

ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

**Mount ISA Copper
Glencore, Australia**

ID: 66

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>

Mount ISA Copper

Copper

General information 	
Indicator or criteria	Description and values
Name of mine	Mount ISA Copper
Description of mining area	The mineralisation generally occurs as breccia hosted massive to disseminated chalcopyrite in 'silica dolomite' altered pyritic dolomitic siltstone. The Mount Isa hosts one of Australia's deepest underground copper mine at 1,900 m. The copper mine complex has two plants: 1 copper concentrator (7.2 Mt/annum capacity) and 1 copper smelter (300,000 t/annum capacity) (Glencore 2019a; Mining Technology 2019; Mount Isa Mines 2019a) Glencore's Mount Isa Zinc, Lead and Silver are a separate mining and processing stream. (Mount Isa Mines 2019b)
Surface extension	34.93km ² 34.93 km ² (Image date: 12.08.2019; Viewing height: 11.42 km) (Google Earth)
In operation since	1924 1924 (Glencore 2019a)
Operator	Mount Isa Mines
Owner	Glencore
Closest town	Mount Isa is a mining town is located in direct vicinity west of the Mount Isa mine complex
Province	Queensland
Country	Australia
Longitude	139.45144°
Latitude	-20.75428°


Altitude	405 m a.s.l. 405 m a.s.l.
Main product and by-products	Main Products: Copper; by-product: none
On-site processing stages	Copper ore is processed and smelted on site before being transported via rail to the copper refinery (Glencore 2019a)
Annual production	217,537 t cathode and copper in concentrates (Reports for Mount Isa Mines + Ernest Henry Mining) (Glencore 2019a) [annual report also does not provide disaggregated figures]
Proven Reserves	Enterprise: 12.4 Mt copper ore (2.17 % Cu grade); X41: 5.1 Mt copper ore (1.79 % Cu grade) (Glencore 2018)
Probable Reserves	Enterprise: 3.6 Mt copper ore (2.44 % Cu grade); X41: 13.2 Mt copper ore (1.71 % Cu grade) (Glencore 2018)

Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	The shared tailings from the Mount Isa mine (Cu and Zn/Pb) have been classified as potentially acid forming. Testing indicates that the tailings are likely to remain non-acid forming for 7 years under aerial exposure. As the acid neutralising capacity (ANC) is depleted, elevated concentrations of sulfates, manganese and zinc may occur (Landers et al. 2016).	Tailings are classified as potentially acid forming. Moreover, copper is a chalcophile element resulting in a high EHP for acid mine drainage.	High	A = high, can be derived directly from available data
Paragenesis with heavy metals	The Mount Isa ore body comprises both copper as well zinc and lead, with issues of high lead in local water reported over a period of time (ABC News 2018)	The presence of copper and lead in the mineralisation, lead to a High EHP rating.	High	A = high, can be derived directly from available data

Paragenesis with radioactive components	No indication of paragenesis with thorium and uranium could be determined in company documents. However, the ore body is located in a region with known uranium deposits (Wilde et al. 2013)	No concrete information on radiation at Mount Isa could be obtained. Since the region hosts uranium deposits a medium EHP is estimated.	Low	B1 = Assessable on the basis of available information.
Deposit size	The mine opened in 1924 (Glencore 2019a). Assuming half of the current production (ca. 100 kt Cu) for the first 50 years of operation and current production (ca. 200 kt Cu) for the rest, a total of ca. 14 Mt of copper have been produced. Adding the reserves the deposit size adds up to 15 Mt of copper (Glencore 2018, 2019a)	According to the measurement instructions, the deposit is considered very large and therefore is awarded a High EHP.	High	A = high, can be derived directly from available data
Ore grade	Enterprise: 2.17 % Copper X41: 1.79 % Copper (Glencore 2018)	According to Priester et al, the copper grade is designated as average for both mines, therefore a Medium EHP is awarded (Priester et al. 2019).	Medium	A = high, can be derived directly from available data

Technology 				
Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Mine type	Underground – sub-level stoping. Both mines in this complex are underground (Glencore 2019a)	Underground mining operations disturb a rather small surface area compared to other types of mining. Accordingly the	Low	A = high, can be derived directly from available data

