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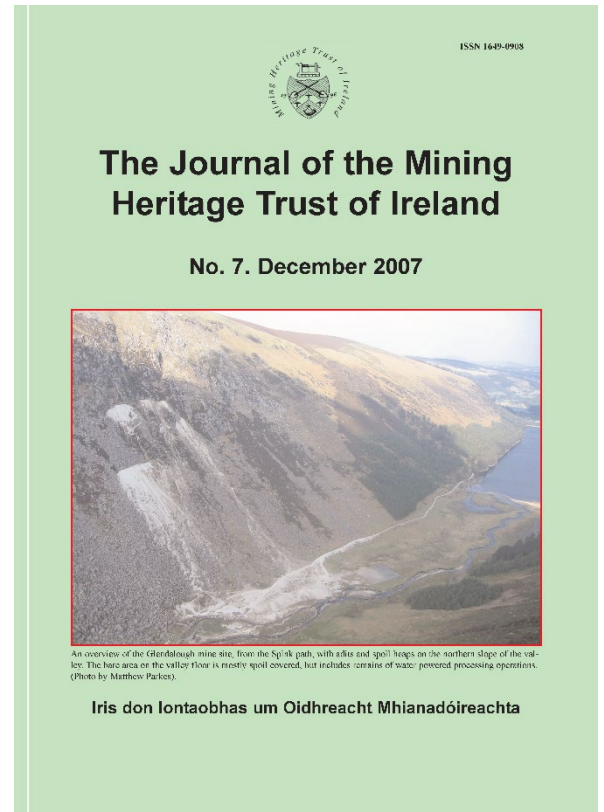
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# A HISTORY OF Zn-Pb-Ag MINING AT ABBEYTOWN, CO. SLIGO

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**Abstract:** Mining for lead and silver at Abbeytown, Ballysadare, Co. Sligo is believed to have commenced as early as the 16th century and continued sporadically through the 18th and 19th Centuries. Processing of zinc-rich waste from the earlier mining began with the development of the flotation process and mining for zinc, lead and silver began in the early 20th Century. A major mining operation was initiated by Johannesburg Consolidated Investments in 1950 and between 1950 and 1961 a total of 731,000 tonnes of ore were mined and processed. The JCI mining operation may have been the first Irish mine to use wheeled vehicles instead of rails. Mining ceased 1961 and the site is currently the location for ancillary activities for a quarrying operation which extracts unmineralized limestone from a reserve identified to the west of the historical mining area. *Journal of the Mining Heritage Trust of Ireland*, 7, 2007, 9-18.

## INTRODUCTION

Mining and quarrying have been undertaken at Abbeytown, near Ballysadare, since before the 1700s, possibly as early as the 1500s or earlier. Initial efforts through the centuries would have been directed at extracting silver and then silver and lead from argentiferous galena with sphalerite as a waste. The development of flotation concentration in the early 20th Century led to mining for zinc, lead and silver taking place during World War 1 and after World War 2, peaking in the 1950s. Metalliferous mining ended in the area in 1961 with the closure of the mine operated by the Abbeytown Mining Company, owned by Johannesburg Consolidated investments. Exploration work from the 1960s to the present day has failed to identify any additional significant mineralization. In addition to the long history of pre-20th Century mining, the Abbeytown site is of interest, as it is believed that this may be the first Irish mine to move from a railed vehicle system to the operation of trackless vehicles.

The mineralization occurs as a replacement of the Carboniferous limestones and sandstones adjacent to north-northeast trending structures. The main orebodies were a predominantly horizontal orebody replacing a calcareous sandstone which is interbedded with the limestones (the Index Bed) and narrower high-angle replacement bodies in the limestones at depth below the Index Bed.

## PRE-18TH CENTURY

The first recorded mining operation at Abbeytown is in the mid 18th Century, but it is known that the monks at Abbeytown produced significant amounts of silver which must have been produced from the mining of argentiferous galena. The site of the abbey is located close to where it is interpreted that the Abbeytown mineralization would have outcropped along the shore of Ballysadare Bay.

