The Salt Deposits of Pakistan and Poland

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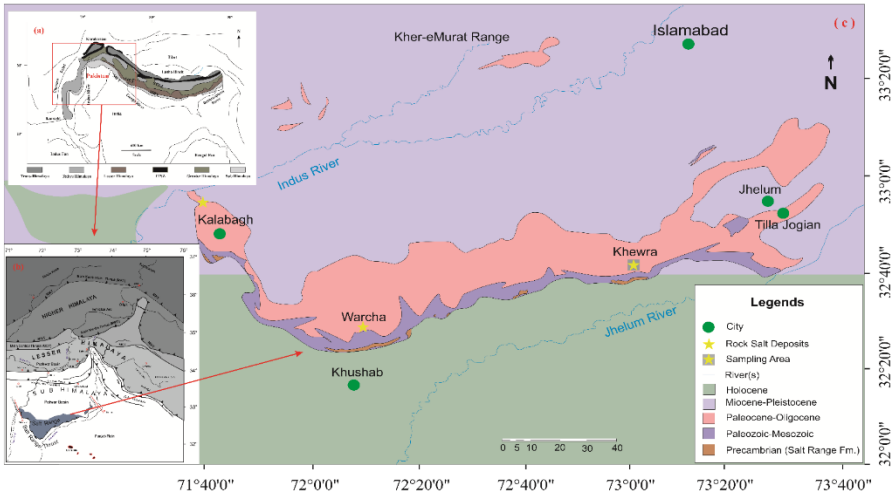
Abstract: Pakistan has the second world largest salt deposits, commonly known as Khewra Salt mine or Mayo Salt mine, these salt mines are located at Khewra, North of Pind Dadan khan, in Jhelum District Punjab province of Pakistan. Geologically the age of salt deposits is early Cambrian, these deposits are found in Salt Range Formation, these Salt Range is highly folded, faulted and distributed, the basal layers consist of crystalline halite, this layer is intercalated with potash salts. This basal layer is overlain by gypsiferous marl, which is all over covered by gypsum and dolomite interlayered beds with some seams of oil shale.

The production per annum is 350,000tons of 99% pure halite and estimated reserve of salt in the mine is from 82 million tons to 600 million tons.

Poland has also salt deposits of great economic value, the rock salt deposits are found in two salt bearing formations of Upper Permian (Zechstein) and Neogene (Middle Miocene, Badenian stage) age. The Permian rock salt deposits also has potash salt, this Permian rock salt deposits is the largest deposits than the other deposits of Neogene age. The Permian deposits are in the Northern and Central Poland.

INTRODUCTION

The Khewra salt mine deposit is known as the second world's largest deposits, these salt mines are located at Khewra, North of Pind Dadan Khan in Jhelum district Punjab province of Pakistan. The mine is situated in the Salt Ranges, Potohar plateau, the Salt Range emerges from the Indo-Gangetic plain, this plain is also called as North Indian River plain, the total area is 700 thousand km2 (172 million acre). This is the most fertile plain its extension is in Pakistan, India and Bangladesh as well as Southern plains of Nepal. This plain is linked to the Himalayan mountains in the North. Most of the river systems emerge from the Himalayas and these river systems are good source of alluvium.

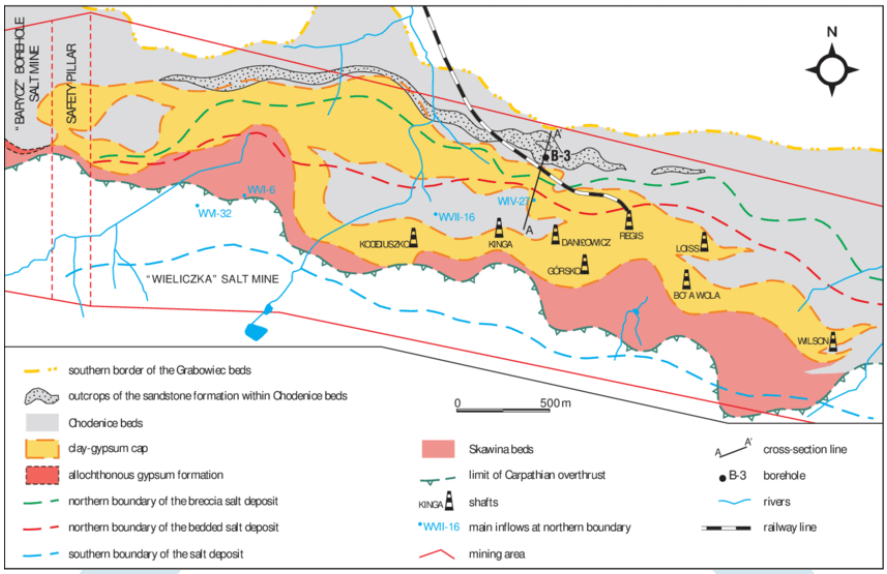


Location map of Khewra Salt Mines

The Khewra Salt mine has been active for 150 years ago, first opened in 1872, the production of salt from the mine is 350000mtons annually. The beautiful pink colored salt is present in the salt mines this pink salt is also called as Himalayan salt and is exported all over the world. The Khewra salt mine is of touristic attraction also in the vacant mine there is a hospital for asthma patients, a beautiful small mosque is carved in the pink salt. A Crystal valley is present in the Khewra salt mines around 250000 visitors visit annually.

