PURLEY CHASE MANGANESE MINE, MANCETTER, WARWICKSHIRE

Alan F Cook

Summary
This “pillar and stall” mineworking has no archival written record or mine abandonment plan of it origins and ownership. The extraction method was made more difficult because the structural of between 35° and 40° to the SW, which is similar to the Seven Sisters Cavern at Wren’s Nest. Mining was started as a shallow quarry in the valley side of the un-named brook rising in the Slack’s Wood, Oldbury Hill area. The valley was dammed in its upper reaches to create Oldbury Reservoir, a canal top-up feeder in 1767. This was drained in the 1990’s and is now part of Oldbury Hill quarry. The main lower mine entrance is at OS NGR SP3094795357, and the higher at SP3095295769. The possible crown hole, or other shaft is at OS NGR SP3083896182, which may belong to another mine, but it more than likely associated with Purley Chase manganese mine.

Geological setting
The manganese mine occurs in the Nuneaton - Hartshill – Oldbury Ridge, which is part of the Ansley Plateau (Fig. 1), which in turn is part of the East Warwickshire Plateau, Birmingham Plateau. Allen (1977, 1978), Cook (1996), Howell (1859), Eastwood et al (1923), Bridge et al (1998).

The manganese deposits formed on the Cambrian sea bed and during the succeeding millennia were concentrated in some of the regional rocks and subjected to high temperature igneous intrusion (Midlands Minor Intrusive Suite). Most of the igneous rocks are lamprophyres. This suite of igneous rocks is associated with particular plate tectonic areas and processes alluded to in Sylvester-Bradley & Ford (1968). There are good correlations with intra-plate igneous activity as well as the closing phases in a subduction zone; there are even similarities with magmas in a seafloor spreading zones. The influence of deep weathering in the Permo-Triassic and Tertiary weathering of the local topography should not be underestimated.

Geological records describe lumps of soil-like manganese as large as 8 feet (2.4 m) being found in Hartshill Hayes. Phillips stated that he found a new type of ore which he named varvicite in Parkes (1824), Phillips (1829, 1830). This was later found to be a mixture of several well known ores e.g. psilomelane (Fig. 2) and pyrolusite by Vaux (1937).
There were many manganese workings shown on old maps, most of the ore was sent to the cotton bleachers of Lancashire. There are still dumps and old workings in Hartshill Hayes and also remains of a washing pond with a dam, spoil heaps and hollows amongst the trees. These Cambrian rocks comprise sandstones, shales, mudstones and siltstones, often containing fossils but also manganese ores which were extensively worked and processed between 1814 and 1920 noted by Carney (1998) and Cook (2000). Manganese occurred in such quantities that a geological survey was undertaken in 1814 by a Cornish mining company, connected with the Jee family of Hartshill. An extraction zone was then developed between Abbey Green, Nuneaton, and the Atherstone Outwoods.

Mining history
All old mine abandonment records were researched along with, Tithe maps, enclosures, and estate maps; none of which recorded this mine and its history, see Dewey et al (1915), Dewey and Dines (1923), Hunt (1860) and Records of the School of Mines (1853-1881). Manganese prospecting took off in a big way in the Nuneaton – Atherstone area in 1814 and by 1850 several big companies were mining beneath Tuttle Hill (Fig. 3). The Jee family and the Cornish mining companies became very interested in the ore. There was an organised mine beneath Tuttle Hill and the Hollystitches Road area, as well as numerous small pits in the Hartshill and Outwoods area, see also reports from the Commissioners (1838-9, 1850-9).

