Spireslack Locality 4 (and 4b): Palaeogene dyke network exposed on McDonald Limestone

NGR: [274631 630471]–[274698 630512] [NS 74631 30471]–[NS 74698 30512]

Key category of interest	Rarity	Quality
1. Igneous rocks	5	5
2. 3D visualization	4	4
3. Structural geology	2	2
4. Mineralisation	2	2

Access: Good access to base of exposure, easily accessible from roadway.

Current safety: Little evidence of recent falling blocks observed on limestone pavement, uneven surfaces, loose scree on limestone pavement. Occasional falling loose scree noted on main scarp exposure.

Measures to enhance site: Clean up loose scree overlying dyke on limestone pavement, and level surface around the site as viewing platform.

Key categories in order of interest (1 = primary interest); Rarity, 5 = only example in Spireslack, 1 = many examples in Spireslack; Quality 5 = exceptional preservation in Spireslack, easy access/viewing potential 1 = average preservation in Spireslack, difficult access/viewing potential

Photograph overview with polygon boundary

(Overview of Locality 4) and 4b (north and south wall respectively). Site boundary includes key rock exposures, immediate access to site and potential for viewpoints to the site at the base of the limestone pavement. Photo on the left looking to the north, photo on right taken looking south toward scarp.

Site description

Geology

An exceptionally well exposed Palaeogene quartz dolerite dyke network is seen intruding the McDonald Limestone at this location. The same dykes on the limestone pavement are also exposed in the scarp, where they appear as isolated strands (i.e. not spatially linked to one another). However, the exposure on the McDonald Limestone proves the apparently individual dykes from the scarp merge together in 3D space. This locality provides a very good opportunity to study the 3D geometries of intrusive bodies throughout layered strata on a large scale, as well as the mechanical effect igneous intrusions have on the strata, e.g. the McDonald Limestone is buckled and faulted at the margins of the dyke. As well as the1 m thick dykes, there are also thinner (c.40 cm) dykes within the locality boundary which display baking of adjacent strata, alteration of the dolerite to white trap, and mineralised surfaces. These smaller dykes are also visible on the scarp. In addition to the 3D visualisation interest of observing the dykes on the limestone pavement and then on the scarp, the scarp exposure also shows areas where the dyke has been altered to white trap, a process related to intrusion of hot magma into organic rich rocks.

Access and enhancement suggestions

This section is easily accessible on foot from roadways. Access could be improved by flattening the area in front of the dyke to provide a viewing platform to appreciate the 3D geometry of the dyke network. For the exposure in the scarp, a

level platform 5 m from the base would provide an appropriate viewing area for the dyke.

Site photographs

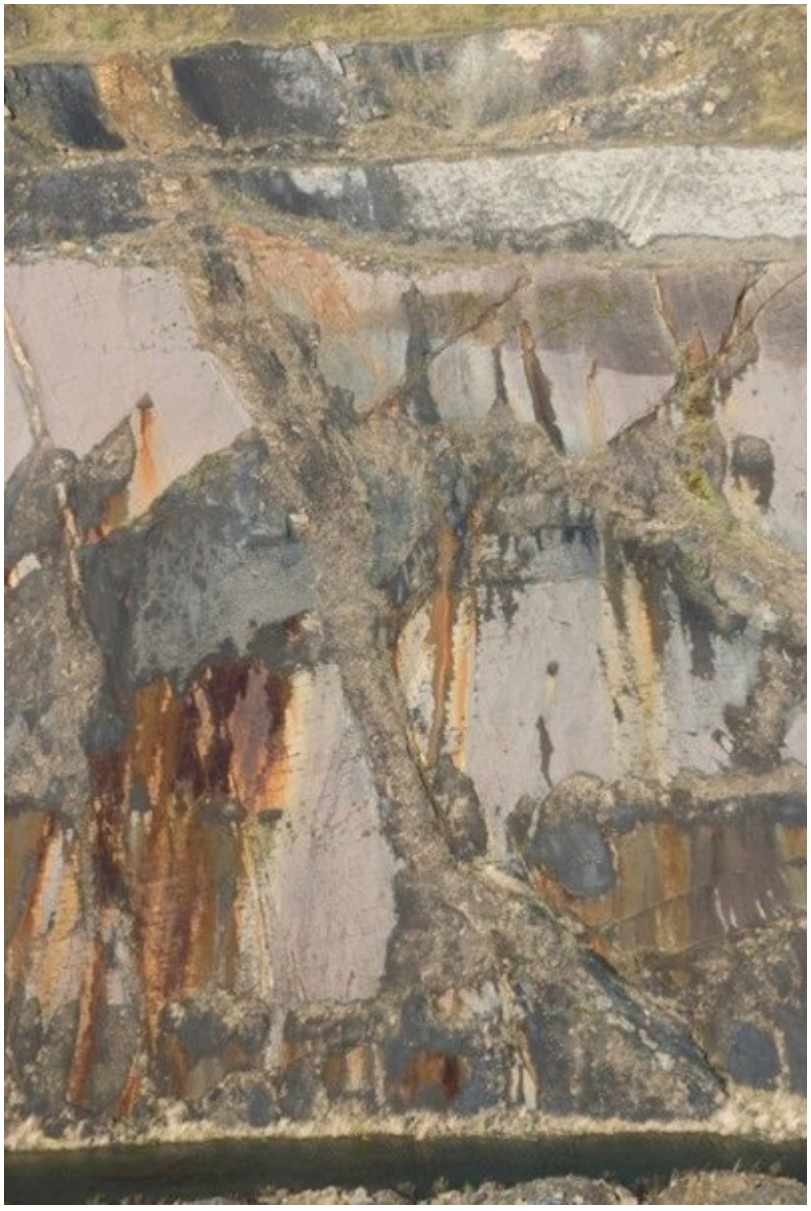
(Spireslack_4 P1): Two approximately 1 m thick quartz dolerite dykes merge near the top of the limestone pavement. The leftmost dyke has a linear trend, whereas the rightmost dyke curves to merge with it in the centre of the photograph. The intruding dolerite has locally distorted the limestone and baked it at its contact. © BGS, NERC.