Salt mines of Poland

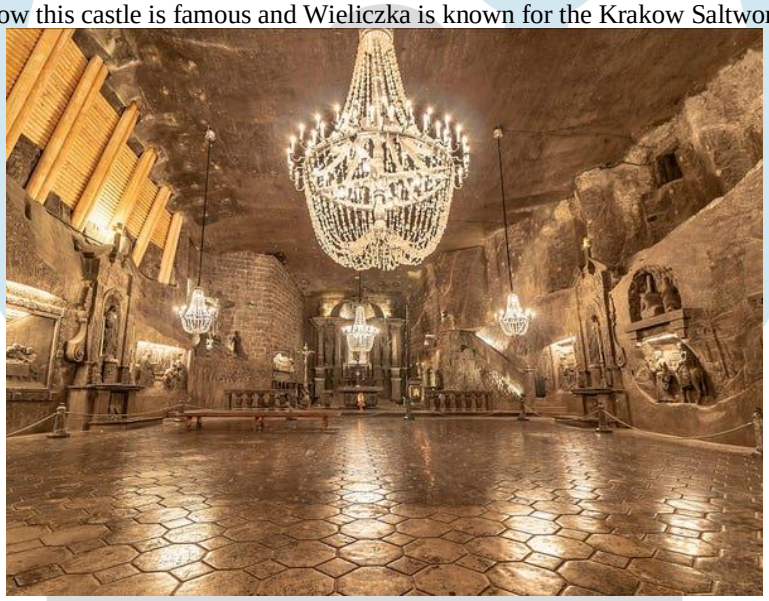
Poland is also known for the salt deposit in the world, there are some famous salt mines in Poland are Wieliczka salt mine, Bochnia salt mines. Bochnia is the oldest salt mines in Poland and in the world, it dates back to 1248. The Wieliczka salt mine near the town Wieliczka near Krakow in the southern Poland. This mine is producing sodium chloride commonly known as table salt since Neolithic times. The Wieliczka salt mine started working in the 13th century and production remained till 2007, it is one of the world's oldest operating salt mines. The Wieliczka salt mine is known as Polish Historic Monument and UNESCO world heritage site. The prime attractions are the shafts present in the mine the passageways, four chapel and various statues carved by miners out of the rock salt, and underground lake.



Geological map of the Wieliczka salt mine

The mine is 327 meters deep and extends horizontally over 287 kilometers' color of rock salt is generally varying shades of grey.

Previously in the 13th century the salt brine upwelling to the surface was collected and further processed for sodium chloride. Later the wells started to sink and then shafts were made to extract the rock salt. During 13th to Early 14th century the Salt works Castle was carved now this castle is famous and Wieliczka is known for the Krakow Saltworks Museum.



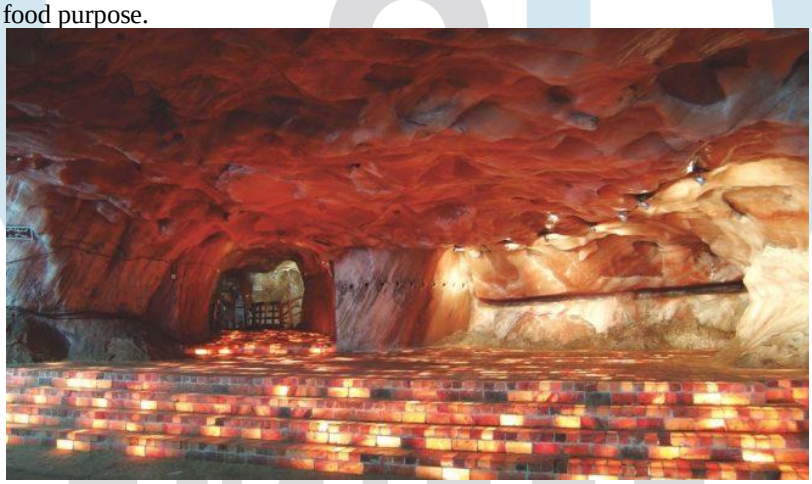
Wieliczka salt mine

Bochnia Salt Mine

Kłodawa Salt Mine

History of Salt Mines

The Khewra salt deposits were originally discovered by Alexander's troops in 320 BC. When the troops of Alexander the great crossed the Jhelum River and the Mianwali area during the Indian Campaign, the horses of the troops were licking the stones and the ailing horses got healthy by licking the stones, hence discovered the second largest deposits of the world. Later, during the Mughal era the Khewra salt was exported and traded in different countries, as far away as Central Asia. After the downfall of the great Mughal Empire, the Sikhs taken the charge of the salt mines. Gulab Singh the ruler of Jammu and Hari Singh Nalwa, Sikh commander started managing the Salt ranges. The salt quarried at the time of Sikhs was traded and used as a source of revenue as well as for food purpose.



