

ÖkoRess III

Pilot Screening of Environmental Hazard Potentials of Mine Sites

Factsheet:

Antapaccay Copper Mine

Glencore, Peru

ID: 65

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>

Antapaccay Copper Mine

Copper

General information



Indicator or criteria	Description and values
Name of mine	Antapaccay Copper Mine
Description of mining area	The Antapaccay copper mine is an expansion project of the Tintaya copper operation, located in the Yauri district of Espinar Province in southern Peru (Mining Technology n.d.). Including 13 mining concessions, the project extends ca. 8,000 ha (Franco Nevada, p. 20-21). The Espinar province is part of the southern highlands of Peru. This region is characterized by Puna grasslands and a two-season climate with heavy rainfalls in winter (Encyclopædia Britannica 2020). Antapaccay is a Cu-Au porphyry deposit within the Tintaya district and contains high-grade zones of Cu-Ag skarn and a Cu-Au-Ag-Pb-Zn-Mo mineralisation (Porter GeoConsultancy 2015). Dominant minerals of the porphyry are chalcopyrite, bornite and chalcocite (Franco Nevada 2018 p. 21).
Surface extension	32.62km ² 32.62 km ² (Image date: 22.7.2019; Viewing height: 12.94 km) (Google Earth)
In operation since	2012 2012 (Mining Technology n.d.)
Operator	Compania Minera Antapaccay S.A
Owner	Glencore
Closest town	Espinar, roughly 16 km northwest of the min (Google Maps)
Province	Espinar Province
Country	Peru
Longitude	-71.31333°
Latitude	-14.90833°

Altitude	4100 m a.s.l. 4100 m a.s.l. (Mining Technology n.d.)
Main product and by-products	Main product: copper (Cu); by-products: gold (Au), silver (Ag) (Glencore 2019 p. 222)
On-site processing stages	Milling, flotation (Mining Technology n.d.)
Annual production	205,400 t of copper, 132 koz of gold and 1,523 koz of silver in 2018 (Glencore 2019 p. 222)
Proven Reserves	257 Mt with an average ore grade of 0.42% of copper (Glencore 2018 p. 12)
Probable Reserves	201 Mt with an average ore grade of 0.52% of copper (Glencore 2018 p. 12)

Geology



Indicator or criteria	Description and values	Explanation	Assessment result	Data quality
Preconditions for acid mine drainage (AMD)	The chalcophile metal Copper is mainly extracted from sulphidic deposits, which pose a high risk for AMD. The Antapaccay deposit is a sulphidic deposit and therefore, particularly prone to AMD (Geosysint n.y.).	The extraction of sulphidic minerals has a high environmental hazard potential with regard to AMD.	High	A = high, can be derived directly from available data
Paragenesis with heavy metals	Mineralization at Antapaccay is associated with heavy metals: Cu, Pb, Zn (Porter Geoconsultancy 2015)	Copper is a heavy metal itself. The extraction of copper is consequently always evaluated with a high environmental hazard potential (EHP). Furthermore, the zinc and lead paragenesis underlines the assessment result.	High	A = high, can be derived directly from available data

Paragenesis with radioactive components	No indication of paragenesis with thorium (Th) and uranium (U) could be determined.	In accordance with the measurement instructions, copper ore deposits are evaluated with a medium EHP, if no other information is available.	Low	B2 = medium, classified according to measurement instructions
Deposit size	458 Mt total reserve with an average copper grade of 0.46 % leads to a total copper content of 2.1 Mt (Glencore 2018, p. 12)	1.2 Mt of copper have been mined since the mine was commissioned (2012, production reports). Combined with the current metal content of the reserve, the deposit size is approximately 3.3 Mt. The deposit is classified as large sized and, hence, is evaluated with a high EHP.	High	A = high, can be derived directly from available data
Ore grade	0.46% Cu (Glencore 2018, p. 12)	With a copper content of 0.46 %, the deposit can be assessed as low grade deposit.	Medium	A = high, can be derived directly from available data

Technology 				
Indicator or criteria	Description and values	Explanation	Evaluation result	Data quality
Mine type	Conventional open pit hard rock mining (Mining Technology n.y.)	Conventional solid rock open pit mining is evaluated with a medium EHP. During open pit mining in solid rocks, the mining activities are restricted to the horizontal and vertical extension of the	Medium	A = high, can be derived directly from available data