(Spireslack_4 P2): Limestone which has been baked at the dyke margin. Calcite mineralisation associated with the intrusion runs parallel to the dyke's contact with the limestone. © BGS, NERC.

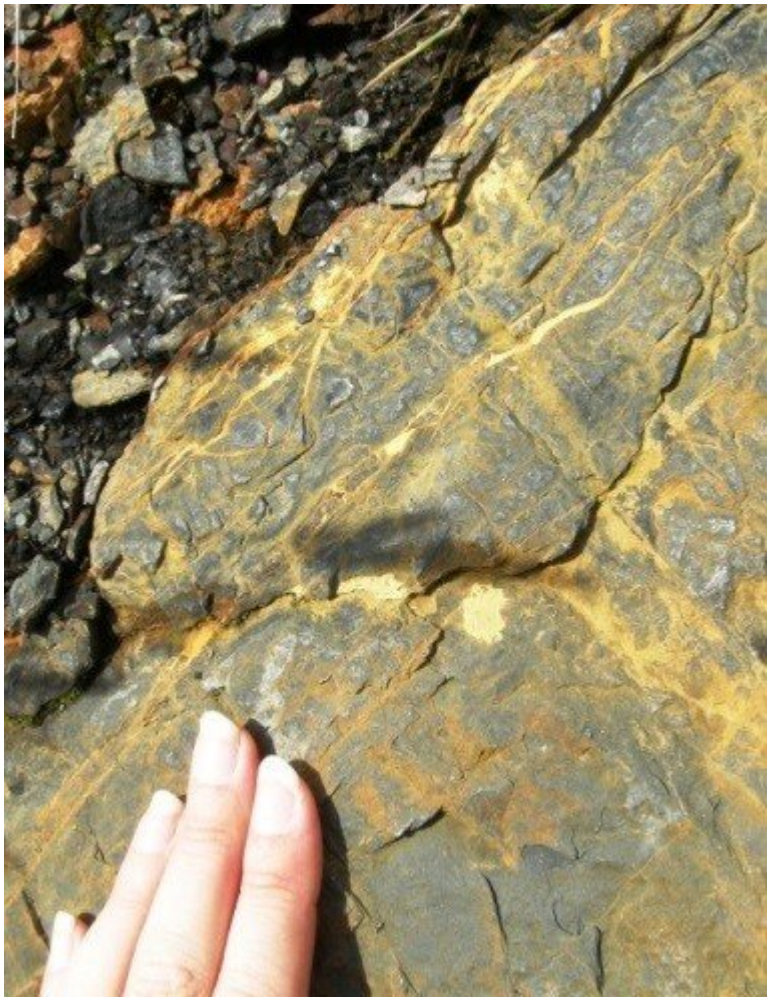
(Spireslack_4 P3): Much of the lower part of the dyke in the scarp is covered in spoil and vegetation. Where the dyke cuts organic rich layers (i.e. coal or mudstone) the dyke has been altered to white trap. © BGS, NERC.

References

(Overview of Locality 4) and 4b (north and south wall respectively). Site boundary includes key rock exposures, immediate access to site and potential for viewpoints to the site at the base of the limestone pavement. Photo on the left looking to the north, photo on right taken looking south toward scarp.



(Spireslack_4 P1) Two approximately 1 m thick quartz dolerite dykes merge near the top of the limestone pavement. The leftmost dyke has a linear trend, whereas the rightmost dyke curves to merge with it in the centre of the photograph. The intruding dolerite has locally distorted the limestone and baked it at its contact. © BGS, NERC.



(Spireslack_4 P2) Limestone which has been baked at the dyke margin. Calcite mineralisation associated with the intrusion runs parallel to the dyke's contact with the limestone. © BGS, NERC.

(Spireslack_4 P3) Much of the lower part of the dyke in the scarp is covered in spoil and vegetation. Where the dyke cuts organic rich layers (i.e. coal or mudstone) the dyke has been altered to white trap. © BGS, NERC.