

The Mid-Nineteenth Century Lead Mines of County Clare

DES COWMAN*

The mines discussed here lie in a confined area between Tulla and Quin, County Clare. (Illus. 1). There are six definite sites (plus some peripheral ones) for which mining records survive between 1833 and 1868. It is not possible from known records to write a comprehensive history of any. However, for the largest of them, Kilbricken, a great deal of information is available about the dubious share dealing that went on in London.

* * * *

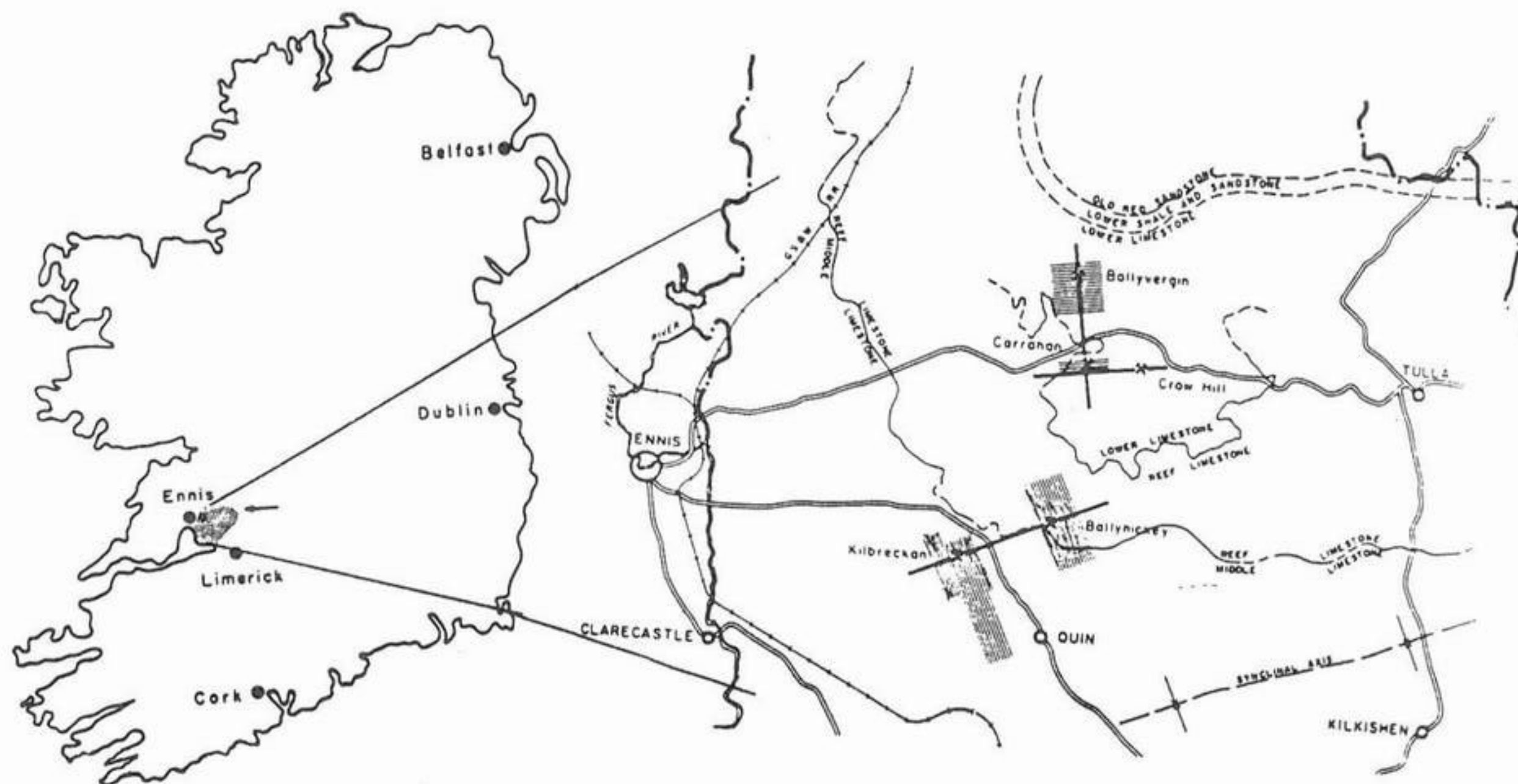
"Various" lead showings are identified at unspecified locations in Clare in a mineralogical survey with attributed date of 1497¹. Miltown may have been one of them. It is the only one definitely to be known from the eighteenth century² while much of its extent and nature were known by the early nineteenth century³. It was the only one to be tested during the mining boom of the mid 1820s. The Royal Irish Mining company raised 11 tons of lead ore from here in 1826, but then it lay idle for another ten years. However, in 1837 "some rude tools (were) discovered, such as oak shovels and iron picks of an extraordinary size and weight" as well as the remains of firesetting for splintering the rock (which was the method used before the introduction of explosives). Miltown was deemed "probably one of the oldest mines in Ireland - the ancient excavation being very extensive"⁴. On the basis of that evidence alone it is impossible to state when such mining would have taken place. While the most likely context would have been in the seventeenth century, there is at least the possibility that there was medieval mining at Miltown.

Another old mine was also identified in the late eighteenth century at Clasagh, near Tulla, "worked many years ago by a company"⁵. This was apparently also called Cass which may be on Carrahan townland. A further comment on its earlier working was, "many years ago great quantities of ore were got" and the difficulties of draining such a lowlying place were noted⁶. The references would suggest an earlier eighteenth century mine.

