

BROW HEAD

Background information:

Mine District: West Cork

Mine Name: Brow Head

Alternative Names:
Mallavoge, Mullavoge

Elements of interest:
Cu

Project Prefix: BROW-

County:
Cork

Townland:
Mallavoge



Grid Reference:
E77247, N23592

Geology and Mineralization

The copper - barite mines of West Cork are hosted by the Old Red Sandstone succession of the Munster Basin. The sediments of the Munster Basin were deposited in a half graben and subsequently uplifted and folded into east-northeast-trending anticlines that now comprise the rugged peninsulas of the southwest corner of the island. The Brow Head deposit is hosted by the Toe Head Formation, a series of cross-bedded sandstones and minor mudstones. It is located 4 km southwest along strike from the Crookhaven mine. Good chalcopyrite (CuFeS_2) ore was mined here to a depth of 30 fathoms (54m) (Cole, 1922). The lode worked was said to be 3m thick and contained bornite (Cu_5FeS_4), malachite ($\text{Cu}_2(\text{OH})_2\text{CO}_3$) and quartz.

Production and Mining History

Operations began at Brow Head mine in 1852 when Sir William Brougham and Samuel Hyde formed a partnership and set up a private mining company (Reilly 1986). Production started in 1854 but, as it was a private mine, records are scarce. The operation appears to have been undermined by divisions among the owners and a split in the vein (Cowman and O'Reilly 1988). Mining ceased between 1857 and 1858 but the largest annual output recorded was for 1859 when 179 tons of ore at 10% Cu was raised (Cole 1922). In 1860 59 tons were raised and subsequently the Brow Head Company worked the mine between 1862 and 1865. No records are available between then and 1906 when the West British Development Syndicate, a Liverpool-based consortium, produced 2 tons of high quality ore, 22% Cu (Cole 1922). There are no subsequent records of production at Brow Head.

Site Description

Brow Head mine is situated at one of the most southerly points in Ireland, at the end of the Brow Head peninsula, 3 km southwest of Crookhaven village and 3.5 km east of Mizen Head. It is reached by a 0.5 km-long walking track that runs south along the peninsula from sealed road that stops immediately north of an old watch tower at the summit of the peninsula. The main part of the mine site is on the cliff edge at the end of the peninsula but it extends inland for 400m (Fig. 1).

This site is largely covered by grass and bog. The most prominent feature is a small two-story terrace comprising three houses, including the mine manager's house and counting house (photo, right). Nearby are the ruins of miners' cottages and an engine house while a small building close to the cliff is a gunpowder house or magazine (Fig. 1). North of the terrace of buildings is a large flat low-walled area that served as a reservoir (Fig. 1). This was linked



by a still-discernible sluice that runs west to two smaller walled areas that may have been processing ponds. Two shafts are visible on the site. The easternmost one, the main shaft (Fig. 1), is open to a depth of at least 5m below which it is filled with water (photo, left). The fence around it has been breached. The second shaft is also fenced and subsidence has taken place around it. There are three adits in the cliff-face, all of them open but accessible only by rope (O'Sullivan 2006).

Solid waste is present both in two small heaps and as a thin layer spread on the surface close to the cliffs edge around the cobbled dressing floor (photo, right) (Table 1). The waste consists of coarse rock fragments scattered between growing bog. The small processing pool close to the waste heaps has a surface of fine pebbles and sand but beneath is a brown silt-sand-grade brown material that resembles processing waste. Table 1 gives the calculated areas and volumes for the waste heaps at Brow Head.



Table 1 Brow Head: Solid waste volume and area calculations

Waste ID	Area (m ²)	Volume (m ³)
BROW-SP01	1274	1274
BROW-SP02	1284	642
BROW-SP03	928	928
BROW-POOL2	202	101

