Minerals & Mining

The White Peak has been associated with lead mining since Roman times and its legacy forms a conspicuous part of the scenery. Much of this is man-made, as seen in the linear trails of spoil tips, hollows and mounds that mark long abandoned workings, not to be confused with the many other circular depressions that pock-mark the plateau surface and are entirely natural landforms that developed through the localised **dissolution** of limestone.

Large mineral veins are called rakes and they are vertical features that often occupy fissures or fractures in the limestone. They are typically 1-2 km long, although occasionally they can be much longer (as at Long Rake, Great Hucklow and Dirtlow). Rakes seldom extend vertically for more than 100 m, are rarely more than a few metres wide and contain mainly non-metallic minerals such as fluorite, baryte and calcite. Metal ores such as galena, **sphalerite** and **chalcopyrite** usually make up less than 10% of the vein complex.

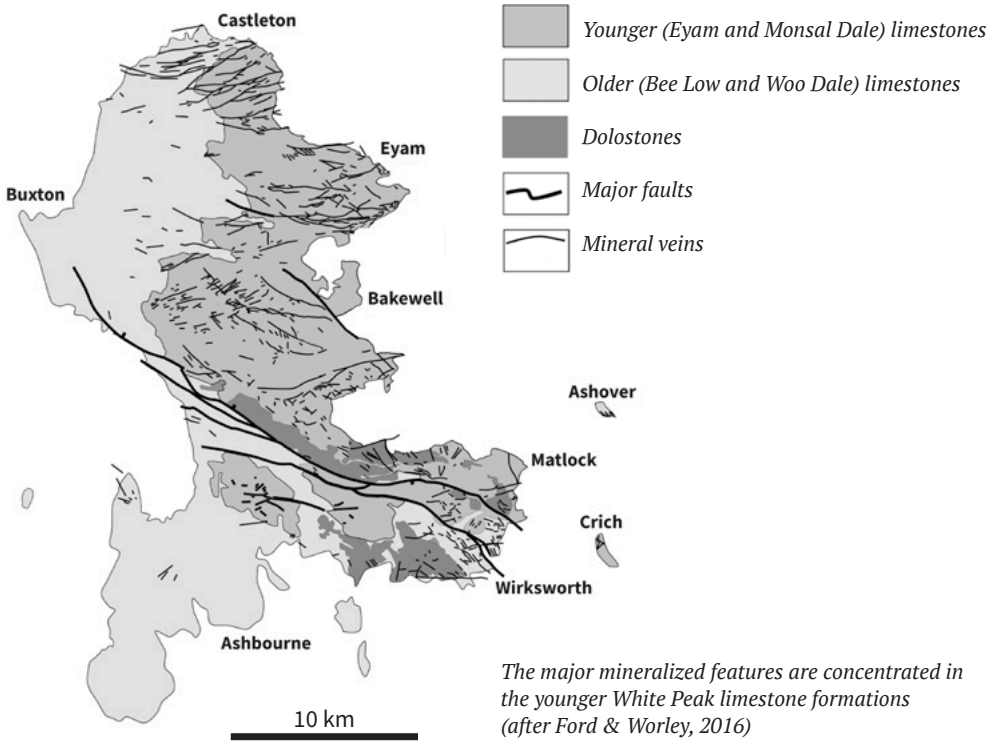
High Rake, Great Hucklow

Other types of mineral deposits known as pipes and flats occur where the limestone has been dissolved away to leave a cavity that was then lined or filled with minerals. Pipes occupy ancient tube-like cave systems whilst flats are more or less horizontal features that lie along the limestone bedding planes. These deposits tend to be more diffuse and on a smaller scale than rakes, but individual cavity fills may be very richly mineralised. Pipes and flats occur underground and are rarely seen at the surface, whereas rakes are often striking features that are marked by disturbed ground and changes in vegetation.

Mineralisation probably began during Late Carboniferous times when the limestones were deeply buried beneath younger rocks. In an adjacent area to the east of the Peak District, these younger rocks were predominantly mudstone and as they too were buried it is thought that hot, acidic fluids percolated through them and accumulated dissolved metals.

As the temperature of the circulating fluids increased to around 150^0 C, and under increasing pressure, the fluids migrated westwards and released their mineral content into fissures and cavities in the adjacent limestone. This explains why most of the mineral veins are concentrated along the eastern flank of the White Peak, close to where the metal-rich fluids originated.

The map (right) shows the surface distribution of the major mineralized fractures, veins and rakes in the White Peak. Their trend varies between NE–SE and most of the mineralisation is confined within the younger limestone formations. In the southern part of the White Peak there are localised outcrops of dolostone associated with the fault system that extends from Wirksworth towards Buxton. It seems likely that the limestone in these locations was infiltrated by magnesium-rich fluids some time before the main phase of mineralisation.



The major mineralized features are concentrated in the younger White Peak limestone formations (after Ford & Worley, 2016)

You are unlikely to come across fine mineral specimens on the GeoWalk because most of the spoil heaps have been well picked over. However, you may be lucky enough to find some small cubes of metallic grey galena (lead sulphide, PbS) or crystals of fluorite (calcium fluoride, CaF_2) in various colours. Fluorite is valuable as a source of fluorine in the chemical industry and it is widely used in other industrial applications as well. Along with baryte (barium sulphate, $BaSO_4$), these two non-metallic minerals have been produced in enormous quantities in recent decades through a combination of re-cycling old spoil heaps, open-cast and underground mining. It seems likely that this most recent mineral extraction phase, which expanded as the recovery of galena declined, is now at an end.

Fluorite

Galena

Much more information about minerals and mining is available at the excellent Peak District Mining Museum in Matlock.