However, it is unlikely that there would have been further developments in the locality if a discovery had not been made at Kilbricken. The mineral showing there came to light during road cutting in 1833 when "tumblers" (large fragments) of lead were found in the soil with more being located during accompany drainage work. Specimens of these were sent to the respected firm of John Taylor of London and he was sufficiently impressed to send his agents to investigate⁷. Presumably this caused considerable local excitement, and further investigation of the area revealed other mineral outcrops at Ballyhickey and Castletown/Moyreisk. Other finds followed - Ballyvirgin in the early 1850s, Crowhill a decade later and the (re?)discovery of Carrahin also in the early 1860s.

No comprehensive picture has emerged about the working of any of the mines. Even within living memory of their ending an interested party could gather very little information about them⁸. Indeed, this article can do little more than echo a compilation during the life of some of them (Kilbricken excepted) that they "were of unascertained condition"⁹.

*"Knockane", Annestown, Co. Waterford.



Illus. 1. Location map of the mineralised area east of Ennis drawn up by Irish Base Metals c. 1860. (Courtesy, Geological Survey Office)

THE "UNASCERTAINED" MINES

Miltown

Taylor's men having come to investigate Kilbricken, reexamined the old workings here between 1836 and 1838. But, "after considerable labour and expense - were disappointed". The mine yielded only forty tons of lead with thirty seven ounces of silver per ton over two years¹⁰. The mine would appear to have been open cast and it was apparently abandoned by 1840¹¹. It may have lain idle for the next thirteen years when John Taylor's men returned for further tests. The resulting report stated that the mineralised vein was fourteen to eighteen feet wide and comprised a mixture of silver, lead and zinc. It recommended that the zinc be sold to pay the expenses of further searches¹². This seems to have been done and an unspecified amount of lead, silver and zinc (the first from Ireland) was sold from here in the mid 1850s. Miltown mine was then purchased by another Englishman in 1857 and he sought investment of £4000¹³; within three months however he had sold the mine again for £1500 reportedly because "residing at a distance from the scene of operations [he] has been unable to bestow constant personal supervision".

The new purchasers were a Dublin-based consortium headed by a Mr. Lisabe. They called themselves Miltown Silver Lead Mining Company (Ltd.) and hoped to raise £15,000 in five pound shares to develop the mine¹⁴. Presumably they were responsible for the ninety tons of lead and seventy tons of zinc sold from there in 1858-'60. If this was their entire production it represented a quite poor return on whatever investment was raised. Nevertheless somebody did try to work Miltown again in the early 1860s (or possibly worked over the spoil heaps) producing a poor twelve and a half tons of lead in 1861-'62¹⁵. The company responsible was grandly named "The Bullion Mining Company"¹⁶. However no further production is recorded from there so, seemingly, Miltown was not worked again. It would have presented difficulties in any case to judge by a report on it in 1861 which described the orebody there as a "large irregular mass - in patches and pockets". The work at that stage was still opencast, being "a wide deep irregular hole"¹⁷. That hole is now waterfilled and when measured some time ago was found to be 110 feet deep¹⁸.

Ballyhickey

In 1834 Taylor, looking for an extension of Kilbricken, discovered Ballyhickey with a similar type of calcite. In it were wide criss-crossing veins of rich lead, some of it, at their intersections, "the richest that ever was seen", sixteen to twenty feet wide in places. Between 1834 and 1838 his men erected a steam engine on the site and extracted 2500 tons of silver-rich (15 ounces per ton) ore from an open cast¹⁹. It must have petered out fairly quickly however having reached a depth of 100 feet with the excavation described as 200 feet long²⁰. Certainly there was a substantial open-cast there by 1840 as well as the engine house and other buildings. However, it seems to have created little in the line of employment to judge from the fact that there was only one house within half a mile of there in that year²¹.

There is no record of Ballyhickey being worked over the next twelve years. However in 1852 a company was set up to reopen it. In mid 1853 the old works were cleared out and, as the supervisor reported somewhat ambiguously, Ballyhickey mine "will soon be as good as ever it was". Nevertheless, testing had probably finished by early 1854 with no ore being raised²². When inspected in 1861 all that remained of the operation was the open-cast, described as a mineral "pocket" which had been cleaned out²³. One local story, however, with a quasi-scientific basis provides an alternative possible reason of the mine's failure. When testing was done in the area between Ballyhickey and Clarecastle in 1961 a strange mineralogical anomaly was reported found on both sides of a bog road. Investigation

reputedly showed that the lead ore being transported for export had been dumped into the bog from carts, the drivers wishing to lighten the load for themselves²⁴. All that is left there now is the water-filled excavation with some stonework at the sides which probably provided a base for lifting machinery. There is a rather elegantly slender chimney of the mid 1830s and the remains of an extremely thick wall with strange burnt material in places.

Ballyvirgin

Nothing emerges about the discovery of minerals here or of the origins of the company set up to work Ballyvirgin early in 1853 except that it comprised a partnership of thirty eight people holding between them two hundred shares to reach maximum call of twenty five pounds. Later (end of 1854) they were reorganised into four thousand share units on which, by then, just twenty eight shillings per share had been paid²⁵. This may have been stimulated by the discovery of excellent copper there, three tons of which were reported to have been raised that year²⁶. By the following Spring (1855) something of the future potential of this copper was reported to have been discovered although only sixty five tons (worth £782) was reported to have been sold. There had meanwhile been a call of six shillings per share which raised £1200²⁷. Some of this money was invested in a steam engine which was probably used both for pumping the mine and crushing the ore.