It has also been suggested that the abbey was one of the last to be affected by the dissolution of monasteries and it has been surmised that the ongoing silver production protected the abbey from dissolution for some time. No recorded evidence of workings by the monks has been identified, although the mineraliza-

tion must have outcropped in the area to the northeast of the known mining operations. Silver content of the Abbeytown galena is significant with assays of high-grade mineralization from 1917 returning between 7.4 and 8.5 oz/t from galena and sphalerite rich mineralization and 12.6 oz/t from massive galena.

## 18TH CENTURY

The earliest record of mining is in the period 1747 to 1752 when Charles O'Hara (the Elder of Annaghmore) is known to have sunk shafts at Abbeytown and the Lugawarry deposit located 3.8km SW of Abbeytown. Engineers and miners were brought from England, but the operation cannot have been very successful as the area is recorded by Arthur Young (a noted published traveller of the time) in 1776 as not being worked.

The area came into the ownership of Sir Edward Crofton in the 1780's and he attempted to promote the prospect. The French consul de Montbret recorded in 1791 that mining was ongoing at Abbeytown with surface workings only and milling and smelting taking place on site. Total production was estimated at about 20 tons a year and he also recorded that various entrepreneurs had ruined themselves engaging in this enterprise.

## 19TH CENTURY

In 1806 the lands were acquired and owned by Henry Montgomery of Donegal who ran into financial problems and the mine lands were mortgaged, finally being sold in 1842 to Thomas McManus (resident in London) and on his death in 1865 they were inherited by Michael and Margaret Mullarkey of Drummartin. In 1872 the lands were purchased by Middleton and Pollexfen, who were merchants in Sligo and Ballysadare. The mines are believed to have been unworked between the efforts of Sir Edward Crofton and coming into the possession of Middleton and Pollexfen. Lewis (1831) reported that the mines were abandoned but that they had yielded considerable amounts of silver and lead.

The site was extensively worked by Middleton and Pollexfen who sank several boreholes, deepened existing shafts and drove several levels in search of workable ore. There must have been

a considerable tonnage extracted (for those times). The target mineral again was argentiferous galena, with several intersected mineralized intervals not worked due to high levels of blende (sphalerite) which was considered to be a gangue at that time.

Hardman of the Geological Survey of Ireland records in 1878 that "Some hundreds of tons of ore have been lately put out by Mr Middleton." and the site is described in Hardman's GSI Memoir of the area, published in 1885. Hardman published a paper on some high strontium-bearing travertine at the site in 1880, when the mine was still being worked although the exact date of cessation of the Middleton and Pollexfen operation is not certain.

## 20TH CENTURY

A report by Herbert Daly in 1917 to the Ministry of Munitions reported that the deposit had not been explored since it was last worked "60 years ago", which would have been 1857, although it is obvious that it had been worked as recently as the 1880s. He described the presence of one worked out heading of about 100 feet in length, as was a 52 foot shaft which had been sunk 52 feet south of the most advanced heading, with shows of mineralization although the shaft was now blocked.

A recommendation to clear the shaft for exploration was made, as the owners at that time were constructing a small concentrating plant. This concentrator must have been constructed to attempt to process that large amounts of sphalerite-rich spoil at

the site which had been discarded in the search for lead and silver. This change in interest indicated that the focus of mining was now moving from lead and silver mining to zinc, lead and silver.

The owners at the time of the Daly inspection would have been Robert Kirwan (the county surveyor) and Joseph Mallagh who had acquired the site from the congested districts board in 1917. The Ministry of Munitions of War is also listed as an owner in the Home Office List of Mines in 1917, but not in 1918, 1919 or 1920.

The deposit was worked in a relatively small way, processing the existing spoil and working an opencast quarry and underground mine until 1919. The Home Office List of Mines records 16 employees in 1917 (6 miners and 10 surface staff), 3 in 1918 (all surface staff) and 5 in 1919 (2 miners and 3 surface), suggesting most processing/mining took place in 1917.

The area was examined by a number of interested parties in the 1930s and 1940s and a review of the site in 1943 (Figure 1) indicated that about 10,660 tons of unprocessed ore grading 7.6% Zn, 3.52% Pb and 1.8oz/t Ag was present at the site, presumably remaining from the operations in the late 1880's and the early 20th Century.

