

# ÖkoRess III

## Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

**Mount Newman Mine**

**BHP Billiton , Australia**

ID: 6

## 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>

# Mount Newman Mine

## Iron ore

General information	
Indicator or criteria	Description and values
Name of mine	Mount Newman Mine
Description of mining area	The mining area is located in Pilbara, a large, dry and thinly populated region in the north of Western Australia. Pilbara is well-known as a resource-rich area for iron ore, base metals and petroleum products (Regional Development Australia Pilbara 2014). The mine comprises the Whaleback orebody as well as satellite orebodies (BHP 2019a p. 238). Smaller orebodies are located in the north and east of Newman. Ore from each of these ore bodies is transported to the Company's "Newman Hub" to be blended, then railed to the port (BHP 2013). The bedded ore types classified as per host Archaean or Proterozoic iron formation, which are Brockman and Marra Mamba (BHP 2019a p. 238).
Surface extension	56.14km <sup>2</sup> 56.14 km <sup>2</sup> (Image date: 21.11.2019; Viewing height: 8.75 km) (Google Earth)
In operation since	1969 Production at Mount Newman began in 1969 with seven different orebodies. Production from Orebodies 31 and 32 started in 2015 and 2017 respectively (BHP 2019a p. 238).
Operator	Mt Newman joint venture
Owner	BHP Billiton
Closest town	Newman (6 km east of mine).
Province	Pilbara region, Western Australia
Country	Australia
Longitude	119.677786°
Latitude	-23.355736°



Altitude	600 m a.s.l. 500-600 m a.s.l. (Google Earth)
Main product and by-products	Main-product: iron ore; by-products: none
On-site processing stages	Newman Hub consist of primary crusher, ore handling plant, heavy media beneficiation plant, stockyard blending facility, single cell rotary car dumper and train load outs (with an annual nominal capacity of 73 Mt). At the Orebody 25, an ore processing plant with an annual nominal capacity of 12 Mt is located (BHP 2019a p. 238).
Annual production	78.8 Mt of iron ore in 2018 (total for all shareholders) (BHP 2018a p. 248).
Proven Reserves	In 2012 proven and probable reserves at Mt Whaleback mines was 760.7 Mt Fe (Brockman and Mara Mamba) (Porter GeoConsultancy n.d.). No information for recent dates could be obtained.
Probable Reserves	In 2012 proven and probable reserves at Mt Whaleback mines was 760.7 Mt Fe (Brockman and Mara Mamba) (Porter GeoConsultancy n.d.). No information for recent dates could be obtained.

## Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	For iron ore mining in the Pilbara region, there is a likelihood of encountering small volumes of potentially (net) acid-forming materials. In the case of Mount Newman, these materials account for up to 10-15 % of mining waste, requiring special waste management procedures to avoid or minimize AMD (Bonstrom et al. 2012).	The results indicate, that the deposits show a low acid mine drainage risk, however some pose a moderate risk. According to (Bonstrom et al. 2012) present rock types pose an AMD risk but are unlikely to be exposed during operations. Iron is a siderophil element and presence of sulfidic ores cannot be completely excluded, therefore AMD poses a medium environmental hazard potential (EHP).	Medium	B1 = medium, can be estimated on the basis of available information

Paragenesis with heavy metals	No indication of paragenesis with heavy metals could be determined.	Mining of metals generally poses a certain risk to contamination with heavy metals, accordingly the EHP is medium.	Medium	B2 = medium, classified according to measurement instructions
Paragenesis with radioactive components	No indication of paragenesis with thorium (Th) and uranium (U) could be determined.	In accordance with the measurement instructions, iron ore deposits are evaluated with a medium EHP, if no other information is available.	Medium	B2 = medium, classified according to measurement instructions
Deposit size	The reserves in BHP Billiton's annual report are aggregate numbers for all their Australian operations. In 2012 secondary sources stated 760.7 Mt Fe as total reserves (Porter GeoConsultancy n.d.).	By adding 43 years of production with approximately 70 Mt of ore per year to the reserves would equal to a total of 2,596.8 Mt iron content. According to the measurement instructions a deposit size of about 2,600 Mt iron content is classified as large. In this case a high EHP is assigned.	High	B2 = medium, classified according to measurement instructions
Ore grade	BHP (2019a p. 262) indicates an average grade of 61 % Fe across all its WAIO sites (Western Australia Iron Ore).	Iron ore with grades over 60 % as high grade deposits (Priester et al. 2019). Accordingly, the EHP potential caused by the ore grade is 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	Open-pit, hard rock mining (BHP 2019a p. 238).	Open-pit mines are usually limited to an area that is only slightly larger than the projection of the deposit body to the surface. Accordingly, the EHP resulting from the mining method is medium.	Medium	A = high, can be derived directly from available data
Use of auxiliary substances	BHP indicates that at each mining hub (Newman, Yandi, Mining Area C and Jimlebar) ore is crushed, beneficiated and blended to create high-grade hematite lump and fines products. Primary crushers, ore handling plants and stockyard blending facility are in operation. No specification is made with respect to what "ore handling" consists of (BHP 2019a p. 55).	Based on the evaluated literature it is unclear, whether processing at Newman includes auxiliary materials. As a conservative estimate a medium EHP is indicated according to the default recommendation.	Medium	C = low, no concrete information, no general specifications in the measuring instructions, (expert) estimate
Mining waste	Overburden generated during mining operations at the open pits is currently placed in out-of-pit overburden storage areas (OSA). BHP tries to minimise the size of the OSAs by increasing the amount of overburden material used to infill final voids (BHP 2013b). The total amount of overburden and waste rock is estimated to reach more than 4 billion tonnes by the end of mining operations at Mount Newman, which is expected post 2030 (Bonstrom et al., 2012). The volume of the Whaleback Tailings Storage Facilities (TSF) is 23 million m <sup>3</sup> , with a maximum height of 25 m (BHP 2019b).	According to the definition of the ICOLD (2018) at least one of the tailings storage facilities is very likely to be large. Accordingly the EHP resulting from waste management is high.	High	B1 = medium, can be estimated on the basis of available information
Remediation measures	BHP's general comment on remediation measures at their mine sites is that they provide for operational closure and site	The EHP is evaluated as low due to the reclamation and compensation	Low	B1 = medium, can be estimated on the basis of