Unlike the other mines in the locality (Kilbricken excepted) Ballyvirgin had a comparatively long life-span of eight years. By 1858 they were exporting sulphur ("mundic") to Garston on the Mersey as well as lead and copper²⁸. Through 1859 and into 1860 the company sent detailed but unenlightening reports of sinkings, drivings and raisings at Ballyvirgin to the Mining Journal²⁹. The man in charge of this was named Wilkes. Between 1858 and 1860 the official record shows him as sending 187 tons of lead plus 256 ounces of silver (this from 1860)³⁰. Some of this they sold to a firm on the Dee while the copper and sulphur went to Merseyside. These latter include sixteen tons of "sulphur dust", seven of "coppery raggins" (?), eighty-two of "coppery mundic" and fifty-three of "plain mundic"³¹. The following year (July 1861) the reports abruptly stop and it was noted that November that the mine had closed. It seems that the lode had split at a depth of thirty six feet into two narrow veins³² which quite possibly petered out or, according to a more recent survey, became uneconomical at a depth of some 360 feet³³. Some seventeen years after closure an interested party had great difficulty finding out anything at all about the operation here³⁴ and there is no evidence of Ballyvirgin ever being worked again although it was tested in the early 1960s³⁵. The entire area is now heavily overgrown and even the chimney has almost disappeared under ivy.

Short-lived mines

It is possible that there was unrecorded mineralogical investigations during the 1830s and again the the 1850s in the townlands around those mentioned above and that some of these gave rise to short-term expectations. A listing of 1861 gives two new locations which were said to have been mined though there is no record by whom or what output, if any. They are Carrownakilly (near Newmarket on Fergus, silver lead), Ballyhurley (Tomgraney, lead)³⁶. However there was often a fine line between what constituted testing a mineral source, and mining it. Hence a later inventory of other mineralised areas in the hinterland may have given rise to expectations. These included sites near Feakle, Broadford and Six-Mile-Bridge³⁷.

These listings include Castletown and Moyreisk, adjoining townlands near Quin, with lead in the former, and silver in the latter. By 1840 there were a number of buildings associated with mining standing on the site³⁸. One source says that Castletown was held about then by

Ireland's largest mining company who had a steam engine there and twenty men employed in 1844 but there is no other evidence of this³⁹. Other trials were reported at an unspecified period (1850s?) from Ballykelly (open cast) and Knocksnachta (a shaft) in 1861⁴⁰.

A little more detail exists about an operation at Crowhill in 1853-54. No information is given about who discovered this showing or how capital to test it was raised in London. However, from early in 1853 a most uninformative series of reports appeared in the Mining Journal about sinking a shaft at Crowhill. These continued up to early 1854 when they suddenly stop. The working by then had reached a depth of 132 feet⁴¹. As there is no record of any ore being sold from here one can only surmise that this was highly speculative enterprise and that the investors lost their money.

Something similar happened at Carrahin in the early 1860s. The investors were two private individuals who were recorded as selling fifteen tons of lead ore in 1863. This operation was said to have finished when one of them died. Then about ten years later (1878) an unnamed company reworked it, extracting a respectable 470 tons in 1879-80 which presumably exhausted the deposit⁴². No other information has come to light about this.

KILBRICKEN

John Taylor was invited to the area by the landowner of the newly discovered showing at Kilbricken. It is likely that he engaged in widespread trials, including at Ballyvirgin⁴³. However, his only success was at Kilbricken where his men quickly got twenty five tons of lead which was exceptionally rich in silver content (120 ozs to the ton). The flat nature of the site, however, posed drainage problems requiring investment in a steam pumping engine which was erected in 1837. It cost £800 plus transport to Clare which added another £140⁴⁴.

However, the engine proved hopelessly inadequate for pumping such a flat, water-soaked area. Various stratagems were adopted towards solving this problem over the next two years. The major one involved using the engine for pumping only during the summer months, then allowing the mine to flood and using the steam power to crush the ore thus extracted over the winter. However, as the mine deepened a second engine reportedly had to be purchased⁴⁵. Presumably ore sales and expectations justified this expenditure though no official figures are available. However, it seems that the expectations were to be disappointed as by 1840 there was a deficit of £1500 on the operation⁴⁶.

What to do with Kilbricken mine at this stage must have been a gamble. It is appropriate, therefore, that Henry Crockford, a member of the gambling family, should have involved himself with the mine. His brother, it seems, was living in Clare when the mine came on the market and he alerted Henry to the opportunity (as it may have seemed)⁴⁷. He set up a consortium in 1840 to buy from Taylor 5000 shares in Kilbricken mine, nominal value ten pounds each, for mere £5500⁴⁸.

Few details are reported of Crockford's operation there over the next six years. It was claimed that between 1840 and 1846 £13,000 worth of ore was extracted though the cost of the working is not given. Henry Crockford himself died in 1846. His son inherited the mine and its growing problems. By then the mine had reached a depth of over 130 feet which must have put a considerable strain on the pumping resources of that boggy area. The engine continued to be only used over the summer months and it was then used for crushing during the winter⁴⁹. Reconsideration seemingly had to be given to this arrangement when, in the summer of 1846, a particularly rich vein of lead was encountered⁵⁰. Crockford apparently decided that as new investment was needed, particularly for pumping purposes, he would reconstitute the company and re-negotiate the lease.