		EHP resulting from the mining method is low.		
Use of auxiliary substances	The crushed ore is fed through a number of ball mills, and mixed with water and reagents and fed into the concentrators flotation circuits. (Mount Isa Mines 2019c)	Generally, flotation is conducted with the help of toxic additives such as organic hydrocarbons. Therefore, a High EHP exists here.	High	B1 = medium, can be estimated on the basis of available information
Mining waste	Mount Isa Copper shares a tailings storage facility with the zinc/lead mine; a 12.3 km multi-cell valley fill tailings storage facility (Forsyth 2014).	Due to the size of the TSF is highly likely that it contains more than 3 million m ³ of material and is therefore defined as a large dam by ICOLD. Accordingly, the mining waste management poses a high EHP.	High	B1 = medium, can be estimated on the basis of available information
Remediation measures	While a mine closure plan is said to be in place (Xstrata 2009) no details for these plans could be identified. (Landers et al. 2016) in reviewing the approach being implemented by the complex, conclude that it will provide a robust, reliable and transparent method of timing and cost of construction and the probable performance of the earthen soil cover. Under Queensland environmental legislation, the company would have submitted a financial assurance arrangement to continue its operations. Financial provisions for rehabilitation are stated in the annual report (Glencore 2019b)	While a coherent closure plan could not be identified, given the operation is located in a highly governed region, it is reasonable to assume the closure plan and financial assurances are in place. No information on remediation measures in parallel to mining have been identified, Therefore, 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 (Dehoust et al. 2017a)). Metrics are directly taken from the given risk assessment. The indicator total is determined by the highest hazard level of the sub-indicators.	The water stress for the mining area is low and is not situated in a desert area, which results in 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 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 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
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 water stress for the mining area is low and is not situated in a desert area, 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 ^{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	
Areas of Law: Environment	<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>
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Corporate Social Responsibility (CSR)

Voluntary Standards	
<p>Aluminium Stewardship Initiative (ASI): Is the mine owning company a member?</p>	<p>No No (ASI 2019)</p>
<p>Aluminium Stewardship Initiative (ASI): Is the mine certified?</p>	<p>Not applicable Not applicable</p>
<p>International Council of Mining & Metals (ICMM): Is the mine owning company a member?</p>	<p>Yes Yes; Joined 2014 (ICMM 2019)</p>
<p>Towards Sustainable Mining (TSM) Is the mine owning company a member of the Mining Association of Canada (MAC)?</p>	<p>Yes Yes (MAC - The Mining Association of Canada 2019)</p>
<p>Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?</p>	<p>No information available No indication found in company documents.</p>

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?	No information available No information available.
Responsible Copper (RC): Is the mine certified?	No information available No information available.
Responsible Mining Index (RMI): Has the mine been rated?	Yes Yes (RMI 2018a)
Responsible Mining Index Company indicator „Working conditions“	0.601 0.601/1.100 (RMI 2018b)
Responsible Mining Index Company indicator „Environmental sustainability“	0.497 0.497/1.00 (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?	No information obtained No documentation could be found.

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 No
Banking Standards	
WB Standards / IFC Performance Standards: Is the mine financed to a major extend by the world bank?	No No
Equator Principles (EP): Is the mine financed to a major extend by a bank adherent to the EP?	No No

*by companies own account.

Sources

ABC News (2018): Mount Isa children continue to live with high levels of lead, alarming parents and expert. <https://www.abc.net.au/news/2018-06-17/mount-isa-children-live-with-high-levels-of-lead/9865676>. (21.11.2019).

ASI (2019): Aluminium Stewardship Initiative - Certified Members. In: Aluminium Stewardship Initiative. <https://aluminium-stewardship.org/asi-certification/asi-certified-members/>. (17.05.2019).

