Environmental Product Declaration

In accordance with UNE-EN ISO 14025:2010 and RCP 2021:03 V1.1 for:

Anhydrous sodium sulphate

COMPAÑIA MINERA RÍO TIRÓN, S.A.U.

(GRUPO INDUSTRIAL CRIMIDESA)

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-03376
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ÍNDICE

1. PROGRAMME INFORMATION

Programme	The International EPD® System EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden www.environdec.com info@environdec.com
Product category rules (PCR)	Basic chemicals. 2021:03, Version 1.1. Product category classification: UN CPC Group 324 Basic inorganic chemicals
PCR review was conducted by	International EPD® System Technical Committee President: Lars-Gunnar Lindfors There is a whole list of members in: www.environdec.com Contact: info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006	☐ EPD process certification ☒ EPD verification
Third party verifier	Elisabet Amat, GREENIZE eamat@greenize.es Approved by The International EPD® System
Procedure for follow-up data during EPD validity involves third party verifier	☒ Yes ☐ No

- The EPD owner has the sole ownership, liability, and responsibility for the EPD.
- EPDs within the same product category but from different programmes may not be comparable.
- Geographical scope of the EPD: Global.
- Reference year of the data used in the EPD: 2019.

2. COMPANY INFORMATION

Owner of the EPD: **COMPAÑÍA MINERA RÍO TIRÓN S.A.U. (CMRT)**

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Description of the organisation:

COMPAÑÍA MINERA RÍO TIRÓN, S.A.U., was founded in 1954 to mine a glauberite deposit with huge reserve potential. Located in Cerezo de Río Tirón in Burgos province, it is one of the pioneer companies in the extraction, processing and trading of 99% high purity anhydrous sodium sulphate (ASS). Experience, throughout a long-established trajectory, has made it a leading company, which has continuously been improving mining production and extraction techniques. The company continues to upgrade in key aspects of product manufacturing processes, such as health and safety, efficiency, sustainability and social and environmental respect, among others.

CMRT is part of **GRUPO INDUSTRIAL CRIMIDESA, S.L.,** (Crimidesa Industrial Group) which is formed by the following companies:

compañía minera río tirón	Glauberite mining and ASS production.
crimidesa maroc	Sodium feldspar mining in Morocco.
compañía minera ilustración	Wollastonite mining in Salamanca, Spain.
excavaciones castilla	Specialised in earth-moving services.
greenmowers	Machinery for golf courses and green areas.
enercrisa	Cogeneration plant (CRIMIDESA owns a 50% stake)

GRUPO INDUSTRIAL CRIMIDESA's objective is to manage the natural resources at our disposal under solid principles of responsibility and sustainability and with the utmost respect for the natural and social environment. Our goal is to be a source of wealth in the region and provide our customers the best product with the best service. Some key issues in this policy are: compromise, health and safety, quality, reliability and sustainability.

CMRT produces ASS from glauberite by a concentration process which takes place in in-situ treatment plants. This process uses steam produced in an adjacent cogeneration plant, which also supplies energy that is sent to the electric network.

The current ASS production capacity is over 750,000 tons per year and 95% of this production is exported to more than 50 countries, making **CMRT** the largest European manufacturer and the world's leading exporter of natural-origin anhydrous sodium sulphate extracted from an open pit glauberite deposit.

CMRT is proud to be the first mining company in Spain to obtain **ISO 14001** environmental certification in 1999. **CMRT** was also the first mining company in Spain to get energy certification **ISO 50001,** in 2018, and the second one to get certification OSHAS 18001. This is currently replaced by certification **ISO 45001. CMRT** also holds quality certification **ISO 9001** and feed certification **FAMI QS.**

Our firm commitment for a sustainable environmental improvement can be verified in the systematic tailing reclamation processes, considering the landscaping criteria in the region. This commitment is also sustained through the implementation of an ambitious CO_2 absorption project by planting more than 2,500 holm oaks in a restored tailing pond.