Khewra Salt Mine

In 1872, when the British were ruling the Indian subcontinent had taken the charge of the salt mines and further developed them more systematically. Previously, the mine was not developed, very narrow and irregular tunnels were present also the narrow entrances made the mining activities more difficult and unsafe. The only road was very difficult in the ranges also no proper supply of water, no salt storage facilities. The British rulers solved these problems, first built proper roads, warehouses and tunnels also provided systematic mechanism for excavation of salt. As well as they controlled the smuggling of salt by charging penalties. After independence in 1947, BMR took possession of the mines in 1974 the Pakistan mineral development corporation took over the mine. The salt reserves are estimated to be 82 million tons to 600 million tons.

The history of Polish salt mines related to 13th century King Casimir III who reigned 1333-1370 contributed greatly to the systematic excavations of salt and development of the salt mines he provided many facilities for the miners. In 1363 the King founded a hospital for miners near the salt mine. In 1978 Wieliczka salt mine was recognized by UNESCO and added in the list of World Heritage sites. This is known as Poland's official national historic monuments on 16th September 1994.The oldest Bochnia salt mine was also added to UNESCO world heritage sites. These two sister salt mines now known as Wieliczka and Bochnia Royal salt mines. Zupny Castle was introduced in 2013 to the Royal salt mines, around 1.2 million people visit the Wieliczka salt mines annually.

Geology of the Salt deposits

The geological age of Khewra Salt mines is Cambrian and the deposits are present in the highly folded and faulted thick layered Salt Range Formation. At the base of this geological formation a crystalline halite is present also potash salts are intercalated with halite. Gypsiferous marl is present above the halite and potash layer. All these are covered by gypsum and dolomite interlayered beds as well as some seams of oil shale, above this the sedimentary rocks of Neoproterozoic to Eocene Epoch are deposited which is of 200 to 500 meters in thickness.

The geology of Wieliczka salt mines is unique and rare found in the salt mines of Poland. The geological age of Wieliczka salt mines is Permian. The rock salt deposits are found in two salt bearing formations of Upper Permian (Zechstein) and Neogene age (middle Miocene, Badenian stage). The Permian rock salt deposit also has potash salt, this Permian rock salt deposit is the largest deposit than the other deposit of Neogene age. The Permian deposits are in Northern and Central Poland. The Badenian Salt deposits are very ancient nearly 750 years and are exploited over this period. These ancient salt deposits were finished in 1996 after exploitation, therefore the salt mines of Wieliczka and Bochnia turned into cultural heritage sites.

The salt deposits are formed due to evaporation of water from oceans in the form of vapors and slow accumulation of salt which remained in the basin. During the dry weather condition and high temperature cause intensive evaporation. The saline sedimentation in the Carpathian Foredeep of Poland was lasted for 200,000 years. These deposits are spread over 300 km in length and 100 km in width, the Wieliczka salt deposits are included in this salt deposits, the extension of Wieliczka is 10 km in length and width of several hundred meters to 1.5 km.

The geological structures present in the Wieliczka salt mine is unique, it consists of two parts, the upper lump deposits and the lower bedded deposits. The Upper lump deposit is very rare in the world, the lump of rock salt is of different sizes from size of basketball to large and huge blocks. The larger block is 100,000m3 in size. In the salt mine the lump is excavated and creating underground chambers. These underground chambers are the most unique and beautiful. The other lower deposits are bedded deposits which are folded and formed in the pattern of tectonic scales which are dipping towards south. The fore-shaft salt deposits are the most famous and valuable, is exploited since the 16th century. The famous and beautiful chambers Pieskowa Skala is excavated in the salt deposits.

Rock salt is a common name of salt and halite is a geological term. The chemical composition of halite is NaCl generally it is formed in shape of cubes it has good cleavage easy soluble in water. It is easily recognized by its salty taste. The pure variety is transparent, while the color is due to mixing of other materials. The pink color salt is of Khewra salt mines while the green color salt due to admixture of claystone is from Wieliczka salt mines.

Discussion

Pakistan has the largest salt deposits in the world, these are geologically more ancient because the deposits are of Early Cambrian, these deposits are 99% pure rock salt the color is very attractive, as well as the taste, this pink salt is known as Himalayan Pink Salt all over the world, while the salt deposits of Poland are geologically of Permian age, these deposits are of different grades some of the layers have impurities and also because of admixture the color of the salt deposits is varying from grey to green color.

Conclusion

Both the salt mines of Pakistan and Poland are very productive and the Khewra deposits have unique and specific geological structures as well as touristic attractions. The excavated portions of the mine in Khewra are turned into hospital for asthma patients as well as a mosque built with salt, a crystal valley all is of touristic attractions.

The salt mines of Poland which are turned into UNESCO cultural heritage is very old and unique, the rare geological structures are of great attractions, as well as the castle and other attractive things carved from salt are of touristic interest.

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