Crockford's new company was called The Kilbricken Silver and Lead Company. It comprised 1300 ten pound shares divided between thirty one shareholders including members

of his own family and his partner W.C. Evans. There is considerable obfuscation, however, about Crockford's own role in the new company. According to one account he awarded himself half the shares free and at the same time his wife had an unspecified number of shares which she sold for £5000. Indignant letters from himself and Evans denying duplicity to the *Mining Journal* do nothing to clarify matters, and an editorial response to these just deepens the suspicion of dubious dealings⁵¹. Even though a powerful new steam engine (sixty-six inch, costing £900) was purchased, a question mark must hangover the motive as, before the engine was put into service, this lode reportedly ran out. Furthermore in trying to find it again the miners were said to have hit a strong spring of water that forced them to abandon the lower levels⁵².

When the pump was put into commission early in 1847, according to the information provided to the editor of the *Mining Journal*⁵³ there was little ore left, nor indeed is there further mention of the rich vein. Furthermore, there is a suggestion of dubious dealing and that Crockford's son, Henry junior, made way with much of the capital of the company so that only £300 was left by early 1847. However, reports on the financial state of the company in 1847 are most confused⁵⁴.

The directors, it seems, decided that their only option was to try to sell Kilbricken as a viable mine and began a promotion campaign. It seems they started by making calls on shareholders totalling 30/- per share to give the appearance of raising extra capital and it was claimed that this brought in £1345. Likewise sales of new shares reportedly raised another £552⁵⁵. By thus boosting confidence in the company, the Crockfords then managed to sell their shares. The editor of the *Mining Journal* commented on their manipulations:

"The statements afloat in regard to them do not, we are sorry to say, reflect much credit on those who were instrumental in getting their shares to a premium"⁵⁶.

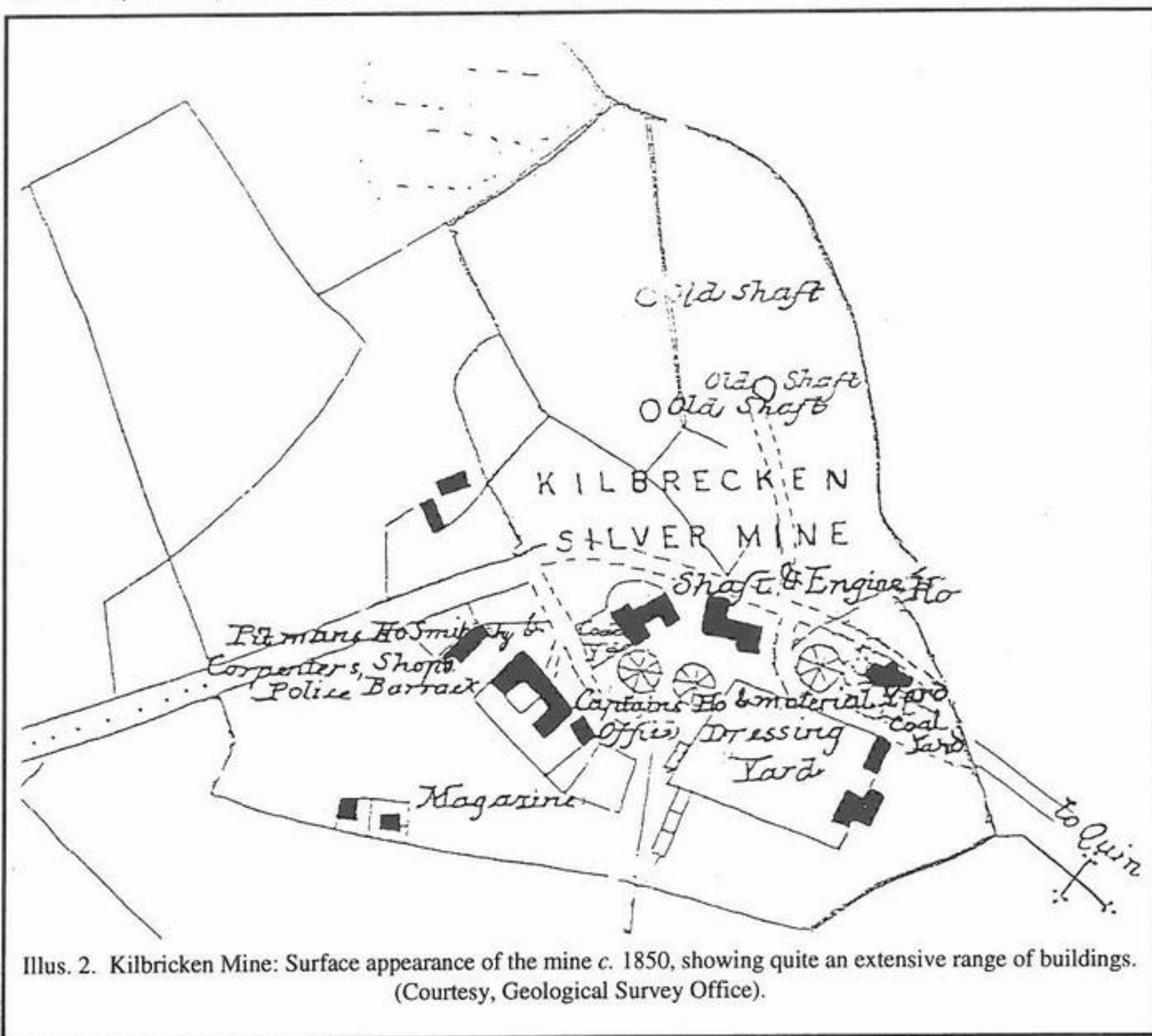
Henry Crockford and wife presumably had no such regrets and probably profited handsomely from their various dealings, - and they were not finished yet!