	<p>rehabilitation and that their operating and closed facilities are required to have closure plans. This includes an internal audit function which tests their effectiveness (BHP 2018). According to BHP's Iron Ore Rehabilitation Standard, the intent for rehabilitation in the Pilbara region is aimed at habitat reconstruction, soil development, and ecosystem establishment. It is also acknowledged that in most cases of iron ore mining in Pilbara, mainly due to large scale operations, the opportunities to restore mined land to pre-disturbance conditions are limited. Thus, the focus of rehabilitation is in re-integrating the disturbed areas with the surrounding environment to create habitats that are appropriate to the location and can sustain over time (BHP 2011).</p>	<p>activities concomitantly to the mining process.</p>		<p>available information</p>
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## Framework conditions natural environment



Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
<p>Accident hazard due to floods, earthquake, storms, landslides</p>	<p>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</p>	<p>For Mount Newman mine there is a medium EHP for tropical storms and earthquakes which determines the evaluation result. The EHP for the other sub-indicators is low.</p>	<p>Medium</p>	<p>A = high, can be derived directly from available data</p>

	is determined by the highest hazard level of the sub-indicators.			
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 mine is situated in a desert area which results in a high EHP.	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 mine 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 <sup>ooo</sup>
WGI 2 -Political Stability and Absence of Violence/ Terrorism	77.62 <sup>ooo</sup>
WGI 3 - Government Effectiveness	92.31 <sup>ooo</sup>
WGI 4 -Regulatory Quality	98.08 <sup>ooo</sup>

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

<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?	Not applicable Not applicable
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?	Yes Yes (ICMM 2019)
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?	No No (RMI 2018a)
Responsible Mining Index Company indicator „Working conditions“	0.550 0.550 (RMI 2018b)

Responsible Mining Index Company indicator „Environmental sustainability“	0.480 0.480 (RMI 2018b)
Responsible Steel (RS): Is the mine owner a member of the RS?	No No (Responsible Steel 2019)
Responsible Steel (RS): Is the mine certified?	No No (Responsible Steel 2019)
Australian Steel Stewardship Forum (ASSF): Is the owner a member of the ASSF?	Yes Yes (ASSF 2018)
Australian Steel Stewardship Forum: Is the mine certified?	No information obtained No information obtained (ASSF 2018)
<b>ISO and CSR reporting</b>	
ISO 14001 (ISO 14004): Is the mine ISO 14001 certified?	Yes BHP environmental management based on ISO14001 (BHP 2019a)
CSR-directive 2014/95/EU: Does the mine owning company have its headquarters in an EU country?	Yes Yes (London & Melbourne)
OECD Guidelines: Does the company have its headquarters in a signatory state?	Yes Yes
ISO 26000: Does the mine implement ISO 26000?*	No information obtained No information available
<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 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.

