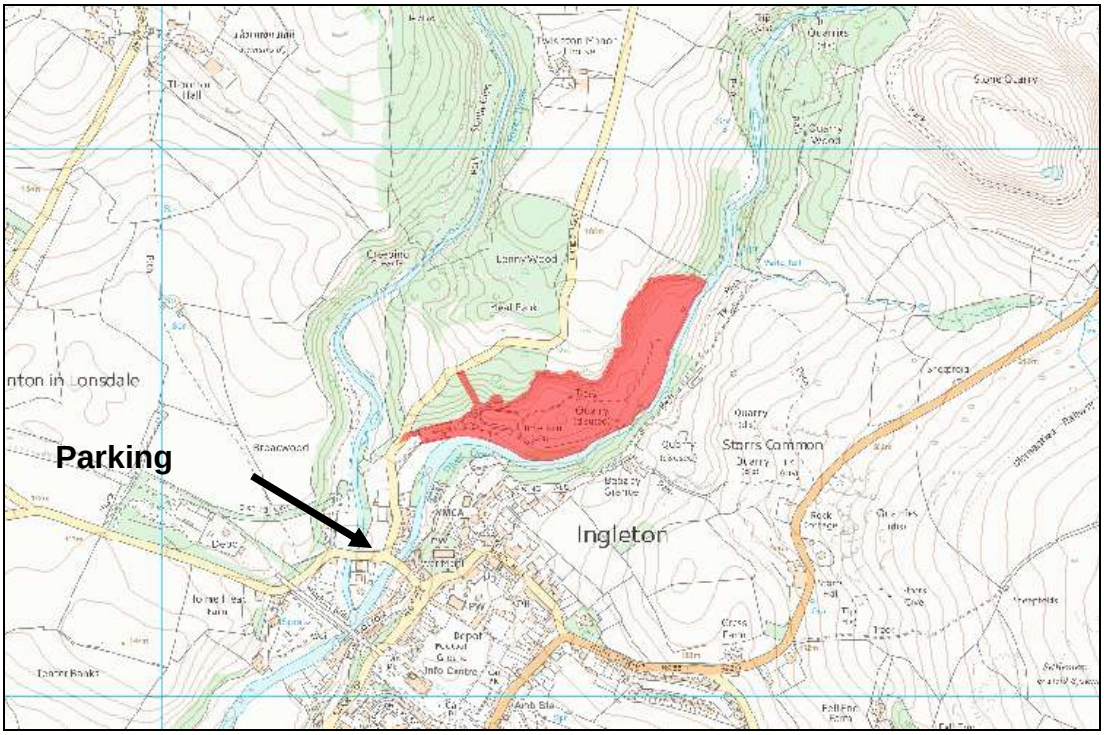
APRIL 2017 –12th Wednesday –Mealbank Quarry Ingleton followed by Ribblehead Quarry with David Johnson then the stones and fossils of Ribblehead Viaduct with John Williams

Meal Bank Quarry



Mealbank Quarry is a disused limestone quarry near the village of Ingleton. Closed in 1910, the site was once a hive of industrial activity centred on the Hoffmann lime kiln. The area is now a Scheduled Ancient Monument and Site of Special Scientific Interest

Mealbank Quarry, lying at the southern edge of the Askrigg Block, exposes the best continuous section of strata from the upper Holkerian to the Asbian (*Visean – Lower Carboniferous – 337 – 330mya*) in the Ingleton district. More important however is that the site is unique in containing an indigenous coal seam/seat earth, which is almost certainly the thickest development of its kind to be found anywhere within any British marine limestone sequence. The quarry is also of considerable interest to the palaeontologist and carbonate sedimentologist for its exposures: these include faunal marker bands and a nodular coral bed. Since the origins of the latter have yet to be fully understood the site is important for its research potential. The quarry is a key stratigraphic locality for rocks of the Carboniferous Limestone with palaeoenvironmental and fossil indicators of great interest.

This impressive quarry is situated between the South Craven Fault and the North Craven fault.