Meanwhile the new shareholders had to decide what to do about Kilbricken. They tried to run the mine for a brief period but abandoned it in November 1847⁵⁷. By then debts of £2200 had accumulated and were rising daily (e.g. the company's solicitor refused to hand over the books until he was paid £100). The only option was to sell the flooded mine and surface equipment (rods and pumps underground had to be abandoned). The best they could get for it was £2312, considerably less than their debts at that point. The purchaser was none other than ex-shareholder Henry Crockford!⁵⁸

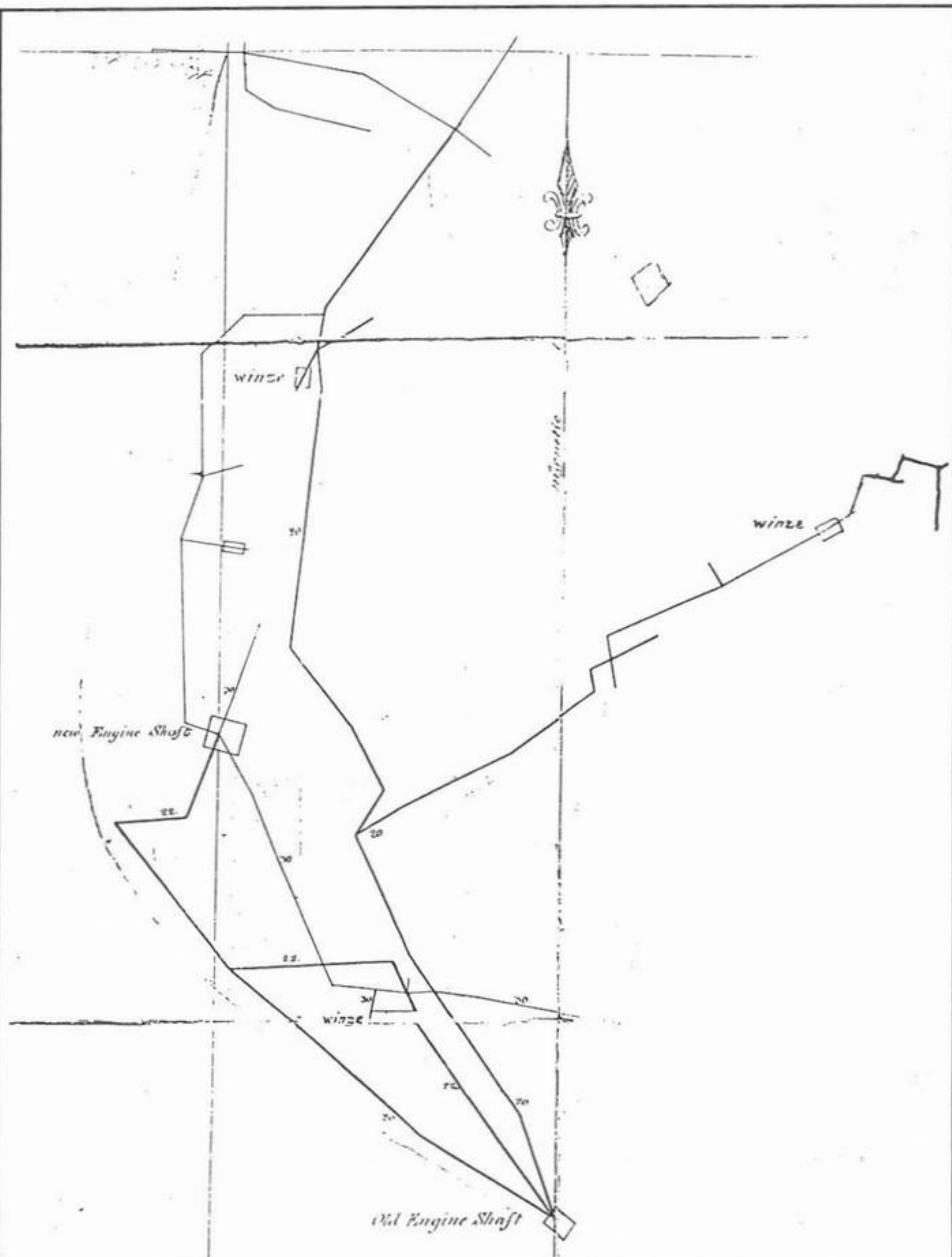
Since the company could not meet its debts, the winding up had to go through the Court of Chancery (thereby adding £700 in legal cost to the liabilities) which decreed that each shareholder had to pay thirty shillings per share⁵⁹. Out of the entire transaction therefore, Crockford had a clear profit of nearly £9000 it seems, as well as having the mine and equipment as his personal possession. By the time the duped shareholders had paid the cost of gambling with Crockford in the Summer of 1851, he had acquired leases of mineral showings at Oughaville and Carahin. Early in 1850 he had set up a new company, his third for the area, Clare United Silver-Lead Mines, purporting to work all three. Within 12 months he had sold that company, reportedly for £1500 to a new collection of shareholders hoping for riches from Kilbricken. His real profit on that transaction goes unrecorded (his loss on paper of £812 was probably compensated for in a variety of other ways) as does any role he may have played in the setting up of this new company!⁶⁰

The editor of the *Mining Journal* certainly had his suspicions about the new Kilbricken company. He reported that within weeks of the final winding up of the 1847-51 company he

himself came across a letter in private circulation which said that £800 worth of ore had been found in the last month of working there but that the shareholders had refused to pay any more money so the ore was simply left there. He was sceptical and hoped that ploys like that would do nothing to inhibit Irish mining. A week later he had been assured that a new company comprising 3300 shares, deposit three pounds each, had bought the mine, its engines and equipment for £1500⁶¹. Had any of these new investors visited Kilbricken they would have seen the surface appearance of a successful mining operation. There were two engines standing there, two powder magazines, three whims for lifting the ore, a dressing yard plus various workshops and houses. In their midst, ensuring good order, stood a police barracks (*Illus. 2*)⁶².



