

ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Panchpatmali

National Aluminium Co. Ltd (NALCO), India

ID: 86

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>

Panchpatmali

Bauxite

General information	
Indicator or criteria	Description and values
Name of mine	Panchpatmali
Description of mining area	The operations consist of a fully mechanised opencast mine with 6.825 Mt tons of bauxite ore per annum capacity (NALCO 2019a). The bauxite ore is processed by the Alumina Refinery located nearby, and is transported via a 14.6km cable belt conveyor. The minerology is noted as 90% gibbsite (NALCO 2019b). The deposit is known to be a high-level lateritic deposit (Pal et al. 2006).
Surface extension	20.79km ² 20.79 km ² (Image date: 25.03.2019; Viewing height: 4.37 km) (Google Earth)
In operation since	1985 1985, with a new mine reported to be opened within the complex in 2017 (Aluminium Insider 2017)
Operator	National Aluminium Co. Ltd (NALCO)
Owner	National Aluminium Co. Ltd (NALCO)
Closest town	Damanjodi ca. 20km south-west of the mine
Province	Odisha
Country	India
Longitude	18.865923°
Latitude	83.026428°
Altitude	1307 m a.s.l. 1307 m a.s.l.
Main product and by-products	Main product: Bauxite; by-products: None

On-site processing stages	Extracted bauxite ore is shipped via a covered conveyor belt to the refinery 15 km away.
Annual production	6.825 Mt of bauxite in 2018-19 (04/18 – 03/2019) (NALCO 2019a)
Proven Reserves	310 Mt – it is unclear whether these are proven or probable (NALCO 2019b)
Probable Reserves	No information obtained.

Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	No specific information on Panchpatmali obtained. Bauxite is a supergene enrichment of aluminium (Al) forming oxidic ore deposits. 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 tailings ponds and waste piles. In general, AMD requires the presence of sulphide minerals.	Aluminium is a lithophile element and bauxite forms oxidic ore deposits (Dehoust et al. 2017a). Bauxite mining therefore does not produce AMD.	Low	B2 = medium, classified according to measuring instructions
Paragenesis with heavy metals	No specific information on Panchpatmali obtained. Aluminium ores are associated with the heavy metals, chrome, zinc and copper (Dehoust et al. 2017a).	As there is no direct information on the paragenesis with heavy metals available, the measurement instructions are referred to. The extraction of metallic raw materials is often connected to heavy metal- and/or arsenic-related problems.	Medium	B2 = medium, classified according to measurement instructions

		Accordingly, a medium Environmental Hazard Potential is estimated (Dehoust et al. 2017a).		
Paragenesis with radioactive components	No specific information on Panchpatmali obtained.	In accordance with the measuring instructions, bauxite deposits are evaluated with a medium EHP, as no other information is available. This class division is based on average thorium and uranium activity levels in Chinese bauxite deposits (Dehoust et al. 2017a).	Medium	B2 = medium, classified according to measurement instructions
Deposit size	The mine has been in operation since 1985 (NALCO 2019b). Calculating with the current annual production of 4.8 Mt a total of ca. 160 Mt of bauxite has been extracted already. Adding the reserves the deposit adds up to a total of 470 Mt of bauxite.	According to the measurement instructions the deposits size is large (Dehoust et al. 2017a).	High	B1 = medium, can be estimated on the basis of available information
Ore grade	A.Al ₂ O ₃ 45% (Aluminium Insider 2017)	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), which is almost the same grade as at Panchpatmali. Therefore, the EHP resulting from the ore grade is Medium.	Medium	A = high, can be derived directly from available data

