

## SEG Trinity College Dublin student chapter

### Iberian Pyrite Belt field trip 2020 report



*Figure 1 SEG-TCD Student Chapter with Anglo American Industry sponsors at Rio Tinto Mines north of Seville, Spain 2020*

## Introduction:

The SEG-Trinity College Dublin Student chapter organised a five-day field trip to the Iberian Pyrite Belt region to visit several mines. These mines included the Rio Tinto mine near Seville in Spain, the Neves Corvo mine in Portugal as well as the historical mine in Aljustrel Portugal. A mixture of Trinity undergraduate and PhD students participated. The field trip was coordinated with industry sponsors from Anglo American.

Our reasoning for choosing the Iberian Pyrite Belt (IPB) results from its extensive mining history and genetic significance in hosting the largest concentration of sulphides on the planet. Furthermore, the minerals being mined along the IPB include chalcopyrite, sphalerite, and galena among more. These minerals are prospected to be in intense demand in the coming decade(s). Furthermore, associated by-products, such as Co, Te, In and Ge are important to energy critical technologies.

Located the the South Portuguese Zone and extending East to Seville in Spain; the IPB covers an area of  $250 \times 20-70$  km (Inverno et al.2015). The IPB formed over 360Ma ago during the Variscan orgney, in Devonian and Carboniferous times, which resulted in the formation of the Super continent Pangea. In particular, the IPB resulted from the South Portugeze Zone obliquely colliding with the Iberian Massif (Tornos et al. 2008). In the IPB geolgical domain, this plate convergence resulted in dense mineralisation of pyrite, copper, zinc, lead, gold and silver. The IPB deposit is incredibly significant in human economics considering that mining began there up too five thousand years ago (Tornos et al 2008).

An elaboration of the rocks involved in the formation of the IPB is included within this document. In particular, a focus is given to the rocks which we expect to see on this field trip. Our aim is to explore the deposits across the IPB and ultimately learn:

1. How to identify economic rocks at an outcrop level
2. Understand the geological setting of the IPB
3. Learn about the economic importance of the IPB

## Trip members

Winifred Duncan, Ethan Brady-Arnold, Meabh Hughes, Johnathan Chambers, Patryca Struzynska , Anna Sweeney, Eimer Prendergast, Mari Davitashvili, Emily Rees, Julie Boal, Rian Quinn, Dr. Sean McClenaghan, Adam Simmons, Catherine Reynolds.

## Trip Objectives

1. Collaborate with Anglo American professional exploration geologists, in order to network with Experts in the mining industry, as well as share knowledge and improve the content of the field trip.



2. To provide students with the opportunity to visit an active mine and have a greater understanding of mining geology.
3. To aid students to improve their knowledge of European ore deposits and the geology of the Iberian Pyrite Belt
4. To learn about the mining heritage of across Spain and Portugal.
5. To give insight on the mapping and assessment of mineralization in exposures with a focus on the setting of volcanogenic massive sulphide mineralization.

## **Day 1 Arrival at Seville, Spain and meeting Industry Sponsors.**

The group met in Dublin Airport and arrived in Seville, Spain at 6pm. After unloading at the Samsay Hostel, we socialised over dinner and had an evening to sightsee.



## Day 2 Trip to Rio Tinto Mines and Drive to Portugal border El Rhompido

We drove to the Rio Tinto mines and had a safety induction and 3-hour tour of an open mining pit. At the mining pit, we set out to identify the main stratigraphy and mineralisation of the IPB:



The oldest rocks in the IPB are called the Phyllite-Quartzite group (PQG) which are Famennian in age (approx. 370Ma). The mineralisation in the IPB is situated within the Volcanic-Siliceous complex (VSC) sequence. The VSC rocks are stratigraphically situated above the PQG and have an Upper Famennian-Visean age (358.9 Ma to 346.7 Ma). The Volcanic-Siliceous Complex transitions into The Culm/Flysch Group. In the Lower Visean age, the Flysch group was formed from a thick turbiditic sequence of shales, conglomerates and greywacke.

The group then visited a mine tailings pond and learned about the environmental processes associated with mining. After visiting the tailing pond, the group visited a historic mine and discussed the importance of mining throughout history. The group also discussed characteristics of supergene weathering and how other characteristics can be mistaken for supergene weathering.