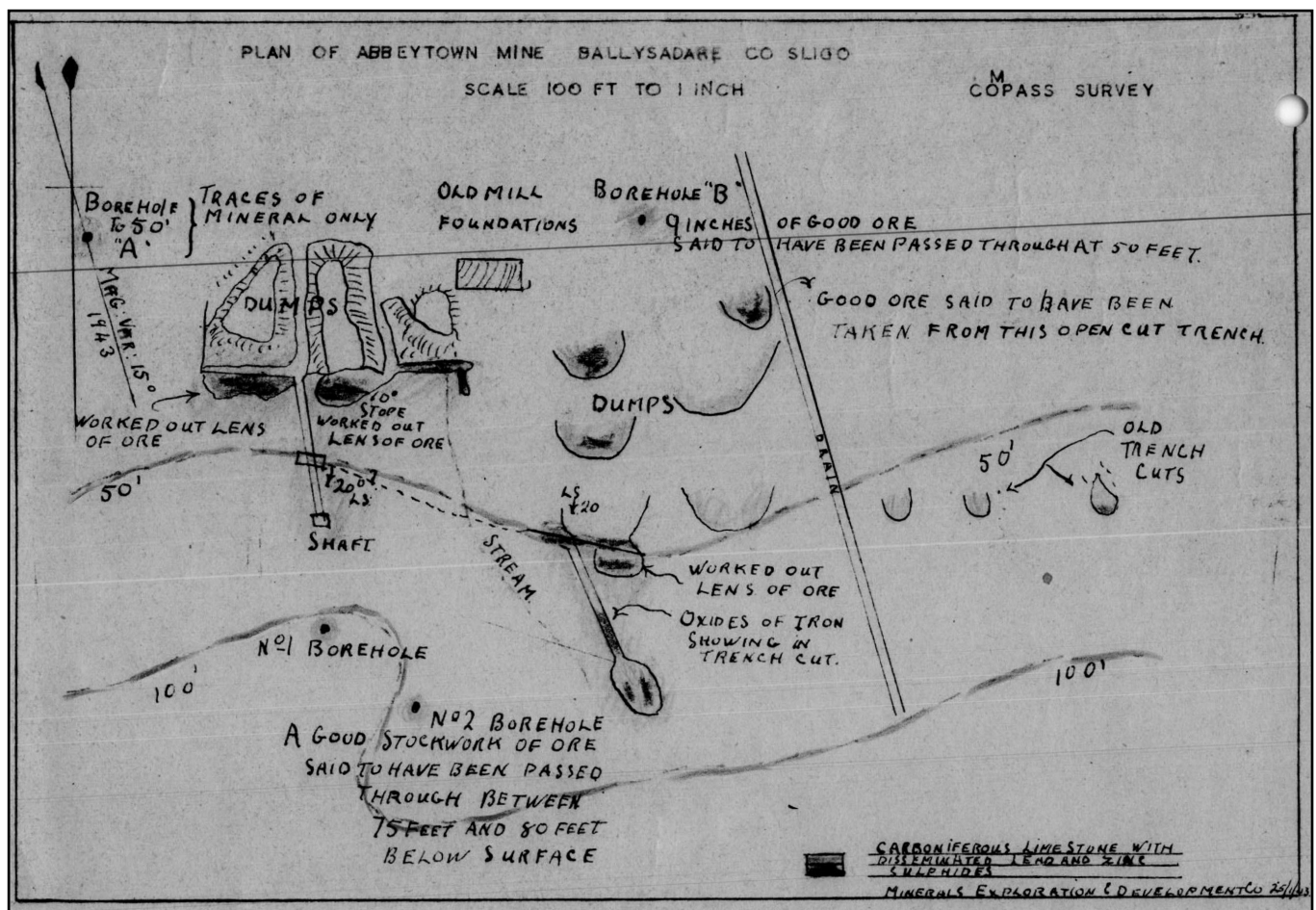


Figure 1. Sketch map of the Abbeytown Mine Site in 1943.

