REPORT

Know your Local Geological Sites: Gunthorpe Weir

Sixty Local Geological Sites in Nottinghamshire are now included in the Nottingham City Insight mapping project. Regionally Important Geological/ Geomorphological Sites (RIGS) were first located and described in a project by David Bowering and others between 1987 and 1991. Over 130 sites were identified, visited and catalogued with standardized notes, photographs, maps and plans recording details of each site. These are held in paper form at Wollaton Hall. A Nottinghamshire RIGS Group was established in September 1991 and held regular meetings for some years (*Mercian Geologist* 1994, 13 (2), p 144).

However the Group eventually ceased to operate and updating of records stopped. A new initiative, by an informal group with representatives from Nottingham City Council, Nottinghamshire Wildlife Trust, British Geological Survey and Wollaton Hall Museum began to investigate the practicalities of checking and updating the existing sites, including digitizing the paper records and using GIS technology to enable the sites and associated datasets to be more widely and easily available to the public.

Following a number of meetings Nottingham City Council provided a small grant to enable a reinvestigation to be carried out in 2017–2018 by Andrea Snelling of Nottingham University. A number of sites had been developed, were inaccessible or ceased to exist. Around 60 Local Geological Sites (LGS) have now been placed on the Insight GIS mapping platform of Nottingham City Council and can be found in the Environment section at https://maps.nottinghamcity.gov.uk/insightmapping/#. Each site shows the area of the site with a brief description of the main features.

Seams of gypsum

General view of rock face at Gunthorpe Weir

As an example, one site is the exposure of gypsum beds in the Gunthorpe Member (previously Gunthorpe Formation) of the Sidmouth Mudstone Formation, Mercia Mudstone Group (Triassic) at Gunthorpe Weir on the River Trent. Here a number of individual gypsum beds outcrop in the river cliff on the east bank below the weir. The beds are up to 6 cm thick with ramifying thinner cross-cutting veins of gypsum in the red- and green-coloured mudstones. Loose blocks by the riverside also display ripple marks and salt (halite) pseudomorphs. These are all indications of an arid but fluctuating terrestrial environment with periodic flooding and desiccation events. It is an excellent, freely accessible and scenic exposure to visit.

Halite pseudomorphs (horizontal field of view c.4 cm)

Ripple marked sandstone

Tim Colman, June 2020

EXCURSION

Hardstoft oil well and Kelham Hall Oil Museum

26 May 2019

Leaders Dr Tim Pharaoh and Kevin Topham

A group of around 25 members and guests met at Oilwell Nursery, Hardstoft, near Tibshelf in Derbyshire. We were welcomed by Philip Schofield, the owner who is resident on the site and who took us through his Garden Centre to examine the relics of Hardstoft No 1 well, the UK's first producing oil well. Oil was discovered at a depth of 3070 feet on 27 May 1919, and to commemorate this centenary anniversary a banner was unfurled for a group photo. Mr Schofield briefly outlined the recent history of the site, after which Cameron Laing, an oil engineer from Aberdeen, described the engineering challenges that faced well diggers in this era before rotary drilling rigs (see *Geoscientist*, March 2016). Dr Pharaoh, with the aid of a BGS map, described the formation of the Hardstoft Dome, or anticline, a late Variscan structure with a north-west trend whose orientation was influenced by structures in the concealed Caledonide basement, since it is oblique to the east-west Variscan Front.

We were told how oil was formed from organic-rich source rocks, which in the East Midlands is principally the early Namurian Bowland Shale Formation (formerly known as the Edale Shales). At Hardstoft, however, the oil originates from the underlying Carboniferous Limestone, which is also the reservoir rock, capped by mudstones. Detailed information about the hydrocarbon province in the East Midlands can be found in the BGS subsurface memoir by Pharaoh et al. (2011). Cameron Laing then spoke about the history of the North Sea oil industry and the drilling techniques employed there.

After lunch, the party moved to Kelham Hall in Nottinghamshire to view the Duke's Wood Oil Museum, recently relocated from the original site near Eakring. There we were welcomed by Kevin Topham, the founder and curator of the museum. Kevin was a survivor of the 1965 Sea Gem drilling rig disaster in the North Sea and the museum is in part a memorial to those who lost their lives in that event. Kevin outlined the history of the Eakring and related oilfields near Newark which produced significant amounts of high-quality oil at a critical period during WW2. This year is the 80th anniversary of first production at Eakring, on 19 June 1939, discovered by D'Arcy Petroleum Company on the eve of the war and developed in great secrecy. Production was greatly facilitated by 42 American engineers from the Noble Drilling Company of Ardmore, Oklahoma who stayed for a year in 1943 and were billeted at Kelham Hall, then an Anglican monastery. Many anecdotes concerning American

drillers, monks and local girls were exchanged. The oilfields ceased production in 1965.

Outside, Tim Colman outlined the history of Kelham Hall, a Victorian Gothic masterpiece completed in 1843 and designed by Sir George Gilbert Scott, who went on to build the St Pancras hotel, the two buildings being strikingly similar in parts. Some of the party then moved on to Duke's Wood, a Nottinghamshire Wildlife Trust nature reserve on the site of the Eakring oil well site, where they looked at the remaining pumping infrastructure preserved there. The famous bronze statue of the American driller is now at Rufford Abbey Country Park after being stolen, and a glass fibre replica is at Eakring.

(Left) Sample of oil collected from well-head seepage, which can be purchased from the Garden Centre along with a copy of the 2013 paper by Craig et al. (photo: David Bate)

(Below) Group photo at the site of Hardstoft No 1 oil well, celebrating the centenary of the first UK oil discovery on 27 May 1919 (photo: David Bate)

(Above) Group photo at Duke's Wood, Eakring, with a replica of the original bronze statue of an American driller; Cameron Laing is on the far left, and Tim Pharaoh second from left (photo: Paul Nathanail)

References

Craig, J., Guyas, J. Laing, C. & Schofield, P. 2016. Hardstoft – Britain's first oilfield. *Geoscientist Online*, https://www.geolsoc.org.uk/Geoscientist/Archive/March-2016/Hardstoft-Britains-First-Oilfield (originally published in *Oil-Industry History*, **14** (1), 2013, 97–116)

Pharaoh, T. C. et al. 2011. *Structure and evolution of the East Midlands region of the Pennine Basin: subsurface memoir.* Keyworth: British Geological Survey, 144 pp.

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