

**HOLIDAY GEOLOGY****Wieliczka Salt Mine, Krakow**

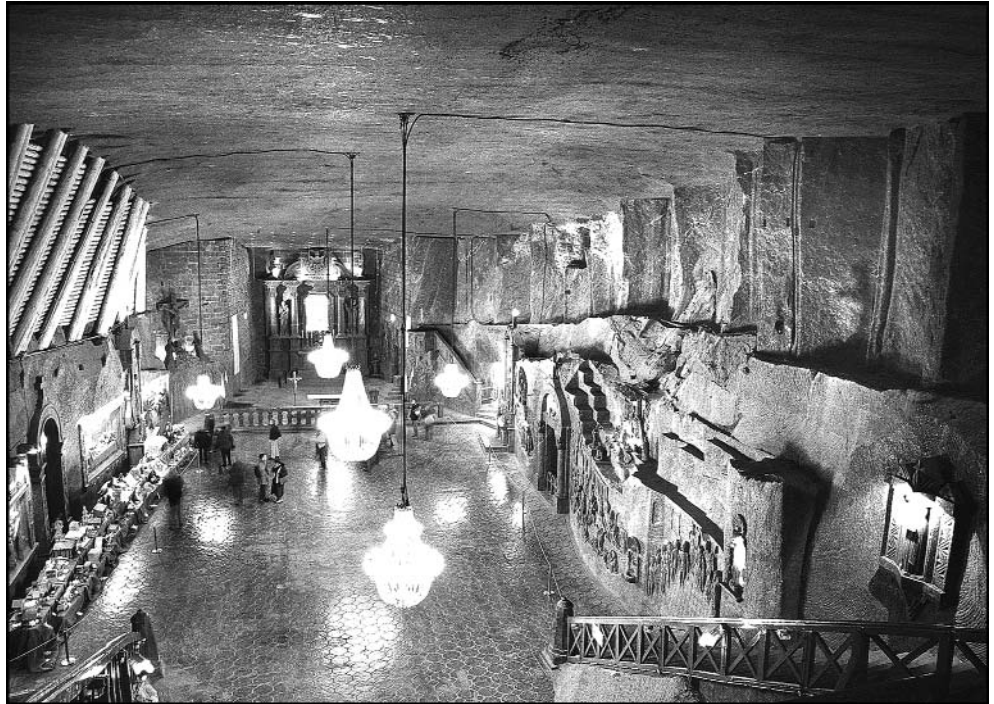
Krakow draws the lion's share of visitors to Poland, and justifiably so. The old city has a splendid collection of fine buildings that suffered very little damage during the wars of the last century. It is a lovely place to visit, and also has the perfect escape from the urban world in the Tatras Mountains just to the south. The geologically minded visitor has an added attraction in the Wieliczka salt mine, tucked away in the suburb of the same name on the southeast side of the city. This has been developed for tourist access on a grand scale, and it offers a spectacular and fascinating underground tour.

Miocene salt stretches for about 10 km beneath Wieliczka, roughly east-west in a nappe structure parallel to the Carpathian front (just to the south). Within this length, the salt is 500-1500 metres thick. Any traces of an early classic diapiric salt dome (formed simply by overburden stress) are now well hidden in a structure that is thickened by spectacular plastic flow under tectonic lateral compression. The lower part of the orebody is bedded and folded, but is nearly solid pure salt, except for some interbedded clay, siltstone, gypsum and anhydrite. The upper part is a large-scale breccia, a classic residual deposit left by partial dissolution and extensive collapse; blocks of salt many tens of metres across have survived within it. Over the salt, a cap of gypsum and clay appears to be a recent dissolution residue as typically occurs on salt domes at outcrop.

Brine springs at Wieliczka were exploited more than 5000 years ago, but it was only in 1250 AD that the source rock salt was first seen during the digging of a new brine well. Rock mining soon started and the first deep shaft was sunk before 1500. The industry expanded, and there are now 2000 mined chambers, reached by 200 km of tunnels, beneath 26 shafts, that descend to a depth of 327 m. Mining ended in 1997, and the site is now just preserved for its underground visitors.

