Spireslack Surface Coal Mine: a unique resource for education and recreation

The geology exposed at the Spireslack Surface Coal Mine near Muirkirk in East Ayrshire makes it a unique and stunning geodiversity site, one that can integrate geology with local social and economic history, recreation, and education. While much of the geology of Scotland's central belt is concealed under thick unconsolidated Ice Age deposits, Spireslack presents a window into the Carboniferous Period some 330 to 315 million years ago.

In 2007, the one-kilometre long excavated canyon in the northern part of the site was proposed as a local geodiversity site following discussions between the then operators, Strathclyde Geoconservation Group, GeoConservationUK, East Ayrshire Council, and the British Geological Survey (BGS). With the collapse of Scottish Coal in 2013, the Scottish Government intervened and appointed the Scottish Mines Restoration Trust to evaluate the future of the site with geological guidance from BGS. A limited restoration programme is nearly complete and it is envisaged that the site can become a recreational and educational resource that will benefit both the local, and wider community.

The Spireslack canyon looking to the north-east, showing exposed, continuous Carboniferous strata to the right and limestone pavement on the left.

The Past Uncovered

The 130 metres of Carboniferous strata visible at Spireslack are typical of this time period: marine limestone and mudstone, shallow deltaic to fluvial sandstone, terrestrial mudstone, ironstone, swamp coal and seatearth. These cyclic packages are symptomatic of sea level changes occurring at a global scale.

The Spireslack strata experienced deformation later in the Carboniferous Period, and are now tilted across the canyon, forming one limb of a broad synclinal fold. Folding was accompanied by faulting. At least 5 narrow basaltic dykes cut through the Carboniferous strata. These were intruded around 60 million years ago as part of the Mull Dyke Swarm. At this time, the Atlantic Ocean was beginning to open and the dykes provide local evidence for that major plate tectonic event.

Dyke intruding sandstone and siltstone.

Spireslack provides an opportunity to study the detail of geology of this part of the Carboniferous Period in central Scotland. Features of note

include regionally important limestone and mudstone marine marker bands and their fossils; natural variation in fluvial sandstone sequences; ancient soil horizons and in situ plants; fold- and fault-related structures.

Coal and Football!

Despite the vast quantities of coal mined in central Scotland, sites such as Spireslack are rare. More often they have already been restored and the geological data are no longer accessible. The 20th-21st century opencast mining operations at Spireslack were superimposed on underground workings which had ceased by 1931. Evidence of this earlier mining practice is still visible in the excavated face, where intact but somewhat crushed wooden pit props are seen.

In-situ wooden pit prop from earlier underground mining

Geological information available at Spireslack provides an essential window into the subsurface, which can be used as an educational resource to help reduce and understand geological uncertainty in Carboniferous rocks.

Bill Shankly, arguably Liverpool Football Club's most famous manager, hailed from the mining community that lived, worked and played in the now disappeared village of Glenbuck. The local Glenbuck Cherrypickers football team achieved fame as a source of some fifty professional football players until the club was disbanded in 1931.

Future Prospects

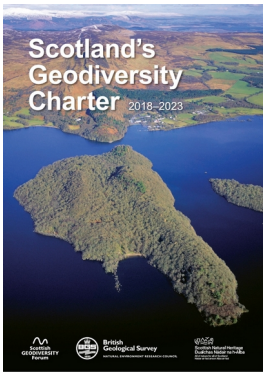
"Spectacular is no understatement, every staff geologist should see Spireslack at least for a half-day sometime in their career, for personal education!" Dr Tim Raub, Lecturer in Earth Sciences, University of St Andrews.

Natural, clean and continuous exposures of these economically important strata are rare, and the exposures at Spireslack give an opportunity to better understand the geology of this part of the Carboniferous within central Scotland. This opens up an opportunity for industry, academics and the general public to study the geological environment at the time, to view excellent examples of key features, and also learn how the geology of the area has influenced the economic and social history of the area. Although at present the site is not open to the public, BGS have led field trips for 34 groups and over 400 people to the site since 2014.

Fault structures are well exposed in the limestone pavement, including relay ramps and evidence of small scale faulting.

The partial remediation of the site is nearing completion, and the future of the site is being discussed. It is likely that the site will be offered to new owners, including the Forestry Commission. East Ayrshire Council will work with the new owners and other partners to develop the site further.

This is a site of great significance that needs to be protected and enhanced as a resource for future generations. There is good potential for a visitor experience and accessible green space for the local community, including a network of paths. As an educational resource, the site could be developed as a 3D laboratory and learning platform for industry, as well as offering learning opportunities for all ages.



Scotland's Geodiversity Charter presents a vision that geodiversity is "recognised as an integral and vital part of our environment, economy, heritage and future sustainability to be safeguarded for existing and future generations in Scotland". The Charter was first published in 2012, and refreshed in 2017. It is supported by 93 signatory organisations. Further information at scottishgeodiversityforum.org/charter/.