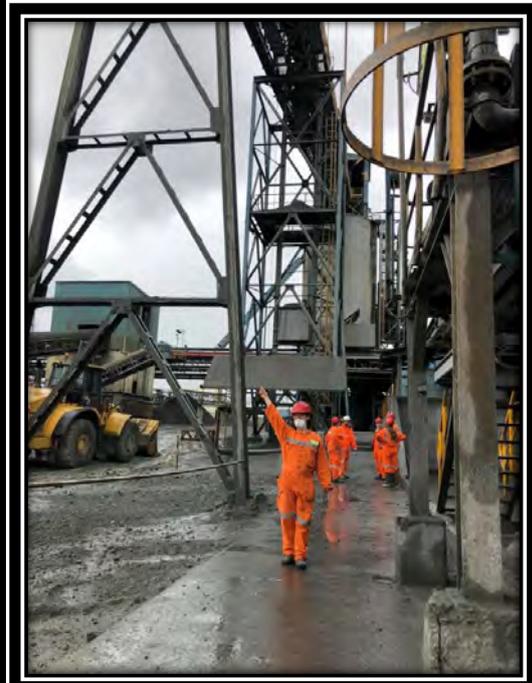
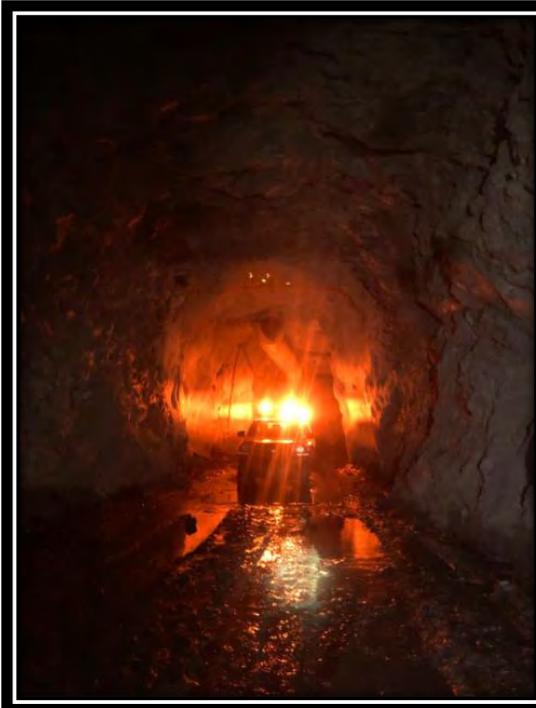
In the afternoon, we drove to El Rhompido and prepared for a very early start to visit Neves Corvo the following morning.



### **Day 3: Neves Corvo Mine visit and travel to Alcoutim, Portugal**

We arrived at Neves Corvo and attended an introduction to mining safety and procedures. The group then split into two sub groups. One sub group attended an underground mining tour while the other sub-group attended a lecture about the theory of the mine before receiving a guided full tour of the processing factory.

Our groups re-joined for lunch before visiting a site off the main mining site where we inspected drill core. After identifying mineralisation in drill core we drove to Al Coutim to stay for the night.



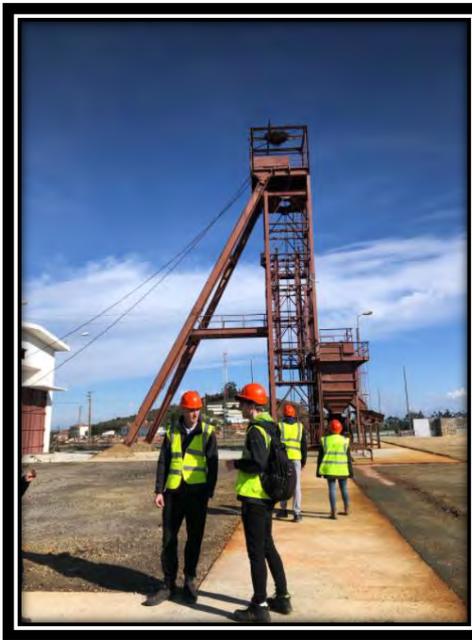
## Day 4: Visit to historical mine with members the Geological Survey of Portugal.

We drove to Aljustrel in the morning to meet with members of the Geological Survey of Portugal/ National Laboratory of Energy and Geology (LNEG). We received a lecture about the geology of the region before looking at several geological maps. After the interactive seminar, we were shown drill core. We were then given a tour of a historical mine in the town of Aljustrel. At the end of the tour,



we went to the Castle of Aljustrel where we identified some iron mineralisation and discussed the geomorphology of the area and how that relates to the development of the IPB.