Whatever about its origins, the new company did apply itself to vigorous working of the mine and sent regular reports of its progress to the *Mining Journal* in the Autumn and Winter of 1851⁶³. An unspecified amount of ore reported to have been sold that December although there is no further mention of the £800 worth. Over the next two years (1852-'53) they did sell 280 tons of lead contains a respectable 6712 ozs of silver worth about £5500⁶⁴. However, over that period the nominal investment in the enterprise was about £18,000 as a series of calls to shareholders had totalled an additional £2-10/-per share. There was still some



Illus. 3. Kilbricken Mine: This plan in the Geological Survey Office is dated 1854, with a note added that the mine was abandoned in 1856. The numbered lines are the levels of the underground works in fathoms (six feet). The winzes were sloping access routes into the mine.

optimism about Kilbricken in January 1853 as the demand for the £5-10/- shares brought trading prices to £6-10/-. Within nine months, however, they were to plummet to £1⁶⁵. The reasons for this seems to have been mainly topographic, relating to drainage.

From early 1853 there were recurrent water problems from Kilbracken⁶⁶ and they dominated the shareholders' meeting that October. By then 1900 gallons per minute were seeping into the workings which the two pumping engines were barely holding at bay, but which were using eight tons of coal per day⁶⁷. However, ore could still be extracted though of low value (*e.g.* in late September 1853 a shipment of thirty-five tons to two smelters averaged only fifteen pounds per ton). Nevertheless, according to Captain Paul in charge at the mine, there was "a great discovery anticipated"⁶⁸. Apparently it did not materialise and over the next six months the decision was taken to close the mine and the company actually complied with the formalities for so doing. A map of the surface was drawn up in 1854 and lodged among "abandoned mine" plans (*Illus. 3*)⁶⁹.

However, it would seem that Kilbricken mine got an unexpected reprieve. An exceptionally dry Spring (only 47mm of rain from March to May 1854) was followed by a good Summer and a dry Autumn⁷⁰. This would have lowered the water table allowing pumping to be resumed. By October 1854 they were back to within ten feet of the bottom and reportedly raising good ore⁷¹. However, Kilbricken had something else to offer. The following month the miners came across a cavity in the rock which drained the water from all parts of the mine into an "unknown communication" so the resulting uncertainty "has for the time being paralysed our operations". This apprehension was quickly justified as the hidden reservoir filled and backed up into the mine, rising even faster than previously so that the pumps could not cope⁷².

The directors of the company seemingly decided that since they had been mistaken in their decision to close the mine earlier that year, they would promote a more positive image of the operation. They may have argued that 120 tons of lead had been sold in total in 1854 containing a good 6650ozs of silver⁷³. By way of positive statement a dividend of thirty shillings per share was paid at a cost of £4950.

It would seem that the company over-stretched itself with that payment. By the end of the following June (1855) they had a deficit of £1261 despite reported ore sales worth £1500 over the previous eight months. It is probably significant that the official figure of sixty six tons of lead ore sold from Kilbricken in 1855 make no mention of silver, so possibly that rich deposit was exhausted. Indeed local information gathered shortly afterwards suggests that the silver petered out below a depth of 180 feet. Nevertheless the directors recommended continuing by means of a bank loan of £600 and a call of five shillings per share⁷⁴. By November 1855 it was apparent that the mine was exhausted and at a private meeting the directors decided to recommend at the next month's half-AGM that the enterprise be abandoned and the company sold. Shareholders would, of course, have to come up with money to meet the company's liabilities⁷⁵.

Attention now focuses on the chairman of that private meeting, a Mr. Librii, holder of 500 shares (which, if he were a promoter of the company he may not have paid for). He could not be seen to off-load his shares (nominal value £5-10/- per share) so he directed a clerk in his office to do so for him for whatever price could be got. Hence they were unloaded onto what were described as "paupers" for 1/- to 1/6d each, thus exempting Librii from paying his share of the liabilities. Word leaked out however and outrage was expressed at the half-AGM held in January 1856. It was accepted, however, that the company would be wound up and that liabilities came to £1700. The mine and stock were quickly sold fetching a mere £825 the following month⁷⁶. Whether Librii was forced to contribute to paying off the balance or

whether the duped "paupers" had to do so is not reported.

What efforts to unwater and work the mine the new owner, a Mr. Mitchell, made is not clear. However, by then it must have been apparent that the mine was exhausted to the depth at which it was technically and economically feasible to pump it. Likewise, the gullibility of any possible shareholders must also have been exhausted. Any likelihood of Kilbricken being reworked must have ended shortly afterwards when the mine overflowed into the bog to form the shallow lake which is there to this day⁷⁷. In 1878 a John Ryan, as part of general promotion of the local mines, suggested that perhaps Kilbricken could be pumped out but nobody seemingly pursued this idea⁷⁸.

All that now remains are five waterfilled shafts, one chimney and part of its engine house. There is no sign of where the other two engines were located. Neither here, nor at the other mines nearby, is there any tradition of their mid-nineteenth century working. While none of the surviving mine buildings seem to be under current threat, an appreciation of what they represent might ensure their preservation into the future.