3. PRODUCT INFORMATION

- Product name: **anhydrous sodium sulphate**.
- This EPD includes the production of anhydrous sodium sulphate by analysing the product in all the varieties obtained by CMRT, including standard, granular and pharma.
- The main application of anhydrous sodium sulphate is the manufacture of powder detergents, but it is also used in the chemical, textile and metallurgic industries, in the production of glass, paper pulp, and in various applications such as animal feed industries and pharmaceutical products.
- The product is shipped to customers in bulk, bags or big bags.

Physical and chemical properties	
Chemical formulation	Na_2SO_4
Molecular weight	142.04
CAS Register N.º	7757-82-6
EINECS N.º	231-820-9
REACH (1907/2006 on December 18th, 2006)	Excluded
Physical state	Solid
Format	Powder
Colour	White
Odour	Odourless
Melting point	884 ºC
Hazardous properties (Regulation 1272/2008)	Non hazardous
Delivery hazards (ADR, RID, IMDG, IATA)	Non hazardous
Flash point	Not flammable
Explosive properties	Non explosive
pH (5%)	6-9
Apparent density (g/ml)	1.3-1.6
Density (g/ml)	2.66
Humidity	0-0.05%
Solubility	Soluble in water
Hygroporosity	Higroscopic

4. LIFE-CYCLE ASSESSMENT INFORMATION (LCA)

Declared unit:

The declared unit is the baseline reference for which all information is collected. As established in the PCR, the declared unit is 1 kg of anhydrous sodium sulphate and its packaging.

Reference service life:

Not relevant for this EPD.

Geographical scope:

The geographical scope of this EPD is global.

Time representativeness:

Data collected in the treatment plants (primary data) and electricity mix are from 01/01/2019 to 31/12/2019. In this study, no databases older than 10 years were used.

Databases and LCA software used:

All the data used to model the process and obtain the Life Cycle Inventory are specific data and have been obtained by measurements made during the period from 2019/01/01 to 2019/12/31. They are representative of the different processes implemented during the manufacturing process. The data has been measured directly at the company's own premises. In addition, the most complete and highest quality European life cycle inventory database, *Ecoinvent 3.6*, has been used, as this database contains the most extensive and updated information and its scope coincides with the geographical, technological and temporal area of the project. The LCA was modelled with *Simapro 9.1.1.1.*

Description of system boundaries:

The system boundaries have been defined according to PCR 2021:03 "Basic Chemicals" (Version 1.1) in which three modules are differentiated along the product life cycle (upstream module, core module and downstream module).

This study has been carried out with a “cradle-to-gate” approach and a distribution and end-of-life scenario for product packaging has been simulated to include possible exceptional applications such as unbound applications.

In other words, the impact has been analysed from the extraction of materials until the product leaves the factory, going through the production of anhydrous sodium sulphate in the treatment plants, and the distribution of the product as well as the end-of-life scenario of product packaging.

The end-of-life for this product has not been taken into account because this product can be used for many different and varied purposes involving a wide range of intermediate product transformations.

System diagram:

Anhydrous sodium sulphate elaboration process:

The production process of anhydrous sodium sulphate begins in the ore deposit with the extraction of the mineral (glauberite). Glauberite is a sodium-calcium sulphate double salt. By performing a static leaching process, both salts can be separated from each other. Calcium sulphate, less soluble, remains in the pit surface and finally, it hydrates itself resulting in gypsum. The other salt, sodium sulphate, is dissolved in water, forming sodium sulphate-rich brine.

This brine is sent to nearby treatment plants. Here, by means of a series of physical and chemistry processes, sodium sulphate obtains a purity higher than 99.6%.

A nearby high-efficiency cogeneration plant provides steam to the treatment plant, which also supplies electricity to the electrical grid.

The end product is shipped to customers in bulk, bags or big bags. It is transported from the production site in Cerezo de Río Tirón by truck. It reaches its final national or international destinations by trucks, or by sea freight, loaded in several ports to ship the product all around the world.