Technology



Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
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Mine type	Open cast mine, with the use of rippers where possible instead of blasting. The over burden is noted at 3 m average and ore thickness at 14 m average (NALCO 2018)	Alluvial deposits have shallow depths and large surface areas are disturbed, leading to a High EHP (Dehoust et al 2017).	High	A = high, can be derived directly from available data
Use of auxiliary substances	No use of auxiliary substances is reported.	Extraction of bauxite is based on either rippers or blasting techniques, with the ore being shipped to the refinery (NALCO 2019b).	Low	B1 = medium, can be estimated on the basis of available information
Mining waste	While no waste is generated during extraction (overburden is reused), red-mud that results from the refining process is stored in a tailings storage facility ca. 10 km south west of the mine. Interpretation of Satellite images indicate that the TSF large as defined by ICOLD (NALCO 2018).	The TSF has a large size. Satellite images indicate a dam height of at least 10m and an area 1.5 by 1.5 km. Large Dams according to ICOLD contain more than 3 Million m ³ , which in this case is highly likely. Accordingly, the mining waste management poses a high EHP.	High	B1 = medium, can be estimated on the basis of available information
Remediation measures	The mine reports the removal of overburden during the excavation phase, with the top soil use for reclamation and rehabilitation of mines out areas with vegetation cover (NALCO 2018). 6 million trees have been planted over an area of 3000 ha in the past 15 years (NALCO 2018).	A 100% reuse of top soil and reuse of overburden is reported for backfilling of mined out areas. Parallel remediation is in place. Accordingly, the remediation measures pose a low EHP (NALCO, 2018).	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 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	60.1 ^{ooo}
WGI 2 -Political Stability and Absence of Violence/ Terrorism	14.76 ^{ooo}
WGI 3 - Government Effectiveness	63.94 ^{ooo}
WGI 4 -Regulatory Quality	46.63 ^{ooo}
WGI 5 - Rule of Law	55.29 ^{ooo}
WGI 6 -Control of Corruption	49.52 ^{ooo}
EPI (Environmental Performance Index)	30.57
EITI membership	No
International Agreements	
ILO 176	Not ratified
Others	None noted
Legal framework	

<p>Areas of Law: Environment</p>	<p>The main legislation applicable is the Environmental Protection Act 1986 (“EP Act”), which is read together with the Environment (Protection Rules) 1986 (“EPR”). The Minister for Environment and Forests (“Minister”), with support from the Ministry of Environment and Forest (“MOEF”), administers the EP Act and EPR and are the main decision makers under the act and rule.</p> <p>In 2006, the central government approved the National Environment Policy (“NEP”). In line with the objectives of NEP, the Minister, pursuant to s. 3(1)(v)(2) EP Act along with r. 5(d)(3) EPR, published Notification S.O. 1533 (“Notification”). The Notification introduced restrictions and prohibitions on new projects, which included restrictions on the expansion of existing projects unless approval was obtained first. The schedule to the Notification also defines projects as either falling under Category A or Category B, where Category A projects are approved by the Minister and Category B projects are approved by a duly appointed State Level Environment Impact Assessment Authority (“SEIAA”) with recommendation from a State Expert Appraisal Committee (“SEAC”). As such, over 25 SEIAA’s and SEAC’s have been formed and each consists of a Chairman and five members.</p> <p>As well as the legislative framework outlined above, the Supreme Court of India (“SC India”) ordered the central government to implement an independent national environment regulator by March 31 2014. The mandate requires for offices of National Environmental Appraisal and Monitoring Authority be established in all states to oversee the implementation of projects that impact the country’s environment (MineHutte 2019)</p>
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Areas of Law: Occupational Health and Safety (OHS)	The Mines Act (1952) and Mines Rules (1995) contain provisions for labour welfare and health and safety in mines, providing detailed provisions on: Working conditions; Sanitation provisions; Working hours and Penalties for non-compliance. The Directorate General of Mines Safety acts as the regulatory agency overseeing compliance. There are additional regulations by mining sector for health and safety included in the Coal Mines Regulation (1957), the Metalliferous Mines Regulation (1961), the Mines Vocational Rules (1966) and the Mines Rescue Rules (1985) (Nanda 2019)
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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?	Not applicable Not applicable
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*?	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?	Not applicable Not applicable
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
ISO and CSR reporting	
ISO 14001 (ISO 14004): Is the mine ISO 14001 certified?	Yes Yes (NALCO 2018)

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.

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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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