In the afternoon, we drove to Sagres where we received a lecture from one of our Anglo American Industry sponsors about a geological exploration case study. We then had dinner together and enjoyed our last night on the SEG-TCD 2020 Iberian Pyrite Belt trip.



## Day 5 Return to Dublin

Before returning to Dublin, we visited the most western region of Portugal.



## Summary and Acknowledgments

Highlights from the trip was visiting both open pit and underground mines from across the Iberian Pyrite Belt. Seeing the processing plant at Neves Corvo in action was an exciting experience. Special thanks is given to our Anglo American industrial collaborators who sponsored the travel logistics of the trip and a few evening group meals. We thank our industrial collaborators at the Rio Tinto mines as well as at Neves Corvo and the Geological Survey of Portugal/ National Laboratory of Energy and Geology (LNEG), to whom contributed to this trip being a grateful success. This trip would also not have been possible without the sponsorship of the SEG and the Stewart Wallace Fund, to which we give special thanks and acknowledgment. The collaboration of all parties involved in this trip has given our members the opportunity to gain insight to a career in industrial mining (both open pit and underground) as well as the operations of a mine processing plant. Our members also gained insight to the career of exploration geologists and the importance of identifying mineralisation both at outcrop and in drill core. Overall, this trip allowed us to learn a lot about the world of mining, from historical to real-present-time as well as from an academic, exploration and industrial perspective.



The Stewart Wallace Fund awarded E1073.15 to the SEG-Trinity College Dublin student chapter. All of which contributed to our successful Iberian Pyrite Belt. This field trip which brought our members to mines across the IPB would not have been possible without the Stewart Wallace fund awarded. To which we give great thanks and acknowledgement.

### IPB Fieldtrip Budget 2020

Iberian Pyrite Belt Field Trip		Dates	Unit Cost (€) Per person	Total Cost (€)
Flights	Dublin-Seville	13 <sup>th</sup> January 2020	€ 32.10	€353.16
	Faro-Dublin	17 <sup>th</sup> January 2020	€ 33.27	€366.04
Accommodation	Seville Samsay	13 <sup>th</sup> – 14 <sup>th</sup> January 2020	€21.81	€ 240
	Precise Resort El Rompido-The Club	14 <sup>th</sup> – 15 <sup>th</sup> January 2020	€ 23.34	€ 256.74
	Pousada de Juventude de Alcoutim	15 <sup>th</sup> – 16 <sup>th</sup> January 2020	€29.66	€326
	Sagres	16 <sup>th</sup> – 17 <sup>th</sup> January 2020	€33.81	€372
Transport	Car Rental + parking fee (5 day) for one car	13 <sup>th</sup> – 17 <sup>th</sup> January 2020	€72.12	€ 793.34
	Car rental + parking fee (5 day) for two cars	13 <sup>th</sup> – 17 <sup>th</sup> January 2020	Sponsored by Anglo American Industry Advisors	
Food/Drink for two nights	Fuel (Approx. 969km x 3 cars)	13 <sup>th</sup> – 17 <sup>th</sup> January 2020	€36.22	€ 398.47
		13 <sup>th</sup> – 16 <sup>th</sup> January 2020	Sponsored by Anglo American Industry Advisors	



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<b>Food/drink</b>		13 <sup>th</sup> – 17 <sup>th</sup> January 2020	(€18	198
<b>Mine Entry Fees</b>	<b>Minas De RioTinto</b>	14 <sup>th</sup> January 2020	<b>Sponsored by Rio Tinto</b>	<b>Sponsored by Rio Tinto Sponsored by Neves Corvo Sponsored by Portugal Geological Survey</b>
	<b>Neves Corvo</b>	15 <sup>th</sup> January 2020	<b>Sponsored by Neves Corvo</b>	
	<b>Aljustrel</b>	16 <sup>th</sup> January 2020	<b>Sponsored by Portugal Geological Survey</b>	
			<b>Total (</b> €300.34/	<b>€ 3303.75</b>
<b>SEG Contribution (€/\$)</b>			<b>Total (11pp)</b> (€97.61) €202.78	<b>€ 1073.15</b>
<b>Student Contribution (€/\$)</b>			<b>Student Contribution</b> (pp) (€)	<b>€2230.6</b>