Author of the Life Cycle Assesment:

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Data quality:

The environmental impact of the anhydrous sodium sulphate has been calculated based on the international standards established for the development of environmental product declarations, such as ISO 14025 for the preparation of the environmental product declaration, ISO 14040 and ISO 14044 for the preparation of the life cycle analysis and the (PCR): *Basic chemicals. 2021:03, Version 1.1.*

Data for raw material supply, transport to fabrication plant, production and distribution (upstream, core and downstream) is based on specific consumption data for the factory at Cerezo de Río Tirón, Burgos. *SimaPro v9.1.1.1.* software was used to prepare the life cycle analysis together with the *Ecoinvent 3.6* database. Characterization factors from *GPI 3.01.*

Assumptions:

The modularity principle, as well as the polluter-payer principle have been followed in the LCA. (Environmental burdens have been assigned to each stage where impact is exerted). The following assumptions have been made in this EPD:

- It does not include the manufacturing processes of the capital goods or spare parts and/or maintenance with a life of more than three years.
- The environmental impact of infrastructure for general management, office, and headquarters operations is not included.
- The impact caused by people (common activities, commuting...) is not considered.
- It does not include the consumption of natural gas for sanitary hot water from showers and heating system for the staff's comfort.
- The processes associated with fuel production are intrinsically included in the indicators in *Ecoinvent's* database, which is used in carrying out the LCA.
- The environmental impact of external transport has been calculated using lorries from the *Ecoinvent 3.6* database: *Euro 5*. These lorries have been selected to reflect the most realistic scenario possible.

Cut off rules:

As stated in the PCR, the LCA has included data on elementary input and output flows from the product system contributing to reach a minimum of 99% of the declared environmental impacts. This cut-off rule does not apply for hazardous materials and substances.

Allocation:

Where necessary, as with waste generation and energy consumption, an allocation based in mass has been applied.

5. PRODUCT CONTENT DECLARATION (per 1 kg of product)

Product

Anhydrous sodium sulphate		
Materials/chemical	**Weight, kg**	**%**
Anhydrous sodium sulphate	>0.996 kg	>99.6%
Impurities	<0.004 kg	<0.4%
TOTAL	1kg	100.00%
Content of packaging per kg of product		
	Wood, kg	**Plastic, kg**
Packaging	1.67E-03	3.36E-04

Packaging: Most of the product is delivered to customers in bulk. The remaining product is packed to be delivered either in palletized bags, protected with plastic film, or in big-bags. Therefore, the amount of packaging corresponding to the declared unit is significantly reduced.

End of life scenario of the product packaging

This table shows the percentages (%) of each end-of-life treatment of the packaging products delivered to different countries.

TYPE OF PACKAGING	End of life	GLOBAL (%)
PLASTIC	Recycling	69.70
	Landfill	11.00
	Incineration	19.30
WOOD	Recycling	69.70
	Landfill	11.00
	Incineration	19.30

Note: The information for the end of life of the packaging has been obtained from official data of the World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/30317/9781464813290.pdf.

6. ENVIRONMENTAL PERFORMANCE

Note: To obtain the results for 1000 kg of product, multiply the data in the tables by 1.00E+03.

Total potential environmental impact (PRODUCT + PACKAGING)

PARAMETER		UNIT	Anhydrous Sodium Sulphate			
			Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	4.23E-03	1.25E-01	1.66E-01	2,94E-01
	Biogenic	kg CO_2 eq.	5.49E-06	5.64E-05	1.25E-04	1,87E-04
	Land use and Land transformation	kg CO_2 eq.	3.02E-06	1.46E-04	5.80E-05	2,07E-04
	TOTAL	kg CO_2 eq.	4.24E-03	1.25E-01	1.66E-01	2,95E-01
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	2,79E-10	1.85E-08	3.03E-08	4.91E-08
Acidification potential (AP)		kg SO_2 eq.	2,02E-05	1.42E-04	5.97E-04	7.60E-04
Eutrophication potential (EP)		kg PO_4^{3-} eq.	7,12E-06	3.27E-05	1.26E-04	1.66E-04
Photochemical oxidant formation potential (POFP)		kg NMVOC eq.	1,39E-05	1.34E-04	6.86E-04	8.35E-04
Abiotic depletion potential – Elements		kg Sb eq.	6,38E-08	7.00E-08	4.52E-06	4.66E-06
Abiotic depletion potential- Fossil Fuels *		MJ, p.c. net	5,40E-02	2.09E+00	2.47E+00	4.61E+00
Water Scarcity Potential		m^3 eq.	1,84E-03	-8.02E-01	7.12E-03	-7.93E-01