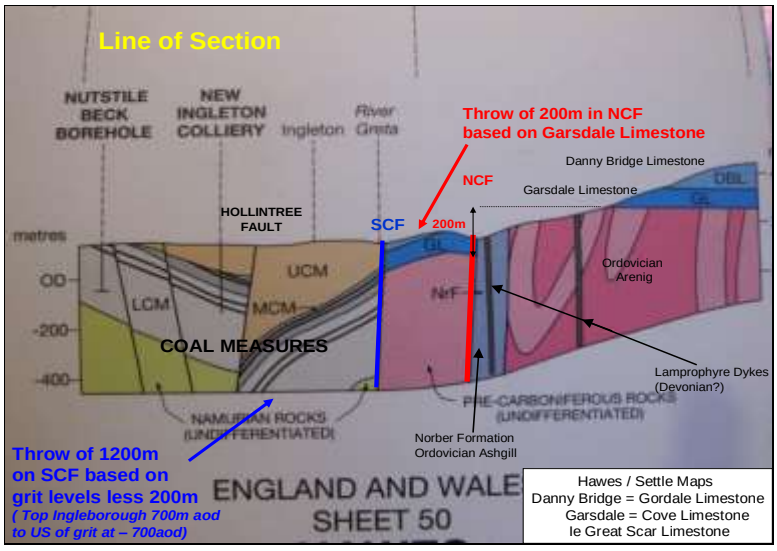
The north end of the quarry is relatively unfossiliferous. As you pass south along the quarry face a shaley coal seam is exposed. This is seen just above the iron staining in the associated fireclay. It indicates a basin-wide lowering of sea level (palaeokarstic surface). There was sufficient time for colonisation by plants before the sea flooded in once more. There is a nodular bed enriched in pyrite 15 metres above coal seam. The palaeogeographical setting for this sequence of limestones is perhaps that of an atoll where the nodular bed is some kind of turbidite slumping on the flanks of the atoll.

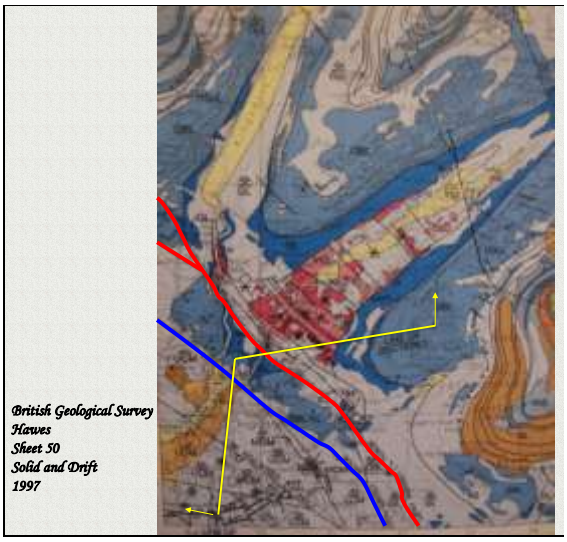
Fossils can be found in the south end of the quarry and include typical Lower Carboniferous corals and brachiopods. It's also extremely popular with rabbits!

The mineral **jarosite** is reported associated with decomposed pyrite in fireclay below the coal seam in Viséan limestones at Meal Bank quarry, Ingleton, Yorkshire. The chemical composition of two samples of the jarosite is given and the mineral is illustrated by electron microscope photographs.

Jarosite is a basic hydrous sulphate of potassium and iron with a chemical formula of $KFe^{3+}{}_3(OH)_6(SO_4)_2$. This sulphate mineral is formed in ore deposits by the oxidation of iron sulfides. Jarosite is often produced as a byproduct during the purification and refining of zinc and is also commonly associated with acid mine drainage and acid sulphate soil environments

Jarosite





Meal Bank Quarry is at the kink in the section line on the plan between the North and South Craven Faults