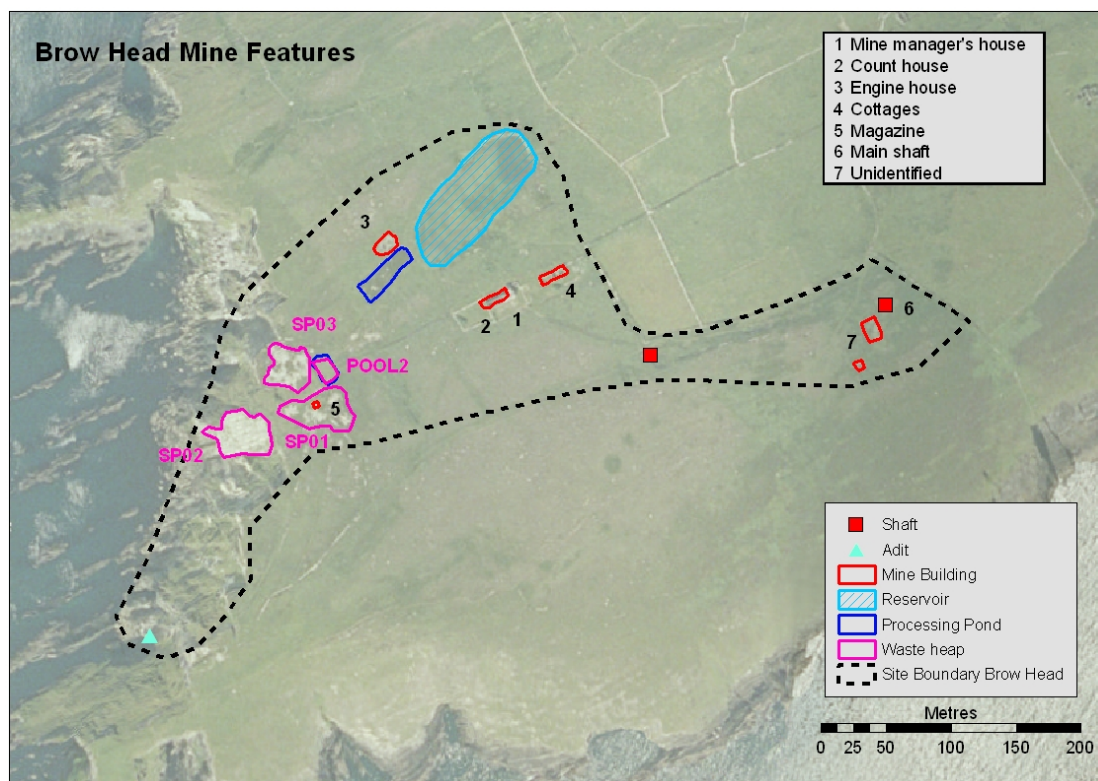


Fig. 1 Brow Head: mine features

Geochemical assessment

1. Surface water

No surface water samples were taken as there was no evidence of surface water on the site.

2. Groundwater

No groundwater samples were taken at Brow Head nor was any leachate test carried out on solid waste.

3. Stream sediments

There are no streams on the site.

4. Solid waste

Five *in-situ* solid waste analyses were carried out at Brow Head, four on SP01 and one on the material forming the base of second processing pool (Fig. 2). The data for SP01 have been used to score both SP02 and SP03 for the HMS-IRC Site Scoring system. Copper concentrations ranged from 52 to 2580 mg/kg. Both Pb and As were detected at very low concentrations (≤ 65 ≤ 32 mg/kg, respectively). Among other elements of interest, only Ba (≤ 442 mg/kg) was present in significant concentrations.