		ore body/mineralized zone. The impact is higher than in underground mining but less pronounced than in mining of alluvial or unconsolidated sediments.		
Use of auxiliary substances	Trucks and Shovels are used to extract the ore at Antapaccay. The processing plant includes a grinding mill and two ball mills to prepare the feed for a conventional flotation circuit. Copper concentrate from Antapaccay and Tintaya is thickened and prepared for transportation to the port facilities of Matarani, ca 355km distant to the mine site (Franco Nevada 2018, p. 20-21)	Flotation is often conducted with the help of toxic additives such as organic hydrocarbons, leading to a high EHP in the evaluation result.	High	A = high, can be derived directly from available data
Mining waste	Antapaccay's tailings are stored in three different tailing storage facilities, one of which is currently being actively used. The "Tintaya Pit TSF (Pit Dam)" is currently used to storage tailings from Antapaccay and has a dam height of 30m and a Storage Impoundment Volume of 160 Mm ³ . The Ccamacmayo TSF and Huinipampa dam are two additional tailing ponds, which are no longer used by Antapaccay (Glencore 2019a).	The storage of tailings inside the pit is evaluated with low EHP according to the measurement instructions. However, since waste and residues have already been stored in large-volume tailing ponds in Antapaccay, this indicator is evaluated with a high EHP.	High	B = medium, classified according to measurement instructions
Remediation measures	As an expansion project, Antapaccay is part of the Tintaya mine and its closure and reclamation plan. The plan was approved in 2011 and includes recovering and revegetation plans. Reclamation of closed tailing facilities as the Huinipampa TSF are conducted concomitantly to the mining activities (Glencore 2013)	The EHP is determined as low due to the ongoing recultivation and compensation activities concomitantly to the mining process.	Low	B = medium, classified according to measurement instructions

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. 2017)). Metrics are directly taken from the given risk assessment. The indicator total is determined by the highest hazard level of the sub-indicators.	For the Antapaccay mine there is a medium EHP for earthquakes and landslides which determines the evaluation result. The EHP for the other sub-indicators is low.	Medium	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 water stress for the mining area is low and the mine is not situated in a desert area, 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 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	55.17 ^{ooo}
WGI 2 -Political Stability and Absence of Violence/ Terrorism	36.19 ^{ooo}
WGI 3 - Government Effectiveness	48.56 ^{ooo}
WGI 4 -Regulatory Quality	67.3 ^{ooo}
WGI 5 - Rule of Law	33.17 ^{ooo}
WGI 6 -Control of Corruption	38.94 ^{ooo}
EPI (Environmental Performance Index)	61.92
EITI membership	Yes
International Agreements	
ILO 176	Yes

Others	No further information obtained.
Legal framework	
Areas of Law: Environment	<p>Peru has a detailed and elaborate environmental legislation in the resource sector. Significant laws are the General Environmental Law (GEL), the Environmental Impact Assessment (EIA) Law and the Environmental Regulation for mining and exploration activities, among others (see Minehutte n.y. for more information).</p> <p>An EIA needs to be carried out for all activities that may lead to significant impact on the environment. Activities are categorized, according to their foreseen impact. For activities with a middle to high environmental impact, detailed planning is required, including but not limited to management, abandonment, citizen participation and monitoring. Each stage of exploration and exploitation requires a specific type of consent, including environmental consent and public hearings (Minehutte n.y).</p> <p>The Ministry of Energy and Mines (MINEM) is the main competent authority for mining and mineral exploration – also for environmental matters. Nonetheless, several more state bodies play a role. Depending on the level of environmental impact, the competent authorities for the approval of an EIA may also be the National Environmental Certification Service for Sustainable Investments (SENACE), or the regional government, for instance (see Minehutte n.y. for more information).</p> <p>The Ministry of Energy and Mines (MINEM) is the main competent authority for mining and mineral exploration – also for environmental matters. Nonetheless, several more state bodies play a role. Depending on the level of environmental impact, the competent authorities for the approval of an EIA may also be the National Environmental</p>

	<p>Certification Service for Sustainable Investments (SENACE), or the regional government, for instance (see Minehutte n.y. for more information).</p>
<p>Areas of Law: Occupational Health and Safety (OHS)</p>	<p>Peru has ratified the ILO Convention 176 on Safety in Health on Mines in June 2008 and subsequently adopted the Supreme Decree No. 024-2016-MS for the Regulation of Occupational Safety and Health in Mining. The Decree applies to mining as much as activities related to the mining sector, such as civil constructions, machinery, equipment and mechanical maintenance (MDNP 2018). The legislation on occupational health and safety (OHS) concerns minimum wages, medical tests and occupational safety for miners (ICGL n.y.). The Ministerio de Energía y Minas (MINEM) is the competent authority for OHS matters (MDNP 2018). ICGL additionally names the Organismo Supervisor de la Inversión en Energía y Minería (Osinermin), the superintendencia nacional de fiscalización laboral (SUNAFIL) and the ministry of labour and employment.</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 2017)
Towards Sustainable Mining (TSM) Is the mine owning company a member of the Mining Association of Canada (MAC)?	Yes Yes (Glencore Canada) (MAC 2018)
Towards Sustainable Mining (TSM) outside Canada: Are TSM standards implemented*?	No information available No information obtained
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 2018)
Responsible Mining Index Company indicator „Working conditions“	0.601 0.601/ 1.000 (RMI 2018)

Responsible Mining Index Company indicator „Environmental sustainability“	0.497 0.497/ 1.000 (RMI 2018)
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 (Seguridad Minera 2016)
CSR-directive 2014/95/EU: Does the mine owning company have its headquarters in an EU country?	No No (Switzerland) (RMI n.y.)
OECD Guidelines: Does the company have its headquarters in a signatory state?	Yes Yes (Switzerland) (RMI n.y.)
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 No
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

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- Öko-Institut e.V. (Institute for Applied Ecology)