The following list summarises the local manganese mining industry:
Camden (1610), in his tour of Britain in 1581, mentioned quarrying at Nuneaton.
Collidge (1996), Judkyn's family history details quarrying in the 18th C. The early operations were probably under the control of Etone and Merevale Priories. This would later transfer to Sir Marmaduke Constable, and later to Lord Pagett, the Tomkinson brothers and then the Judkyns & Cropper families joined by Jees.
1788 The first British penal settlement in Australia. Several local manganese miners’ named Orton were transported there.
1814 Manganese geological survey from Nuneaton to Atherstone.
1818-45 CRO Original bundle 108/1-35, includes correspondence to R. Jee re John Williams’s proposals for working his land for manganese. In 1818 statements re: manganese accounts, receipts, shipments and profits.
1818-45 A plan of the Green showing position of and details of workings. 1840's, letter to Jee from Messrs. Williams regretting the end of business association because of insufficient manganese remaining to be worked 1845.
1820 Grant of licence (109) by Richard Jee of the Park, Hartshill to John Williams of Cornwall to search for and work manganese in 7 closes in Hartshill for 14 years paying £1 10s per marketable ton within 1 month of manganese being removed and giving 3 days notice of the weighing. Includes covenants re: working practices
1834 Cornish Mining Company began prospecting for Manganese again at Nuneaton-Hartshill. They dug several deep pits but found nothing of worth.
1836 July: Nuneaton Diary Vol. 2, further searching for manganese by Cornish Mining Company in several fields belonging to estates of Aston & Tomkinson up Wash Lane & Mr. Bond's field. They went deeper in their sinking than previously in Bond's Field. They sank 3 pits 5, 6 & 7 Feet deep without success, see Astley (1810-45)
1838 Notebook of evidence (110) re: Mrs. Topp's alleged stealing of the company's manganese. Entitled Evidence as to manganese Nul et Void Thomas Jee
1840 19 April: Analysis of specimens of manganese ore (111) by John Woolwich of The Crescent, Birmingham. Primitive peroxides etc. for Mr. Burberry
1841 Counterpart grant of liberty (112) by Richard Jee of Hartshill to Michael Williams of Trevince, Cornwall and William Williams of Tregallow, Cornwall, to search for and work manganese on lands and premises at Hartshill (sketch plan) for 14 years, paying £1 5s per marketable ton and giving 3 days notice of weighing. Includes covenants re: working practices.

Mine
The mine lies within the O.S. Grid sheet SP39. It is all situated above 106 m (350 feet) contour with its maximum elevation of 137 m (450 feet) A.O.D. On the majority of visits made by the author in the period 1964 to 2000 the mine was usually partially flooded, which prevented surveying beyond the first stall (Fig. 4).

Fig. 4. Flooded section to NW 24/2/1982. Cook (1964-2012)

The abandoned Purley Chase manganese mine is probably more extensive than has ever been surveyed, because flooding prevents examination. The presence of a crown hole like depression 390 m to the north (Fig. 6) and this, the fact that much rainfall run-off from the surrounding field flows toward it and disappears. This feature does not appear on the older Ordnance Survey maps and plans (Fig. 6).

Fig. 5. 2006 24th September possible crown hole, 390m NW of Purley Chase manganese mine main entrance. Cook (1964-2012)

Surviving features, remains
The roof is very low in places preventing standing upright, which means that surveying has to be done on hands and knees (Fig. 7).

Fig. 6. O.S. plan of 1887-89 possible crown hole, 390m NW of Purley Chase manganese mine main entry

Fig. 7. Mine survey scale (1.0 m stadia) showing “pillar and stall” 24/2/1982. Cook (1964-2012)

The only traces of manganese minerals were shiny purple-blue or blue-black mineral stains on the surfaces of the rock (mainly pyrolusite). The roof has phosphor-luminescent white fungal growths in places. It is quite possible the fungus absorbs a lot of manganese into its cell structure, like most mines and caves, the ambient temperature underground never
The rock strata, faulted strata, proximity of heavy buildings or high traffic loading, and even seismically disturbed faults. The whole floor was strewn with broken angular rocks, noted in Cook (1971).

The Russell Society constructed a limited and safer form of access using pipes and a lockable gate (Fig. 8).

Interpretation

The commercial demand for manganese arose from the industrialisation of the cotton industry in the late 18th and early 19th Century which required an industrial-scale method of bleaching cotton. The use of ‘bleaching powder’ (chloride of lime and other chlorine/Calcium compounds) reduced the time taken to bleach cotton from months (bleaching in sunlight, later superseded by bleaching using sulphuric acid) to hours. The manufacture of paper and soap also required bleach. Commencing in the 1780’s, chloride for bleach manufacture was obtained from salt by reaction with sulphuric acid and manganese dioxide. This method declined towards the end of the 19th century in response to the introduction of chlorine production processes from the hydrochloric acid by-product of the Leblanc process (manufacture of sodium carbonate).

One of these chlorine production processes, the Weldon Process, involved boiling hydrochloric acid with the manganese to produce chlorine and manganese chloride. Manganese was considered to be expensive by the chlorine industry and recovery processes for its re-use were developed. One such recovery process involved treating the manganese chloride with milk of lime (a thin cream of slaked lime and water) to make ‘Weldon Mud’ or ‘Recovered Manganese’ (a mixture of calcium manganese CaO.2MnO and manganese manganese MnO.MnO). This was separated from the calcium chloride solution and used again in the chlorine production process. The various processes did not hinder these minerals being sold for a good price to the bleachers of Lancashire (it had more oxygen than other British supplies).