## ABBEYTOWN MINING COMPANY AND JOHANNESBURG CONSOLIDATED INVESTMENTS

In the immediate aftermath of World War 2, zinc and lead prices reached record levels. A diamond drilling programme undertaken by the Geological Survey of Ireland defined a significant reserve of disseminated mineralization in the Index Bed and the Abbeytown Mining Company was established by Reid and McGuinness to develop the deposit. A layout of the area, and section are presented in Figures 2 and 3.

Initially mining was undertaken by opencast workings on three levels advancing to the south. The barren limestone overlying the mineralized horizons was initially sold as aggregate, but the southerly dip and increasing thickness of unmineralized rock led to the development of an adit to allow underground working to follow the top of the Index beds. In addition to the commencement of underground workings, the crusher was upgraded to handle 300t/day and the flotation plant was also upgraded to allow 300t/day. These were commissioned in November 1951 and quickly reached 280t/day with minor startup teething problems.

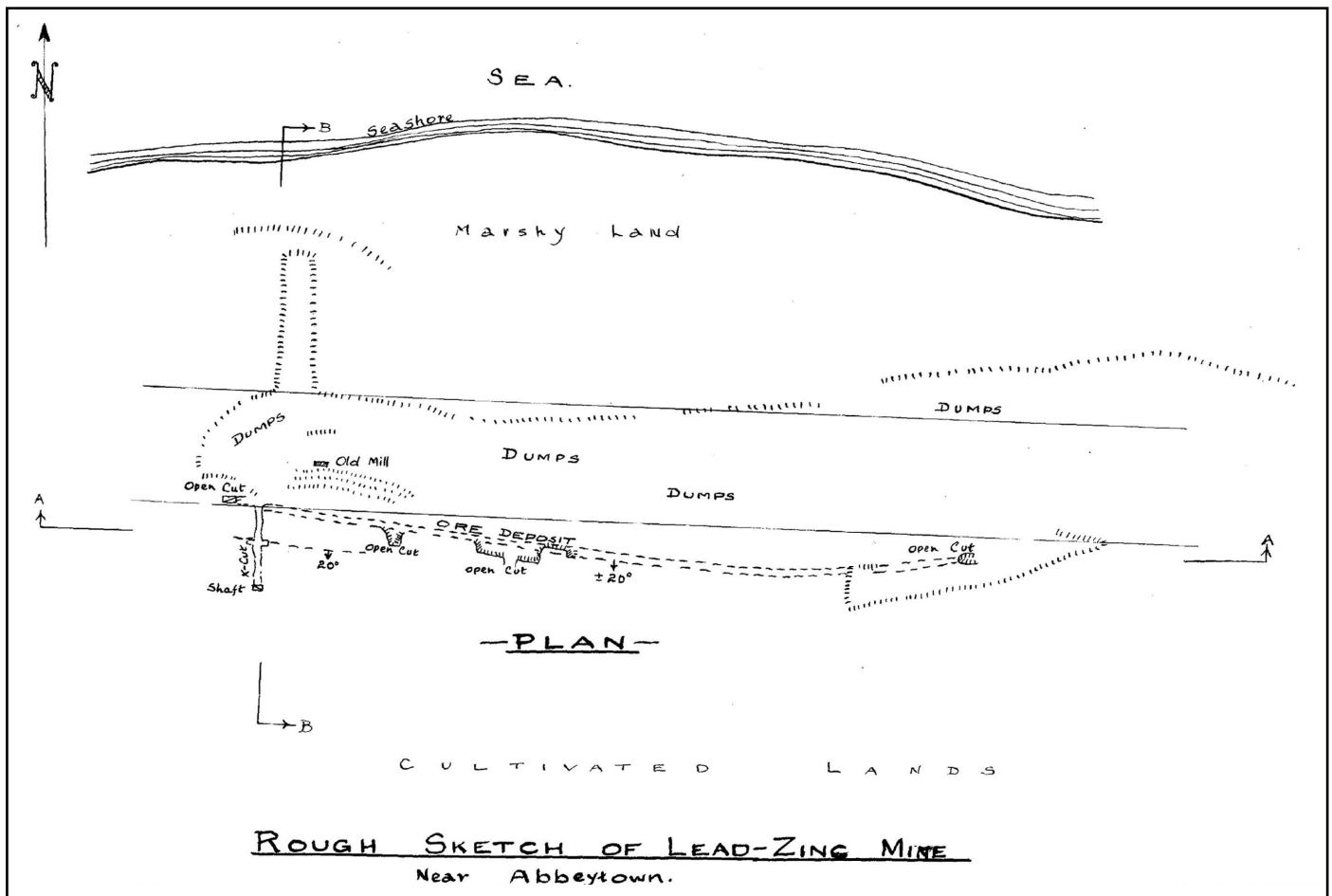


Figure 2. Plan of the Abbeytown Mine Site immediately pre-JCI.