- 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 (ökoRes 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 (ökoRes I) - Methode für einen standortbezogenen Ansatz. Umweltbundesamt, Dessau-Roßlau.
- EITI (2019): EITI Countries. In: Extractive Industries Transparency Initiative. <https://eiti.org/countries>. (16.04.2019).
- EPI (2018): EPI Results. In: Environmental Performance Index (EPI). <https://epi.envirocenter.yale.edu/epi-topline>. (26.11.2018).
- Forsyth, B. (2014): Understanding the Long-term Seepage Geochemistry of Base Metal Mine Tailings in a Semiarid Subtropical Climate, Mount Isa, Australia.
- Glencore (2018): Resources & Reserves Report 2018. https://www.glencore.com/dam/jcr:ae4466b4-7ef4-4407-ae00-6ca55b694028/GLEN_2018_Resources_Reserves_Report-.pdf (05.11.2019).
- Glencore (2019a): Copper. <https://www.glencore.com.au/en/who-we-are/metals-and-minerals/Pages/copper.aspx>. (21.11.2019).
- Glencore (2019b): Annual Report 2018. <https://www.glencore.com/dam/jcr/b4e6815b-3a2c-43ca-a9ef-ef606bb3c1/glen-2018-annual-report--.pdf>. (05.11.2019).
- ICMM (2019): Member companies. In: International Council on Mining and Metals (ICMM). <https://www.icmm.com/en-gb/members/member-companies>. (16.04.2019).
- ILO (2017): Ratifications of C176 - Countries that have not ratified this Convention. In: International Labour Organization (ILO). https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11310:0::NO:11310:P11310_INSTRUMENT_ID:312321:NO. (05.11.2019).
- IRMA (2018): Responsible Mining Map. In: Initiative for Responsible Mining Assurance (IRMA). <https://map.responsiblemining.net/>. (16.04.2019).
- Landers, M.; Maddocks, G.; Nucifora, C.; Mandaran, K.; Jones, J.; Forbes, A.; Wilson, W.; Newman, S. (2016): Mount Isa Mines Rehabilitation Material Sampling and Analysis Program for Closure Planning. https://www.imwa.info/docs/imwa_2018/IMWA2018_Landers_21.pdf (21.11.2019).
- MAC - The Mining Association of Canada (2019): Our Members.
- Mining Technology (2019): Mount Isa Copper Mine. https://www.mining-technology.com/projects/mount_isa_copper/ (21.11.2019).
- Mount Isa Mines (2019a): Copper in Mount Isa. <https://www.mountisamines.com.au/en/about-mim/copper/Pages/Copper-in-Mount-Isa.aspx>. (21.11.2019).
- Mount Isa Mines (2019b): About Mount Isa. <https://www.mountisamines.com.au/en/about-mim/Pages/home.aspx>. (21.11.2019).

Mount Isa Mines (2019c): The mining process. <https://www.mountisamines.com.au/en/about-mim/copper/Pages/The-mining-process.aspx>. (21.11.2019).

OECD (2019): Member Countries. In: Organisation for Economic Co-operation and Development (OECD). <https://www.oecd.org/about/members-and-partners/>. (05.11.2019).

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.

RMI (2018a): Mine Sites. In: Responsible Mining Index (RMI). </en/mine-sites>. (30.10.2019).

RMI (2018b): Glencore - Company report. In: Responsible Mining Index (RMI). </en/companies/17>. (13.06.2019).

Safe Work Australia (2018): Glossary | Safe Work Australia. https://www.safeworkaustralia.gov.au/glossary#model_WHS_Act. (20.08.2019).

WGI (2018): The Worldwide Governance Indicators (WGI). The World Bank. <http://info.worldbank.org/governance/WGI/#home>. (10.12.2018).

Wilde, A.; Otto, A.; Jory, J.; MacRae, C.; Pownceby, M.; Wilson, N.; Torpy, A. (2013): Geology and Mineralogy of Uranium Deposits from Mount Isa, Australia: Implications for Albitite Uranium Deposit Models. In: Minerals. Vol. 3, No.3, S. 258–283.

Woods & Rifici (2018): Australia: Mining Law 2019. In: International Comparative Legal Guides (ICLG) International Business Reports. Text, <https://iclg.com/practice-areas/mining-laws-and-regulations/australia>. (18.04.2019).

Xstrata (2009): Xstrata Mount Isa Mines Sustainability Report 2009. [https://www.mountisamines.com.au/en/publications/SustainabilityReports/2009_Mount_Isa_Mines_SD_Report\[1\].pdf](https://www.mountisamines.com.au/en/publications/SustainabilityReports/2009_Mount_Isa_Mines_SD_Report[1].pdf) (21.11.2019).

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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