For information about Meal Bank Quarry **Ctrl+click** here

https://historicengland.org.uk/listing/the-list/list-entry/1020889

Hoffman Kiln at Ingleton

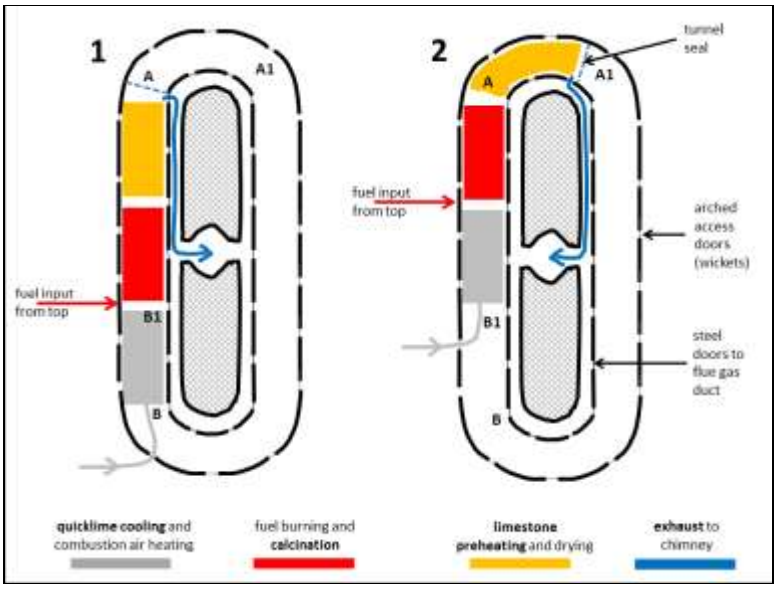
Clark and Wilson, two Austwick men, expanded their lime burning operations from Giggleswick Scar by taking on the lease of Mealbank Quarry and its Ingleton Lime Kilns business in 1864. Two years later they purchased a patent licence to build and operate a Hoffmann continuous kiln there, effectively preventing anyone else from building such a kiln within 11 km of Ingleton, Skipton and Settle and 8km of Clitheroe. The kiln they built had 14 firing chambers, producing 40-60 tons of lime per day, and the owners – Clark, Wilson, & Co Ltd now operating as the Ingleborough Patent Lime Works – extended it in 1893 to 18 chambers with capacity increased accordingly. The quarry was connected to the north west by a branch to the Clapham/ Tebay line which crosses the famous viaduct – Famous because it's lack of use almost broke the Midland Railway Company.

How it worked

Limestone blocks from the nearby quarry were barrowed in and carefully stacked by hand in the burning chamber. Coal was mixed in, and once lit, more was added through small coal chutes from the top of the kiln. The complicated flue system allowed the heat and speed of the burn around the kiln to be carefully regulated. As one chamber burned, waste heat warmed limestone blocks in the next two or three chambers. Behind the burning zone, two or three chambers were left to cool down before the lime could be shovelled out and loaded onto railway wagons waiting in the sidings beside the kiln. Limestone was burned continuously in a circuit around the kiln and it took an average of six weeks to complete one whole circuit.

Four men worked inside one chamber. They packed fist-sized lumps of limestone up to the roof and it could take as much as 5 days to fill a chamber. These men were paid for the amount of work they actually did so if bad weather meant no limestone was quarried and brought to the kiln, then the kiln workers didn't get paid. At the other end of the process were the 'drawers'. They were paid a higher wage because their job of emptying (drawing) the kiln was considered to be one of the worst. The burnt lime in the chamber still looked like lumps of stone but because of the chemical changes that took place during the burning the process it became much lighter. However, the heat from the fire had turned the stone pieces into a solid mass and this meant that it was not easy to remove. The workers had to try and break up the lime by hitting it with picks, and then remove large pieces that broke away with a fork or shovel. Whilst this was going on the temperature inside the kiln chamber was still very hot. This not only made the work very hot and sweaty, but also dangerous. Powdered lime often ended up in the men's clothes and boots, and it stuck to their moist skin causing an itchy rash. The dust could also become airborne and so got into their throats and lungs.

Hoffmann were very coal efficient kilns but very labour intensive so when Spencer Kilns (vertical kilns) were patented in 1900 with low labour costs the Hoffmann Kilns became out of favour especially when the Spencer kilns could be made cheaper using steel.



Plan view of Hoffmann kiln showing principle of operation`. The zones are located inside an annular tunnel. The exhaust gases leave via a chimney located above the central blue arrows on the diagram.