A mill and concentrator were established, initially to process the large amounts of spoil lying about the site and this operation was capable of processing approximately 100 tonnes of ore per day. Estimated grades at this time were 3%Pb / 4%Zn and it was believed that the mineralization was restricted to the top of the Index Bed and immediately overlying dolomitised limestones.

Johannesburg Consolidated Investment Co., a South African mining investment company became involved in 1950, purchasing the Abbeytown Mining Company outright. Grades, however, turned out to be somewhat disappointing, at about 1%Pb / 2.5% Zn, but prices were very high (at £180/t Pb and £190/t Zn) and the operation proved profitable even at these lower grades.

The first 6 months saw most production from the quarrying operation, then from the underground workings. These underground workings involved the development of a major room and pillar mining method in the Index Bed ore using mine railways, although significant problems were encountered due to undulations in the ore level. By late 1952 falling metal prices and higher costs from underground workings led to a refocusing on the surface mining.

In 1953 a major decision was made, based on a number of excellent drill intersections to the south of the workings at that time, to undertake the development of an area of deeper mining to exploit high grade ore which was discovered below the Index Bed workings. At the same time, the decision was made to abandon the use of tracks and the first use of trackless vehicles in an Irish mine was established.

The initial mining in the new deeper zone was disappointing, but the discovery of the much lower costs from the trackless



