Hartcliff Rocks Quarry, Avon

[ST 532 662]

Introduction

Hartcliff Rocks Quarry (1 km north-east of Felton) (see (Figure 6.13)) was a large aggregate quarry, elongated roughly east–west and exposing a northern face of considerable length (originally 0.5 km). The quarry worked Carboniferous Limestone, overlain for most of the site by Triassic Dolomitic Conglomerate. The quarry is at present a landfill site, with much of the southern part of the quarry now infilled, and with the eastern part actively being filled and landscaped. However, some of the major geological features of the quarried northern section have been conserved, and despite being overgrown in places, with faces needing some tidying up, excellent, easily accessible geological and mineralogical features can be studied at the site (see (Figure 6.14)).

Description

The quarry has been cut into a ridge of the Carboniferous Limestone, part of the Broadfield Down Anticline. The section now exposed was probably part of the upper bench of the quarry. The central part of this quarried section exposes fine sections of the plane of unconformity, especially the Triassic wadi deposits overlying the Carboniferous Limestone. The wadis contain rich iron ores of a replacement type, typical of many Mendip sections. Calcite- and barite-rich mineralized veins cut through the Triassic and Carboniferous sedimentary rocks and iron ores. The plane of unconformity is sinuous, reflecting the shape of the Triassic Dolomitic Conglomerate wadis.

The Triassic and Carboniferous strata have both undergone extensive silicification associated with the replacement of massive iron oxides. The iron oxides (hematite, goethite, and limonite) are themselves siliceous. In the wadis, limestone pebbles are associated with iron oxides and sometimes show the replacement growth of crystalline quartz (so-called 'Bristol Diamonds'). The iron ores tend to be concentrated along the plane of unconformity, the Dolomitic Conglomerate being the preferred host for such mineralization. Several late-stage, minor calcite-barite veins cut through the rocks and iron mineralization. Towards the eastern end of the quarry, neptunian dykes containing some calcite and barite cross the wadi structures. However, the best-developed mineralized fissures and neptunian dykes are to be found at the extreme western end of the worked section. These are near-vertical structures up to 5 m wide, and despite being extensively overgrown the critical geological features can still be studied. The fill varies from comb-layered calcite, to minor calcite-barite veins, and iron-rich clays. Some manganese oxides have been reported to occur in these structures but are not readily visible at present.

In front of the faces of the western section a large heap of intensively mineralized rock has been preserved. The material is essentially blocks of Dolomitic Conglomerate and Carboniferous Limestone containing the iron oxides hematite and goethite. Traces of galena, barite, calcite and quartz are also present.

Interpretation

Traces of former iron workings are widespread in the Mendip Hills area, although production was usually on a small scale. Their origins have been compared and likened to the iron ores of the Forest of Dean and South Wales (seen for example at the Mwyndy Mine GCR site, Chapter 5). The ores worked were iron oxides (hematite, goethite and limonite). In many instances these iron oxides were intimately associated with mixtures of earthy black manganese oxides (principally pyrolusite and psilomelane), collectively known as 'wad'.

The iron orebodies are always more extensive and continuous than the associated manganese ores, which occur in smaller pod-like structures. Such a deposit was formerly mined for iron ore at Higher Pius Farm Quarry [ST 535 491], the ore occurring as pockets and veins associated with black earthy manganese oxides (Burr, 1996).

Iron ore deposits are recorded from faults in the Coal Measures of the Somerset and Avon Coalfield and as replacements and fissures-fills in the Carboniferous Limestone and Triassic Dolomitic Conglomerate throughout the Mendip region. These are specifically concentrated in the Hartcliff Rocks Quarry, Winford Ochre Mine and the Compton Martin Ochre Mine GCR site of the north Mendips (Symes, 1985). At Winford Ochre Mine [ST 535 638] some 3 km south of Hartcliff, a considerable tonnage of siliceous iron ore was mined (mainly as pigment) from similar wadi-filled deposits (Alabaster, 1982). Again at Winford it can be seen that mineralized veins carrying calcite and barite, and also a little galena, cut the iron ores. A phase of silicification is associated with the iron oxides such that dumps associated with the quarried area contain fine, clear quartz crystals ('Bristol Diamonds').

Alabaster (1982) reviewed the characteristics of all Fe-Mn deposits in the Mendips region and related them to one mineralizing event of late Triassic age. He considered that the style and age of the deposits demonstrated the following relationships:

1. in fissures, Fe and Fe/Mn mineralization Is cut by Jurassic fissure-fill;
2. in east Mendip, mineralized fissures with Triassic fill are truncated by the basal Inferior Oolite (Jurassic) unconformity;
3. at various localities veins of Pb-Zn-Ba mineralization cut through both the Lower Lias and Inferior Oolite.