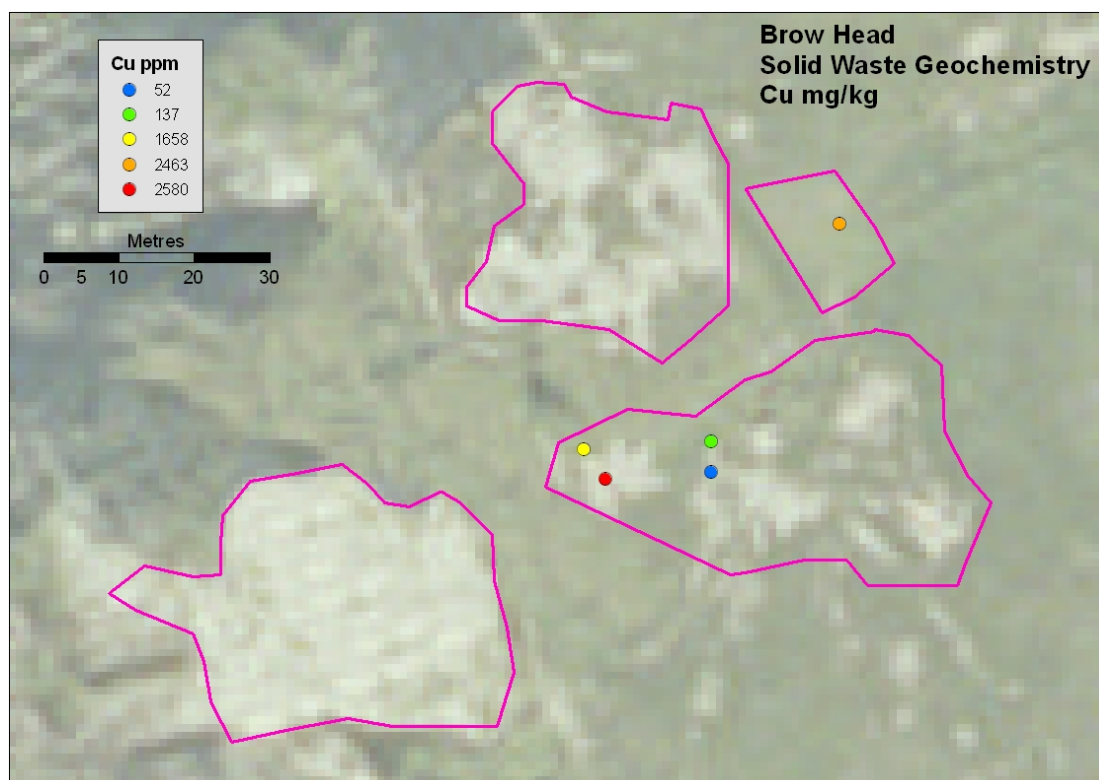


Fig X.2 Brow Head XRF Cu analysis

5. HMS-IRC Site Score

The total HMS-IRC Site Score for Brow Head is 1. None of the individual waste scores exceeds 0.49 so each is rounded down to zero. However, the total score without rounding comes to 1.33, hence to site total of 1. The low score reflects the absence of any significant concentration of high-relative toxicity elements in the solid waste as well as the absence of other waste sources such as adit discharges. In the absence of any surface water on or near the site, the groundwater pathway score dominates.

Table 2 HMS-IRC Site Score Brow Head

Waste	SP01	SP02	SP03	POOL2	Total
1. Hazard Score	10	10	10	10	40
2. Pathway Score					
<i>Groundwater</i>	0.23	0.23	0.23	0.35	1.03
<i>Surface Water</i>	0.07	0.07	0.07	0.07	0.30
<i>Air</i>	0.00	0.00	0.00	0.00	0.00
<i>Direct Contact</i>	0.00	0.00	0.00	0.00	0.00
<i>Direct Contact (Livestock)</i>					
3. Site Score	0	0	0	0	1

6. Geochemical overview and conclusions

Brow Head mine was exploited for a short period in the mid-19th century and again in the early 20th century. Although the underground workings are reputedly extensive, production was low and this is reflected in the modest amounts of solid waste remaining on the site. Only Cu is found in significant concentrations in the solid

waste. The absence of high-relative toxicity elements in the waste and the remoteness of the site, in a location where little impact on human health can be expected, give rise to a very low HMS-IRC Site Score.

References

Cole, G.A.J. (1922) Memoir and Map Localities of Minerals of Economic Importance and Metalliferous Mines in Ireland. *Memoirs of the Geological Survey of Ireland*.

Cowman, D. and Reilly, T.A. (1988) The Abandoned Mines of West Carbery. Promoters, Adventurers and Miners. *The Geological Survey of Ireland*.

O'Sullivan, P. (2006) The mines of Sheeps Head and Mizen Head Peninsulas, County Cork. *Journal of the Mining Heritage Trust of Ireland*, 6, 23-36.

Reilly, T.A. (1986) A review of vein mineralization in SW County Cork, Ireland. *Geology and genesis of mineral deposits in Ireland*. (1986), p. 475-480.