The Alderley Edge Mines

History of the Alderley Edge Mines

Mining started at Alderley Edge in the Early Bronze Age. Crudely shaped hammer stones and an oak shovel found during the nineteenth century near Brynlow have been identified as Bronze Age tools from around 1750 BC. A hearth at Engine Vein has been dated to around 1950BC. Roman mining has also been found at Engine Vein where a 10m deep shaft and passage were dug down to reach the vein below the Bronze Age workings. The shaft has been dated to the first century AD.

The first documentary evidence is in 1697 and from 1693 to the mid-1800s various people are reported to have explored the Edge for copper. Work was done at Saddlebole, Stormy Point, Engine Vein and Brynlow. It is likely that the near-surface sections of Wood Mine and West Mine were investigated during this period. One operator of note was Charles Roe of Macclesfield who worked the mines from 1758 to 1768 before moving over to Anglesey on the discovery of major deposits of copper at Parys Mountain.

In 1857, a Bristol man, James Michell, started work at West Mine and moved on in the 1860s to Wood Mine. His company lasted 21 years (the length of the lease) although Michell died in an accident in the mines in 1862. During this working period nearly 200,000 tons of ore were removed yielding 3,500 tons of copper metal. The West Mine closed in 1877 and the Abandonment Plan of 1878 shows all the workings open at that date. All equipment was sold in 1878. There were some small and unsuccessful attempts to re-open the mines just before and during the First World War but these ended in a sale of equipment in 1926.

From the 1860s onwards there have been many thousands of visitors to the mines, many - including the earliest - with good lighting and experienced leaders. However, many other visitors, especially between 1940 and 1960, were ill-equipped and unprepared. This led to a series of tragic accidents which gained the mines a notoriety which still haunts them today. The West and Wood Mines were finally blocked in the early 1960s.

In 1969 the Derbyshire Caving Club obtained permission from the National Trust (owners of The Edge) to re-open Wood Mine. Since 1970 hundreds more visitors have been provided with miners' lamps and helmets and led in safety around Wood Mine and Engine Vein. In 1975 the owner of West Mine allowed the Caving Club to make a new and safe entrance to that mine. In 1981 the Engine Vein was capped for safety and added to the Caving Club's lease. In the late 1980s an Open Day was inaugurated by the Club and for one or two weekends each year the public can visit a selected mine without making prior arrangements.

Mining techniques

Until the end of the seventeenth century, explosives were not available and all rock had to be cut by hand. At the Edge, where the rock is soft, this practice continued into the early nineteenth century and pick marks can be seen in many places in Engine Vein and Brynlow mines with occasional use of shot-firing. Throughout the Wood and West Mines (which were mainly worked in the nineteenth century) the rock was drilled by hand and blasted with black powder (gunpowder). There is also evidence of some 20th century mining used a high explosives such as dynamite. The ore was roughly sorted at the face and "deads", the waste rock, were left behind in heaps. The good ore was taken to the surface in trucks on rails. The ore was crushed, put into wooden tanks and the copper extracted using acid and scrap iron. The ore gave about 2% copper. In the second half of the nineteenth century, some 200,000 tons of ore were raised from all of the Alderley Edge Mines, yielding 3,500 tons of copper worth £3,000,000 at the time.

Wood Mine

Wood Mine was worked for copper, lead and, possibly, cobalt. Although Wood Mine is not the largest mine, it is a good illustration of mining techniques and minerals. The mine is mostly the result of working between the early 1860s and 1877. The mine was worked on three beds or levels and the ore was removed through one of two adits; one is the present entrance and the second is the Hough Level.

There were five shaft entrances to Wood Mine, four were probably driven to find the extent of the ore and the fifth, the deep shaft mentioned before, to extract ore straight to the treatment works. Later, two adit entrances were made, one connecting with the bottom of the deep shaft and the other - the present main entrance - connecting with the upper levels of North End Chamber and Sand Cavern.

West Mine

By contrast with Wood Mine, West Mine is immense. It is by far the largest and longest of the Alderley Edge mines at around 10,000 metres (six miles) in length. The current entrance is a small hole in the corner of a field but previously the entrance was a massive open cutting, 15 metres deep leading to a gaping entrance 10 metres high. Inside, the mine consists of two parts divided by a fault. Parts of the mine feature in Alan Garner's novel *"The Weirdstone of Brisingamen"*.

If you visit West Mine, you have to return out by the same way as you went in as there is only one open entrance. When the mine was working, there were two airshafts – one at the middle and one near the end. At some stage in the development of the mine, another five or more shafts were open to the surface but these have all been capped with stone slabs.

Engine Vein

This mine gets its name from a deep shaft which required an engine (probably driven by horses, not steam) and the fact that it is mainly dug along one mineralised fault. The name is quite old. Within Engine Vein, you can see evidence of all periods of mining from 1750 BC to 1919 AD. There are Bronze Age pits, large Roman galleries, narrow mediaeval "coffin levels" (so-named from their shape) and worked out stopes blasted by gunpowder and dynamite. At the lowest point in Engine Vein, there is a connection to the Hough Level which can be followed to Dicken's Wood one way and Brynlow the other.

Other Mines

The other mines at the Edge include Brynlow Mine, the Cobalt Mine, Stormy Point Mines, Saddlebole, Reeking Mine and Finlow Hill Mine.

The Derbyshire Caving Club (DCC) and its activities at Alderley Edge

Members of the DCC meet regularly at the Edge to explore the mines and to re-excavate the numerous blocked entrances that remain. Adults are welcome to join the Club either to help occasionally with digging or as a full member, to help take groups around the mines and participate in the wider activities of the Caving Club. If you are interested in knowing more, contact the Club by leaving a message through our website: www.DerbysCC.org.uk or on Facebook: derbyshirecavingclub.