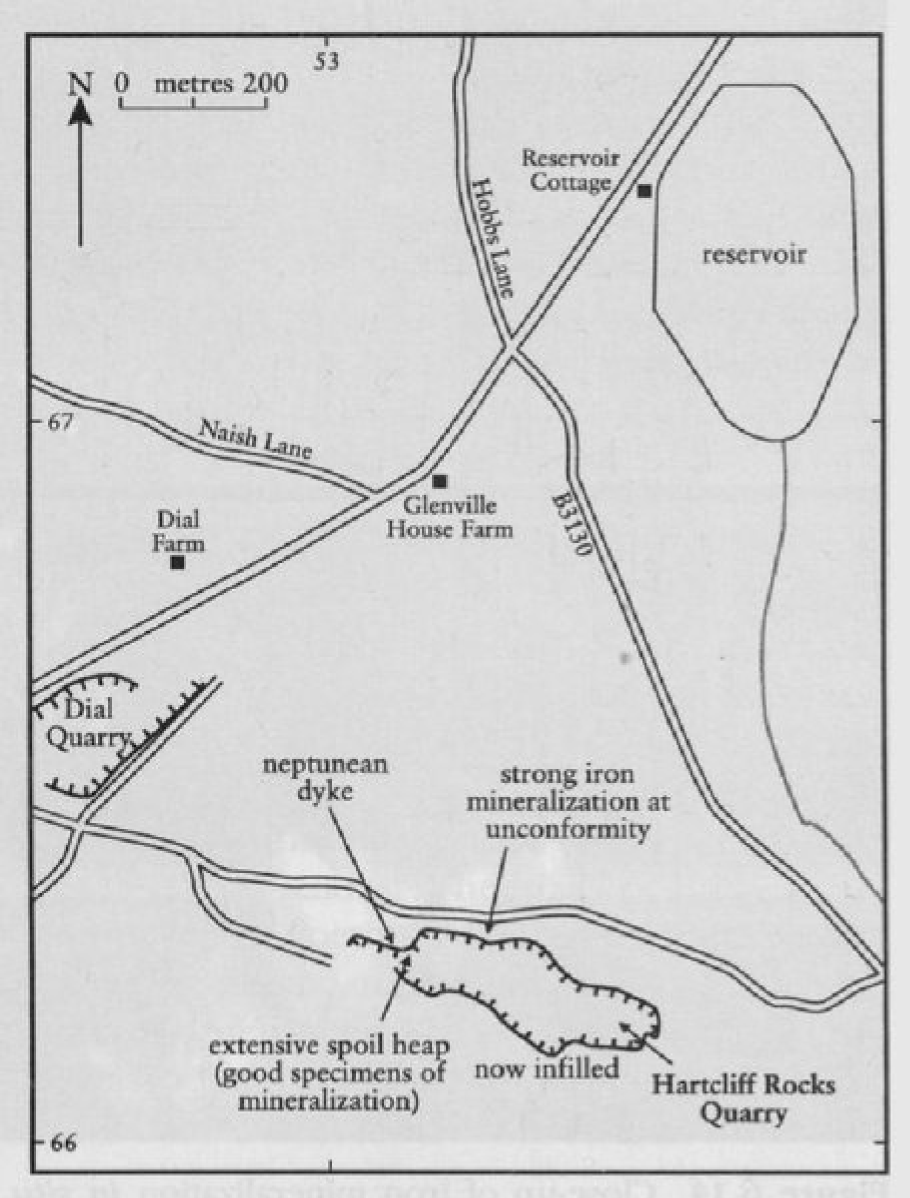
Green and Welch (1965) observed that the emplacement of hematite pre-dated the Pb-Zn mineralization, the hematite deposits often being cut by lead veins. They supposed that descending iron-rich solutions in Triassic basins formed the Mendip ores. However, Ford (1976) considered that the iron ores were of a gossanous character, formed by weathering, probaby in late Tertiary times. It is now generally believed that the red hematite ores were formed and concentrated, normally as replacement deposits, under hot and arid conditions in Triassic times. However, Alabaster (1982) proposed that the source of the iron and manganese was due to intense weathering, under semi-arid conditions, of pyrite-and/or siderite-bearing Carboniferous rocks, the associated manganese being primarily derived from the Upper Carboniferous shales.

Within any mineralized area, the relative amounts and distribution of iron and manganese have been determined by the chemical environment at the site of precipitation and the chemistry of the mineralizing solutions themselves, such factors as the pH and the oxidation potential being all-important.

Conclusions

Hartcliff Rocks Quarry provides excellent exposures of mineralized Triassic Dolomitic Conglomerate rocks unconformably overlying the Carboniferous Limestone. Both rock-types have undergone extensive replacement by siliceous iron oxides. The iron ores, principally hematite and goethite, are concentrated along the plane of the unconformity. Calcite-barite veins and neptunian dykes cut across the rocks and associated iron mineralization.

References



(Figure 6.13) Outline map of the Hartcliff Rocks Quarry GCR site.

(Figure 6.14) Close-up of iron mineralization in situ, north quarry wall, Hartcliff Rocks Quarry. The dark material is mainly hematite and goethite. A cavity in the massive iron mineralization has crystals of calcite, quartz and hematite deposited by late mineralized solutions in groundwaters. (Photo: Natural England.)