The tour route starts with a spiral staircase for 45 m down the Danilowicz Shaft. Many of the tunnels from there on are lined with old or new timbers or colliery arches, but some have bare walls of clean salt. They break out into a succession of chambers, each of which exploited a single massive block of salt within the breccia zone. The first notable room was one of many turned into a chapel by the miners. It has some excellent statues, arched doorways and tall pillars, all carved out of solid salt - the salt statues are a much-lauded speciality of Wieliczka. One of the bedrock pillars is out of true, and looks to be the only sign of salt squeezing along the tourist trail. Another large room has a flat roof, stabilised with rock bolts, with long straw stalactites of pure salt, comparable to those of calcite in a natural limestone cave.

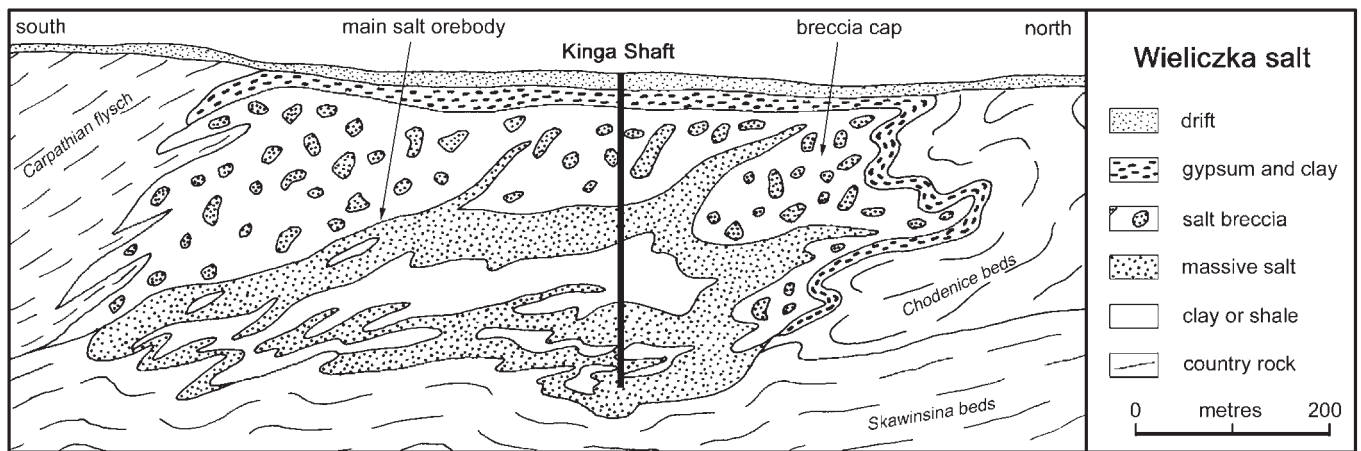
The Chapel of the Blessed Kinga in the Wieliczka salt mine, with walls, floor, roof, carvings and chandeliers all made of salt.



The highlight of the tour is the Chapel of the Blessed Kinga, a room 54 m long. It was excavated in 1862-1880 by working over 20,000 tonnes of salt from a single block in the breccia zone. Now it has a salt floor, a huge salt altar at one end, bas-relief carvings in walls of translucent salt, and brilliant chandeliers of salt crystals. Coal mines were never like this. The tunnel beyond cross-cuts down through beds of salt dipping at 50° and impure with clay and gypsum. The walls also expose some excellent breccia beds, each only 2 m thick, with salt fragments each 50 mm across. They would appear to be left from phases of Miocene dissolution and collapse that interrupted salt precipitation.

The tour continues down through spacious chambers floored with deep brine lakes, and then through rooms with monumentally massive timber roof supports. Brine streams still flow in channels through and along some galleries; they were an important part of the mine production, but now are just a source of beautiful cubic salt crystals. An underground restaurant occupies one of the chambers, and there are yet more large rooms with museum displays that are not always open. From the restaurant room, it's 135 m straight up the Kinga Shaft in an original triple-deck miners' cage - back to daylight.

Tony Waltham



A simplified geological cross section through the Wieliczka salt body.