NOTES

1. Hamner Papers cited in Addenda to CSPI 1601-'03 p. 670-1 with provenance pp. lxxx-lxxxiii dating the survey to 1497 though it may in fact be later.

2. *Transactions of the Dublin Society*, 1799, Vol. I, pt. ii, "The Report of Donald Stewart, Itinerant Mineralogist of the Dublin Society", p. 22. His Survey of Clare was done in 1788-'89.

3. Hely Dutton, *Statistical Survey of the County of Clare, with observations on the means of improvement drawn up for the consideration and by the direction of the Dublin Society*, (Dublin 1808), p. 13.

4. "A Short Account of the Lead Mines in the County of Clare by P.M. Taylor with Geological Remarks by John Taylor", *Journal of the Geological Society of Dublin*, Vol. I, part iv, 1838 p. 386-7.

5. Stewart (1799), op. cit. p.22.

6. Katherine Dillon, "Donal Stewart and the Mineral Survey of Co. Clare" and "Catalogue of Irish Minerals in the Museum of the Dublin Society" (with notes by M.V. O'Brien) in *North Munster Antiquarian Journal*, Vol 7, 1953, p.187-189 and 190-197 with particular reference to p.194. This apparently draws on manuscript notes unpublished by the Dublin Society (ref. 2).

7. Taylor 1838, loc. cit., p. 386-7; *Memoirs of the Geological Survey*, Explanation of sheet 133 (Clare), (HMSO 1862), p. 35, re. "tumblers" [henceforth MGS 1862].

8. John Ryan, advocate of their reopening in *Mining Journal* 1878, p. 213, 382, 408-9, 436 & 464-5. It was obvious from these that he had been able to find little about their history.

9. *Parliamentary Gazateer of Ireland*, (London 1846), Introduction to pt. 3, p. liv.

10. Taylor 1838, op. cit., p. 385-6.

11. To judge from 6" OS map 1840, Clare sheet 35.

12. G.A.J. Cole, *Memoirs of the Geological Survey of Ireland (Mineral Resources): Memoir and Map of Localities of Economic Importance and Metalliferous Mines in Ireland*, (GSI 1922), report Clare and notes on p. 145. He quotes Taylor's records which unfortunately were destroyed by bombing during the last war.

13. *Mining Journal* (London) 1857, p. 700, Dublin Correspondent [Hencefort M.J.]

14. *MJ* 1858, p. 184 and 269 (short notices) and 278, 310, 396 ads for the company.

15. Robert Hunt, *Mineral Statistics*, (HMSO annually), cf 1858-9 and 1862-4 and passim.

16. Richard Griffith, "Catalogue of the several localities in Ireland where mines or metalliferous indications have hitherto been discovered -", *Journal of the Geological Society of Dublin*, Vol. IX, 1860-2, p. 141 mentioning this company.

17. MGS, p. 35.

18. Information from landowner Michael O'Keeffe, August 1994. His father tested it with a plumb line.

19. Taylor 1838, op. cit. p. 385-6. This is quoted verbatim without comment by R. Kane, *The Industrial Resources of Ireland*, Dublin 1845, p. 211 - 214.

20. *MJ* 1853, p. 429 British Mining report on clearing out Taylor's working.
21. 6" OS map 1840, Clare sheet 35.
22. Reported in *MJ* 1852, p. 88 "Mining Notabilia"; 1853, 429 (quotation from Matthew Francis) & 445 the last report being p. 725, 19th Nov.; not mentioned in otherwise comprehensive list of Irish mines in 1855, p. 43, Dublin Correspondent.
23. *MGS*, p. 35.
24. Local tradition narrated to me by local man Mr. J. Scanlon on 22 June 1977 quoting I.P. test by Mr. Schultz. However, this is not mentioned in the report jointly written by him (see. ref. 33 below).
25. *MJ* 1854, p. 89, anon, item on recent find there; p. 413, "British Mines" report; 1855, p. 43 Dublin Correspondent on recent change in capital structure.
26. While this is not given in the *Mineral Statistics* (*op. cit.*) an E. Pycroft is specific about 3 tons at £21 per ton in *MJ* 1854, p. 822
27. *MJ* 1856, p. 76 stating that commercial copper had been found 9 months earlier; also reports from a Capt. Smith at Ballyvirgin in 1854, "British Mines", p. 808 & 817. *MJ* 1856, p. 76 the Dublin Correspondent gives tonnage 1855 and share price.
28. *MJ* 1858, p.337, 768 and 852, Mining Correspondance/British Mines.
29. *MJ* 1859-'60 in "British Mines" which carries summaries of the week's activities submitted by the mine managers. Ballyvirgin features almost every week up to July 1860.
30. *Min. Stats.*, *op. cit.*, 1858-'60.
31. *MJ*, 1860 p. 5 and 249
32. *Ibid.* 1861, p. 499 last report 13th July 1861. *MGS*, p. 35, visited by Messrs Kinahan and Foot.
33. *Transactions of the Society of Mining Engineers*, Vol. 223, Ontario, Sept. 1962: "Induced Polarization and Geological investigation of the Ballyvirgin Copper Deposit, County Clare" by P.G. Hall, R. Schultz and R.A. Bell, p. 312-3 reporting on testing carried out in 1960-1.
34. *MJ* 1878, p. 464-5, letter, John Ryan.
35. See ref 33 above. Also Hudson and Sevatopulo in *RDS Scientific Proceedings, Series A*, Vol. II, no. 18, 1966.
36. Richard Griffith, "Catalogue of the several localities in Ireland where mines or metalliferous indications have hitherto been discovered --", *loc. cit.* 1860-2, p. 141. *MGS* (1862), *op cit.*, p. 35 re Crow Hill.
37. G.S. Kinahan, *Economic Geology of Ireland* (RGSi 1886) p. 15
38. OS map Clare sheet 35, 1840.
39. T.C. Foster, *Letters to the Times*, London 1847, p. 601 and Appendix XXV. However, the Mining Company of Ireland's own reports to their shareholders (NLI) make no mention of this operation.
40. *MGS* (1862), p. 36.
41. *Mining Journal* 1853 pp 76, 90, 104, 162, 194, 226, 292, 365-6, 433, 693, 709, 740, 757, 789, plus *MJ* 1854 p. 21, 54, 138 and p. 108, a circumspect report on the half-AGM of Crowhill Company.
42. Hunt, *Mineral Statistics*, *op. cit.* as per years given. Detail in letter from a John Ryan in *MJ* 1878, p. 439 one of four letters from him promoting the reopening of the south Clare mines.
43. *The Clare Almanack* 1859, p. 27, says Ballyvirgin was worked by Taylor some 30 years earlier.
44. *MJ* 1850, pp. 112, 153 and 196, evidence given on winding up of the company.
45. *Ibid.* 1846, p. 457, Report on Kilbricken. However, only one engine and water course are shown on 6" OS Clare, sheet 34.
46. *Idem.* 1846.
47. *MJ* 1850. p. 112, report winding up.
48. *MJ* 1848, p. 29, anonymous letter.
49. *Idem.* and *MJ* 1846, p. 457 report meeting; 1847, p. 18, "Minig in 1846" re Crockford.
50. *Idem.* 1846
51. *MJ* 1848, p. 21, two letters and editorial plus p. 29 another four letters on the Kilbricken company. Also evidence given at two stages of the winding up in *MJ* 1850, p. 102 re half the shares and 1851, p. 382 implies that his stake was £3000 worth of free shares.
52. *MJ* 1847, p. 24 & 500, reports quarterly meetings re engine and p. 561, report adjourned meeting re rising water.
53. *MJ* 1848, p. 21 editorial.