Geology of Alderley Edge

Alderley Edge is made of sandstones which dip from the Edge towards the Congleton Road (old A34) at about 12 degrees to the horizontal. The sandstone is not one solid mass but is in layers many metres thick. Each layer or 'bed' is slightly different in origin, hardness and colour. All the rocks at Alderley were laid down about 240 million years ago. The youngest rocks are the West Mine beds which are formed from air-borne sand and form the thickest layers at Alderley. Below them are the Wood Mine beds formed of alternating layers of conglomerate, water-deposited sandstone and marl. Below these again are the hard beds of the Engine Vein sandstones which form the bottom of the Helsby Formation. It is these hard beds which outcrop at Stormy Point and provide the weather-resistant rocks that form the Castle Rock. Finally, appearing at the bottom of Stormy Point, are the soft Wilmslow sandstones.

As well as the horizontal divisions in the rock formed by the beds of sandstone and clay, there are vertical divisions which were formed some tens of millions of years after the sandstone was laid down. These vertical breaks or 'faults' occur throughout the Edge and follow two predominant directions. The north-south faults have been responsible for most of the major movement of rock including the uplifting Edge itself and the steep hill on the Congleton Road. In fact, the whole area of land between the Congleton Road and the Edge has been raised as a block several hundred metres because of the faulting. The other direction of faulting is roughly northwest-southeast and faults on this alignment are often mineralised. It is thought that the ores were carried in solution up through the faults, which provided easier routes for the flow of water than the surrounding clays and sands.

Some lead is found in the faults (e.g. at Engine Vein and at Stormy Point) but most of the copper and much of the lead is found dispersed in the sandstone on one or both sides of the faults. The copper-bearing ore body is usually thickest near a fault and tapers away from the fault. Generally, ore is found only on the down-dip (south-western) side of the fault showing how it was deposited by water percolating through the sandstone after the land was uplifted. In West Mine the association with faults is less clear-cut but this is probably explained by the fact that the rocks in West Mine are more porous and the solutions could carry further than in Wood Mine or Engine Vein.

Minerals found in the Alderley Edge Mines

Of all the minerals present at Alderley Edge, sandstone, consisting of quartz or silica (SiO_2) grains is clearly the most abundant. The useful minerals are the metal ores which are found in the sandstone or in faults through the sandstone. The common minerals are listed on the back page of this leaflet.

Please don't collect any minerals, enjoy looking at them and leave them for future visitors to see.

Malachite: Basic copper carbonate - $Cu_2CO_3(OH)_2$
Green malachite is the most common economically viable ore at Alderley Edge and was the object of most of the mining. It was formed by the reaction of surface water containing dissolved carbon dioxide with "primary" sulphide ores such as chalcocite (Cu2S) traces of which are still present in the ore body.

Azurite: Basic copper carbonate - $Cu_3(CO_3)_2(OH)_2$
Found with the malachite, azurite is bright blue (especially when damp) and is formed in a similar way to malachite. Azurite is less common than malachite but is found in one unusual form in Engine Vein where small spherules, about 3mm in diameter, are found dispersed in a grey clay.

Chrysocolla: Hydrous copper silicate - $CuSiO_3.nH_2O$
Chrysocolla is also a secondary mineral and forms in abandoned mine passages from trickling water. It is a beautiful deep blue-green colour when damp and forms the "Green Waterfalls" in Wood Mine and the "Green River" in West Mine.

Galena: Lead sulphide - PbS
Pure galena is shiny grey and looks like lead metal. At Alderley it is more often dispersed in the sandstone as grey specks although the characteristic cubic crystals can still be seen with the aid of a hand lens. The carbonate of lead, cerussite, is also found abundantly at Alderley.

Asbolite: Manganese/cobalt oxides and arsenates
Black and found in small patches in several places in the mines. More strictly known as "Cobaltian Wad", asbolite was worked for a short time to obtain cobalt for blue colouring in glass and paper.

Barite: Barium sulphate - $BaSO_4$
Barite is found very widely on the Edge and has never been worked for profit. In many places it cements the sand producing the very hard rock that stands out at locations such as Stormy Point.

Iron Minerals: Various iron oxides
A number of iron compounds are present which give rise to the distinctive rust-red bands in all the mines. The chemical process in the last century removed the iron from the sandstone which is why the processed sand in the area of the old sand hills is much whiter than sand elsewhere.

This page lists only a few of the minerals at the Edge. Elements found include silicon, copper, iron, lead, sulphur, chlorine, phosphorous, carbon, oxygen, hydrogen, calcium, aluminium, molybdenum, vanadium, tungsten, zinc, barium, cobalt, arsenic, nickel, manganese and even traces of gold

More information

The Club has a small museum in a building behind the Wizard. There is also a wealth of information on our website (www.DerbysCC.org.uk) and in the book *"The Alderley Edge Mines"* by Nigel Dibben published in 2012.

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TRANSLATION

This leaflet has been translated automatically. It probably contains many errors in your language so if you are willing to correct these, we will be very grateful. We are hoping to have versions in French, Spanish, German, Italian and Polish and more if people want to offer to translate the original.

The text in each language is available to be downloaded as a Word document from our website at the page www.DerbysCC.org.uk/alderley/euroleaflets.php. You can send comments or amended versions to the author via alderleymines@DerbysCC.org.uk or through a link on that page.

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The logos of the *Derbyshire Caving Club* (1960-today) and the *Alderley Edge Mining Company* (1859-1877)

N J Dibben for Derbyshire Caving Club – September 2018