**Disclaimer: the results of this environmental impact indicator must be treated carefully as the uncertainty of those results is high and in addition to this, there is a limited experience with this indicator*

Total use of resources (PRODUCT + PACKAGING)

PARAMETER		UNIT	Anhydrous Sodium Sulphate			
			Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1.67E-02	1.44E-01	3.86E-02	1.96E-01
	Used as raw materials	MJ, net calorific value	3.16E-02	0.00E+00	0.00E+00	3.16E-02
	TOTAL	MJ, net calorific value	4.84E-02	1.44E-01	3.56E-02	2.28E-01
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	4.12E-02	2.41E+00	2.52E+00	4.97E+00
	Used as raw materials	MJ, net calorific value	1.67E-02	0.00E+00	0.00E+00	1.67E-02
	TOTAL	MJ, net calorific value	5.79E-02	2.41E+00	2.52E+00	4.98E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m^3	5.22E-05	-9.72E-02	2.66E-04	-9.40E-02

Total waste production and output flows (PRODUCT + PACKAGING)

Waste production

PARAMETER	UNIT	Anhydrous Sodium sulphate			
		Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	6.50E-08	2.54E-06	6.60E-06	9.20E-06
Non-hazardous waste disposed	kg	3.11E-04	2.51E-03	1.22E-02	1,25E-02
Radioactive waste disposed	kg	1.27E-07	5.29E-06	1.72E-05	2.26E-05

Output flows

PARAMETER	UNIT	Anhydrous Sodium Sulphate			
		Upstream	Core	Downstream	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E-03	2.61E+00	3.86E-04	6.488E-04
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Potential environmental impact (PRODUCT)

PARAMETER		UNIT	Anhydrous Sodium Sulphate			
			Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	2.83E-03	1.24E-01	1.65E-01	2.92E-01
	Biogenic	kg CO_2 eq.	1.24E-06	5.64E-05	5.00E-05	1.08E-04
	Land use and Land transformation	kg CO_2 eq.	5.18E-07	1.46E-04	5.79E-05	2.04E-04
	TOTAL	kg CO_2 eq.	2.83E-03	1.25E-01	1.65E-01	2.93E-01
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	1.90E-10	1.85E-08	3.02E-08	4.90E-08
Acidification potential (AP)		kg SO_2 eq.	1.43E-05	1.41E-04	5.96E-04	7.52E-04
Eutrophication potential (EP)		kg PO_4^{3-} eq.	5.17E-06	3.26E-05	1.22E-04	1.60E-04
Photochemical oxidant formation potential (POFP)		kg NMVOC eq.	7.15E-06	1.34E-04	6.85E-04	8.26E-04
Abiotic depletion potential – Elements		kg Sb eq.	4.28E-08	6.86E-08	4.51E-06	4.62E-06
Abiotic depletion potential- Fossil Fuels *		MJ, p.c. net	2.08E-02	2.08E+00	2.46E+00	4.57E+00
Water Scarcity Potential		m^3 eq.	1.02E-03	-8.02E-01	7.10E-03	-7.94E-01

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Use of resources (PRODUCT)

PARAMETER		UNIT	Anhydrous Sodium Sulphate			
			Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	2.39E-02	1.44E-01	3.55E-02	1.82E-01
	Used as raw materials	MJ, net calorific value	0.00E-02	0.00E+00	0.00E+00	0.00E-02
	TOTAL	MJ, net calorific value	2.39E-02	1.44E-01	3.55E-02	1.82E-01
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.99E-02	2.41E+00	2.51E+00	4.94E+00
	Used as raw materials	MJ, net calorific value	2.01E-02	0.00E+00	0.00E+00	2.01E-02
	TOTAL	MJ, net calorific value	2.19E-02	2.41E+00	2.52E+00	4.94E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m^3	3.09E-05	-9.72E-02	2.65E-04	-9.42E-02