About 95% of the world output of the ore is used as an ingredient in steelmaking to form ferro-manganese alloy. The balance is consumed in the manufacture of electric dry cell batteries and chemicals. Overall world consumption of manganese has been rising since the 1950’s. The world’s largest producer was the USSR for many years, mainly from Chiautra, Georgia and Nikopol areas with Brazil as the second largest producer. Other countries include South Africa, India, Australia, New Hebrides, Mexico. Sea floor deposits have been identified for mining near the U.S.A.

Manganese oxides occur in 2 main types of deposit:

1. In the sedimentary deposits, where it has been precipitated in beds or layers of nodules together with iron compounds with which it is invariably associated (N.B. Mancetter has abundant iron pyrite, some chalcopyrite, locally common limonite, rarer goethite and haematite etc.). This precipitate is carried out in moderately deep water. By the uplift of these deposits they can become workable.

2. Another type of deposit is formed by precipitation of its oxides in lakes etc. by the action of plants, fungi and bacteria. This type of deposit is formed by the alteration of rocks containing Manganese bearing minerals - chiefly silicates. By weathering of such rocks these oxides aggregate together to form nodules or layers in the residual clay which forms on the outcrop of the weathered rock. This is formed a residual or lateritic deposit (probably the Hartshill Hayes type).

Conclusions

In my working life I have been aware of several attempts to infill the mine entrance, but this has proved futile – ‘agents unknown’ remove the backfill. The local tenant farmer is aware of the mine and has always been helpful when requests were made to access it. It could arguably be worthy of a Natural England protected status such as LGS (formerly RIGS) or even SSSI – but fails to meet accessibility and safety criteria. In my geological engineering career I have investigated many “pillar and stall” mine workings in various geological strata; many stand for decades in stable condition, some for 200 years or more. This stability is a function of compressive and tensile strength of the rock, the 3-Dimensional nature of rock discontinuities, depth and overburden pressures, groundwater behaviour, dip of the strata, proximity of folded and faulted strata, proximity of heavy buildings or high traffic loading, and even seismically disturbed faults. The rock strata in the mine dip at between 35° and 40° down to the south west (Fig. 9).
The Purley Chase manganese mine scores quite low on many of these. It would be my engineering viewpoint that the mine is unstable, as evidenced by the amount of roof spalled material (some natural, some vandalism).

The manifestation of crown hole type of failure is possible when the pillars eventually fracture, (Fig. 10) this could affect the local road above it and adjacent farmers fields within in the next 50 to 100 years.

Acknowledgements

My sincere thanks to John Allen for showing me the fantastic geology and the old quarries and brickyards of ‘The Ridge’ in 1964. I, like many before me, was introduced to Purley Chase manganese mine (known euphemistically as The Cave) see Cook (2006) by someone else. It would have been great to have discovered it by accident, or by research – but not this one! As years went by I was surprised how many people knew of its existence, both in Nuneaton and elsewhere! I met a mineralogist at Leicester University (1968) who knew of its existence before I did [Dr Bob King]; and thanks of the course to the Russell Society who have done much to save it for posterity.

References

Ashley, J. 1810-45. Memorandum Book of Occurrences (The Nuneaton Diary)
Camden W.: Britannia 1st Ed. English. 1610
Carney, J.N. 1998. Geology and structure of the Lower Cambrian Hartshill Sandstone Formation; information from quarries north west of Nuneaton. WA 92/08, BGS Technical Reports
- Building Stone
  - The Unique and Important Geology of the area
- Vol. 4 of 9 Extractive Sites in the Nuneaton area’s history
- Vol. 7 of 9 Extractive Industry of the Nuneaton Area
List of the Plans of Abandoned Mines-deposited in the Home Office (plans transferred from the late Mining Record Office). HMSO. 1897 to 1924
Report from the Commissioners of Mining Districts and Appendix. 1838-49 and 1850-59

**Maps**
Warwickshire County Record Office
Manuscript map Newdegate Collection
Archive: CR/136/M
CR/764/104/4 1716 Mancetter, Atherstone Bracebridge Estate

Warwickshire printed maps

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(field survey outline drawings or Ordnance Surveyor’s drawings)

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HMSO 1967 Maps and Plans in the PRO under Warwickshire
3073 Mancetter 1848 land belonging to Moore, surveyor.
Vicar of Stoneleigh

**Drawings and other documents**

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HMSO List of quarries 1906 (List of the Plans 1897-1924)

Warwickshire County Record Office
Non-coal mine Abandonment Records
Ref. Parish Plan No.
Aband. Date  O.S. Sheet  Minerals
9/1865   X NE/SP3592  Manganese (Tuttle Hill area)
Warwickshire County Record Office CR691
Jees Collection & Archives
CR 691 61 Estate Papers-letter book of
Richard Jee 1807-44
Hartshill properties & Manganese Mining.

Alan F Cook