

Q. Examine how humans interact with the rock cycle in the case of one of the following :

- Mining
- Quarrying
- Oil/Gas exploration
- Geothermal/Energy production.

(LC Exam Paper)

Introduction

Mine employment has an important multiplier effect, generating over 1 billion euro for the Irish economy, with quarrying. Human interact with the rock cycle is a key factor in the Irish economy, as can be seen in the Tara Lead and Zinc mines in Navan, Co. Meath. The mine employs 680 people in a variety of jobs.

Body of Topic

Rock containing metal is referred to as ore. At Tara, lead and zinc is found in sedimentary bedding planes of carboniferous limestone and dolomite, known as the Pale Beds, formed in the shallow tropical seas that once covered Ireland over 350 million years ago. The origin of these ores (Lead and zinc) was as a consequence of sea water seeping down many kilometres into the seabed rock, which was the heated by geothermal energy. As this heated water (brine) moved down through the bedding planes/ joints, it dissolved small amounts of lead/zinc out of the surrounding rock. As limestone formed on the seabed, the brine rose back up through the sedimentary rock, bringing the dissolved minerals. This water cooled, leaving 'veins' of lead/zinc running through the limestone.

Tara mines is an underground shaft mine located 2km from Navan in Co. Meath . The company employs 650 people in a variety of underground and surface works . The construction of shaft mines, 50-900m below the surface, reach the ore using a method called 'stope and pillar'. This method, whereby large areas (or stopes) are blasted out and pillars of rock are left to support the underground structure, is used in mining throughout the world, for example coal mining. With Tara mines being the largest zinc mine in Europe, fifth in the world, Tara mines provides 2.7 million tonnes of zinc and lead concentrate to the European market. This is sent to refineries in Kokkola, Finland, and Odda, Norway and other EU countries.

The extraction of this ore, the second method by which humans interact with the rock cycle, involves the crushing of the mined ore underground into large stones, which is carried to the surface for chemical treatment. On the surface, the further crushing and treatment of the ore allows the powder to be filtered and dried to form a metal concentrate, ready for transport.

The processing of the ore produces waste byproducts which need to be disposed of. With this in mind, the tailings (sediments deposited out of the waste water used in the extraction of the ore), and fine particles, are removed from the waste water and pumped to the tailings pond, which is located 5km from the mine site. All water from the mine is pumped into settling ponds, and excess water is discharged after acidity has been neutralised with lime. Natural bacteria are used to reduce the amount of sulphate in the water.

Since 1977 the mine has produced over 5 million tonnes of zinc and over 1 million tonnes of lead. In 2009 the mine was threatened with closure due to the global recession, however continued growth in the car sector in China and India has bolstered the mine.

Conclusion

So as has been shown, humans interact with the rock cycle in Tara mines through the construction of mines, extraction and transportation of the ore, and the environmental treatment of waste products.

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