Waste production and output flows (PRODUCT)

Waste production

PARAMETER	UNIT	Anhydrous Sodium sulphate			
		Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	2.67E-08	2.53E-06	6.59E-06	9.15E-06
Non-hazardous waste disposed	kg	1.15E-04	2.48E-03	1.20E-02	1.23E-02
Radioactive waste disposed	kg	6.74E-07	5.28E-06	1.71E-05	2.25E-05

Output flows

PARAMETER	UNIT	Anhydrous Sodium Sulphate			
		Upstream	Core	Downstream	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	2.61E+00	0,00E-04	2.61E-04
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Potential environmental impact (PACKAGING)

PARAMETER		UNIT	Anhydrous Sodium Sulphate			
			Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	1.41E-03	6.46E-01	4.50E-01	1.92E-01
	Biogenic	kg CO_2 eq.	4.26E-06	1.74E-05	7.51E-05	7.94E-04
	Land use and Land transformation	kg CO_2 eq.	2.50E-07	2.98E-04	1.20E-05	2.65E-04
	TOTAL	kg CO_2 eq.	1.41E-03	0.46E-01	5.26E-01	2.00E-01
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	8.94E-10	1.13E-08	6.46E-08	1.65E-08
Acidification potential (AP)		kg SO_2 eq.	5.90E-05	7.46E-04	1.42E-04	8.07E-04
Eutrophication potential (EP)		kg PO_4^{3-} eq.	1.95E-06	9.42E-05	4.46E-04	6.50E-04
Photochemical oxidant formation potential (POFP)		kg NMVOC eq.	6.73E-06	6.71E-04	1.63E-04	9.03E-04
Abiotic depletion potential-Elements		kg Sb eq.	2.11E-08	1.34E-08	9.15E-06	3.15E-06
Abiotic depletion potential-Fossil Fuels *		MJ, p.c. net	3.32E-02	9.18E+00	5.25E+00	3.94E+00
Water Scarcity Potential		m^3 eq.	8.23E-03	2.29E-01	1.72E-03	8.43E-01

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Use of resources (PACKAGING)

PARAMETER		UNIT	Anhydrous Sodium Sulphate			
			Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1.43E-02	1.12E-01	8.59E-02	1.44E-01
	Used as raw materials	MJ, net calorific value	3.16E-02	0.00E+00	0.00E+00	3.16E-02
	TOTAL	MJ, net calorific value	4.80E-02	1.12E-01	8.59E-02	4.61E-01
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	2.13E-02	9.33E+00	5.37E+00	2.76E+00
	Used as raw materials	MJ, net calorific value	1.47E-02	0.00E+00	0.00E+00	1.47E-02
	TOTAL	MJ, net calorific value	3.60E-02	9.33E+00	5.37E+00	4.23E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m^3	2.13E-05	8.37E-02	1.05E-04	2.24E-02

Waste production and output flows (PACKAGING)

Waste production

PARAMETER	UNIT	Anhydrous Sodium sulphate			
		Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	3.83E-08	1.98E-09	1.36E-08	5.40E-08
Non-hazardous waste disposed	kg	1.96E-04	3.22E-05	1.64E-03	1.87E-03
Radioactive waste disposed	kg	5.95E-08	6.40E-09	3.64E-08	1.02E-07

Output flows

PARAMETER	UNIT	Anhydrous Sodium Sulphate			
		Upstream	Core	Downstream	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	3.86E-04	3.86E-04
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

7. REFERENCES

- General Programme Instructions (GPIs) of the International EPD® System. Version 3.01.
- General Programme Instructions (GPIs) of the International EPD® System. Version 4.0.
- UNE-EN ISO 14020:2000 Environmental labels and declarations-General principles.
- UNE-EN ISO 14025:2010 Environmental labels and declarations-Type III Environmental Declarations-Principles and procedures.
- UNE-EN ISO 14040:2006 Environmental Management-Life Cycle Assessment-Principles and framework.
- UNE EN ISO 14044:2006 Environmental Management-Life Cycle Assessment-Requirements and guidelines.
- Product category rules (PCR): Basic chemicals. 2021:03, Version 1.1.