54. *MJ* 1851, p. 382, report on final winding up of company. The report says that only £930 worth of ore had been raised (over what period not stated) at a total cost of £16,470 (presumably the sum of the capital raised by both Crockford companies).
55. *MJ* 1848, p. 21, editorial and *Idem*.
56. *MJ* 1848, p. 9, "Mines During the Year 1847"; 1850, p. 102, report winding up.
57. *Ibid.* 1850, p. 153, Chancery proceedings (continued).
58. *Ibid.* 1849, p. 505, report on winding up; 1850, p. 112, report of Chancery hearing (it is not clear from Crockford's evidence whether the £2312 included the engine valued at £650): 1851, p. 382 "Final Winding Up".
59. *Ibid.* 1850, p. 102 & 196, reports on winding-up of company
60. *Ibid.* 1850, p.222 "Mining Notabilia": 1851, p. 334 & 346, editorials and p. 382, "Final Winding Up".
61. *Ibid.* 1851, p. 334 and 346, editorials.
62. *GSI* 125/5/2, copy of LEC map c. 1850 redrawn 1926.
63. *MJ* 1851, e.g. pp. 464,476,489,500,524, etc. under "British Mines".
64. *Ibid.* 1852, p. 235, anonymous item and passim "British mines", e.g. p. 7 and 146. Tonnage from Mineral Statistics (HMSO 1852 & '53).
65. *MJ* 1852, p. 79, Report General Meeting; 1853, p. 43 and 108, Dublin Correspondent's and 1825-54 Share Prices, passim; 1855, p. 108, Dublin correspondent's retrospect.
66. *Ibid.* 1853, p. 76, 382, 542, "British Mines" some very frank reports from Captain Paul.
67. *Ibid.* 1853, p. 692, report of half AGM.
68. *Idem.* and p. 633 anonymous report on shipment ore.
69. In the *List of Abandoned Mines*, (HMSO 1892-'93) Kilbricken is shown as abandoned in 1854 and the plan also dated 1854 in *GSI*, Clare file 125/5/2. Nevertheless ore sales for 1854 and 1855 are given in the mineral Statistics *op. cit.* The Dublin Correspondent in *MJ* 1854, p. 43 reports dividend.
70. "Values of rainfall amount (mm) as recorded at Dublin (Phoenix Park)", 1837-1977, typescript courtesy of the Meteorological Service.
71. *MJ* 1854, report p. 750.
72. *Ibid.* 1854, p. 750 report (apparently from Paul) and 766, "British Mines".
73. *MJ* 1854, p. 682, report from Captain Paul giving depth reached.
74. Min. Stats. 1855; *MJ* 1855, p. 440, "Mining Market", report half-AGM. Report of local miner John Conlon in *MGS* 1861, p. 35.
75. *MJ* 1856, p. 105, report half-AGM.
76. *Idem.* and reports "Winding Up of Companies", pp. 481 & 513.
77. *Idem.* p. 513; plan of mine in *GSI*, Clare, 125/5/2. On the 1840 6" OS map Kilbricken is marked as a bog; a consensus of local opinion gathered in a pub in Quin in June 1978 was that the present lake was as a result of mining operations about 120 years earlier. *MGS*, 1861 attributes the closure of the mine to flooding.
78. *MJ* 1878, p. 382, letter John Ryan.