a medium EHP is awarded.	Medium	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 all sub-indicators (earthquakes, flood, landslide, tropical storm, arctic region) is low for all sites of the mining area.	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 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 EHP for water stress is high and the mine is situated in a desert area. Both results alone already determine the high EHP result.	High	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 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

## State Governance

Indicators	
WGI 1 -Voice and Accountability	5.91 <sup>ooo</sup>
WGI 2 -Political Stability and Absence of Violence/ Terrorism	28.57 <sup>ooo</sup>
WGI 3 - Government Effectiveness	64.9 <sup>ooo</sup>
WGI 4 -Regulatory Quality	53.37 <sup>ooo</sup>
WGI 5 - Rule of Law	58.65 <sup>ooo</sup>

WGI 6 -Control of Corruption	65.87 °°°
EPI (Environmental Performance Index)	57.47
EITI membership	No
<b>International Agreements</b>	
ILO 176	No
Others	No significant agreement identified.
<b>Legal framework</b>	



<p>Areas of Law: Environment</p>	<p>The principal environmental legislation is the General Environmental Law (15 October 2001). It is supplemented by Rules for Implementation and The Environmental Protection Standards. Article 13 of the law indicates that all persons engaged in production, servicing, or other activities, shall take the necessary precautions to prevent contamination of surface, ground and coastal waters, that may be caused by solid or liquid residues, to preserve the soil and land, curb its deterioration or contamination, and to limit noise pollution. The Deputy Ministry of Mineral Resources and the Presidency of Meteorology and Environmental Protection are responsible for regulating environmental permitting in respect of mining matters. The law precludes the operation of a mine without an approved EIA, but not necessarily its construction, depending upon the circumstances.</p> <p>Article 5 of the General Environmental Law requires an environmental impact assessment (EIA) to be prepared at the feasibility stage, in respect of projects that cause negative effects on the environment (MineHutte 2019)</p>
<p>Areas of Law: Occupational Health and Safety (OHS)</p>	<p>The Mining Investment Law (2000) provides for the employer to take all precautionary measures to ensure the safety and health of their employees. Additional provisions are given under the Labour Law (2006) pertaining labour conditions in mines &amp; quarries; health and safety are addressed at a general level only (Ministry of Labour Saudi Arabia 2006).</p> <p>No specific mining regulations on health and safety could be identified.</p>

## Corporate Social Responsibility (CSR)

Voluntary Standards	
Aluminium Stewardship Initiative (ASI): Is the mine owning company a member?	No No (ASI 2018) (Alcoa is a member but is not the majority owner)
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 2019)
Towards Sustainable Mining (TSM) Is the mine owning company a member of the Mining Association of Canada (MAC)?	No No (MAC 2019)
Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?	No information available n.d.
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 2018a)
Responsible Mining Index Company indicator „Working conditions“	No No (RMI 2018b)

Responsible Mining Index Company indicator „Environmental sustainability“	No No (RMI 2018b)
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
<b>ISO and CSR reporting</b>	
ISO 14001 (ISO 14004): Is the mine ISO 14001 certified?	Yes Yes (Ma'aden 2019a)
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 information obtained Not mentioned in company documents
<b>Banking Standards</b>	
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.

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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)