## Sources

- ASSF (2018): ASSF Membership. In: Australian Steel Stewardship Forum. <http://steelstewardship.com/membership/>. (13.05.2019).
- BHP (2011): Iron Ore Rehabilitation Standard. Number: 0001074. Version: 2.0. S. 16.
- BHP (2013): BHP Billiton Iron Ore Western Australian Overview. <http://www.companydirectors.com.au/Events/Events-Calendar/WA/~media/Resources/Events/WA/PDFs/BHP%20Billiton%20Iron%20Ore%20Brochure.ashx> (12.08.2019).
- BHP (2018a): Annual Report 2018. <https://www.bhp.com/-/media/documents/investors/annual-reports/2018/bhpannualreport2018.pdf> (12.08.2019).
- BHP (2018b): Annual Report 2017. <https://www.bhp.com/-/media/documents/investors/annual-reports/2017/bhpannualreport2017.pdf?la=en> (12.08.2019).
- BHP (2019): Tailings Facilities Disclosure: Response to the Church of England Pensions Board and the Council on Ethics Swedish National Pension Funds. [https://www.bhp.com/-/media/documents/environment/2019/190607\\_coe.pdf?la=en](https://www.bhp.com/-/media/documents/environment/2019/190607_coe.pdf?la=en) (12.08.2019).
- Dehoust, G.; Manhart, A.; Möck, A.; Kießling, L.; Vogt, R.; Kämper, C.; Giegrich, J.; Auberger, A.; Priester, M.; Rechlin, A.; Dolega, P. (2017a): Erörterung ökologischer Grenzen der Primärrohstoffgewinnung und Entwicklung einer Methode zur Bewertung der ökologischen Rohstoffverfügbarkeit zur Weiterentwicklung des Kritikalitätskonzeptes (ökoRess I) - Konzeptband. Umweltbundesamt, Dessau-Roßlau.
- Dehoust, G.; Manhart, A.; Möck, A.; Kießling, L.; Vogt, R.; Kämper, C.; Giegrich, J.; Auberger, A.; Priester, M.; Rechlin, A.; Dolega, P. (2017b): Erörterung ökologischer Grenzen der Primärrohstoffgewinnung und Entwicklung einer Methode zur Bewertung der ökologischen Rohstoffverfügbarkeit zur Weiterentwicklung des Kritikalitätskonzeptes (ökoRess I) - Methode für einen standortbezogenen Ansatz. Umweltbundesamt, Dessau-Roßlau.
- EITI (2016): EITI welcomes Australia implementing the EITI. <https://eiti.org/news/eiti-welcomes-australia-implementing-eiti>. (16.04.2019).
- EPI (2018): EPI Results. In: Environmental Performance Index (EPI). <https://epi.envirocenter.yale.edu/epi-topline>. (26.11.2018).
- ICMM (2019): Member companies. In: International Council on Mining and Metals (ICMM). <https://www.icmm.com/en-gb/members/member-companies>. (16.04.2019).

- ICOLD (2018): World Register of Dams - General Synthesis. In: International Commission on Large Dams (ICOLD). [https://www.icold-cigb.org/GB/World\\_register/general\\_synthesis.asp](https://www.icold-cigb.org/GB/World_register/general_synthesis.asp). (12.06.2019).
- ILO (2017): Ratifications of C176 - Safety and Health in Mines Convention, 1995 (No. 176). In: International Labour Organization (ILO). [http://www.ilo.org/dyn/normlex/en/f?p=1000:11300:0::NO:11300:P11300\\_INSTRUMENT\\_ID:312321](http://www.ilo.org/dyn/normlex/en/f?p=1000:11300:0::NO:11300:P11300_INSTRUMENT_ID:312321). (12.04.2018).
- IRMA (2018): Responsible Mining Map. In: Initiative for Responsible Mining Assurance (IRMA). <https://map.responsiblemining.net/>. (16.04.2019).
- OECD (n.d.): OECD Countries. <http://www.oecd.org/>. (12.09.2019).
- Pfister, S.; Koehler, A.; Hellweg, S. (2009): Assessing the Environmental Impacts of Freshwater Consumption in LCA. In: Environmental science & technology. Vol. 43, No.11, S. 4098–4104.
- Porter GeoConsultancy (n.d.): Mt Whaleback Western Australia, WA, Australia. <http://www.portergeo.com.au/database/mineinfo.asp?mineid=mn319>.
- Priester, M.; Ericsson, M.; Dolega, P.; Löf, O. (2019): Mineral Grades: An important indicator for environmental impact of mineral exploitation. In: Mineral Economics. Raw Materials Report. Springer Nature Vol. 32, No.2, S. 127–256.
- Regional Development Australia Pilbara (2014): The Pilbara - Resource and Beyond.
- Responsible Steel (2019): Members and Associates. <https://www.responsiblesteel.org/membership/members-and-associates/>. (07.01.2019).
- RMI (2018a): Companies. In: Responsible Mining Index (RMI). </en/companies/29>. (16.04.2019).
- RMI (2018b): Arcelor Mittal - Company report. In: Responsible Mining Index (RMI). <https://responsibleminingindex.org/en/companies/4>. (07.01.2019).
- WGI (2019): The Worldwide Governance Indicators (WGI). The World Bank. <http://info.worldbank.org/governance/WGI/#home>. (10.12.2018).
- Woods, G.; Rifici, M. (2018): Australia: Mining Law 2019. In: The International Comparative Legal Guide to: Mining Law 2019.

## 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)