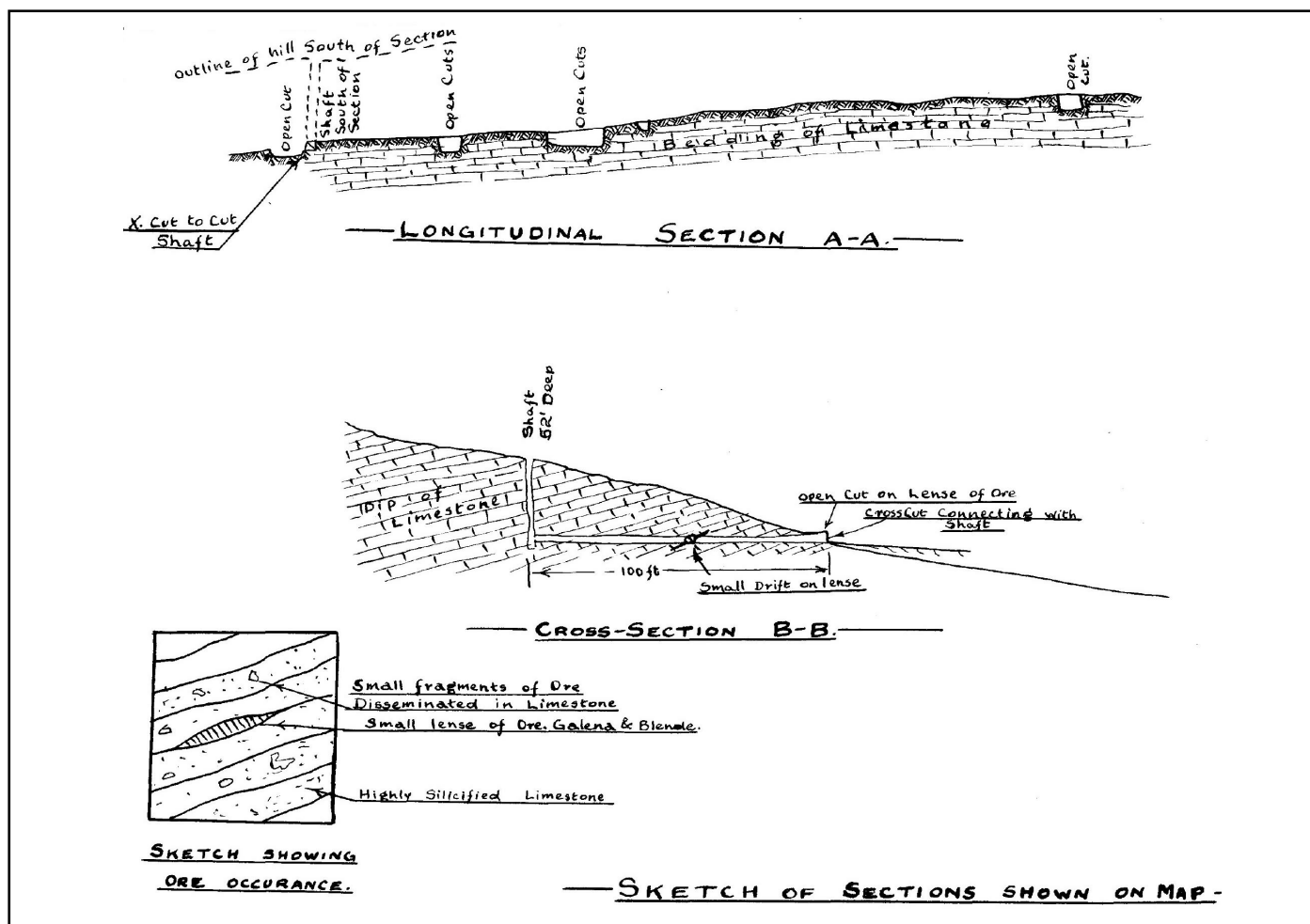


Figure 3. Sections through the Abbeytown Mine Site immediately pre-JCI.

mining allowed cost effective development of large scale room and pillar working in the Index Bed. Further drilling also discovered more high grade mineralization at depth, so the incline was diverted towards the new drilling in 1954. By 1955 80% of the ore was coming from the Index Bed and the surface operation had nearly ceased, but fortunately, the higher grade mineralization was intersected about this time. Increasing metal prices also helped.

The start of 1957 saw the Index Bed more or less exhausted, grades falling and metal prices heading south as well. The mine was put on notice in late 1957 and work ceased on 19th March 1958. An agreement with the Department of Industry and Commerce to fund the drilling of some surface exploration holes was modified to provide funds to develop a small area of high grade mineralization identified by underground drilling and draining the flooded mine began in August 1958.

Development began on 9th October 1958, but ore was stockpiled as by this stage the price of the concentrates were only worth £42/t Pb and £12/t for Zn. But milling began again in January 1959. The base of the mineralized limestone sequence in the lower Orebody was reached in April 1961 and the writing was again on the wall. The mine continued working at a loss while a number of geophysical anomalies defined to the north of the opencast workings were drilled (as part of a technical assistance programme funded by the Department of Industry and Commerce), but these intersected thick fracture-fill pyrite at best and the mine finally closed on 13th September 1961. The final mine layout is shown in Figure 4.

During its operation the Abbeytown Mining Company employed a maximum of 97 workers and mined and processed 730,831 tons of ore. Concentrates shipped by the company from Sligo contained a total of 9685 tons of lead and 14,350 tons of zinc. Minor quantities of silver were also produced.

Total revenue from concentrates were £1,179,374 and royalties and rent of £39,680 were paid from profits after operating costs. Converting from 1961 values to 2006 (using GDP), this is an equivalent value of £48,792,598 income and £1,641,625 royalties and rents.

### ABBEYTOWN MINE - POST 1961

The Abbeytown Mine Site had provided general aggregate materials as a by product of the mining operation and following the closure of the mines, the site has been owned and worked by several quarrying companies. During the course of the early quarrying operations, mine buildings and plant which had not been dismantled and sold following the closure of the mining operation were replaced or demolished. Some of the old open cast faces were also retreated and some mine workings were removed during ongoing quarrying.

The site is currently owned by Harrington Concrete (Sligo) Ltd. who are currently quarrying a large reserve of clean, unmineralized and undolomitised limestones located to the west of the

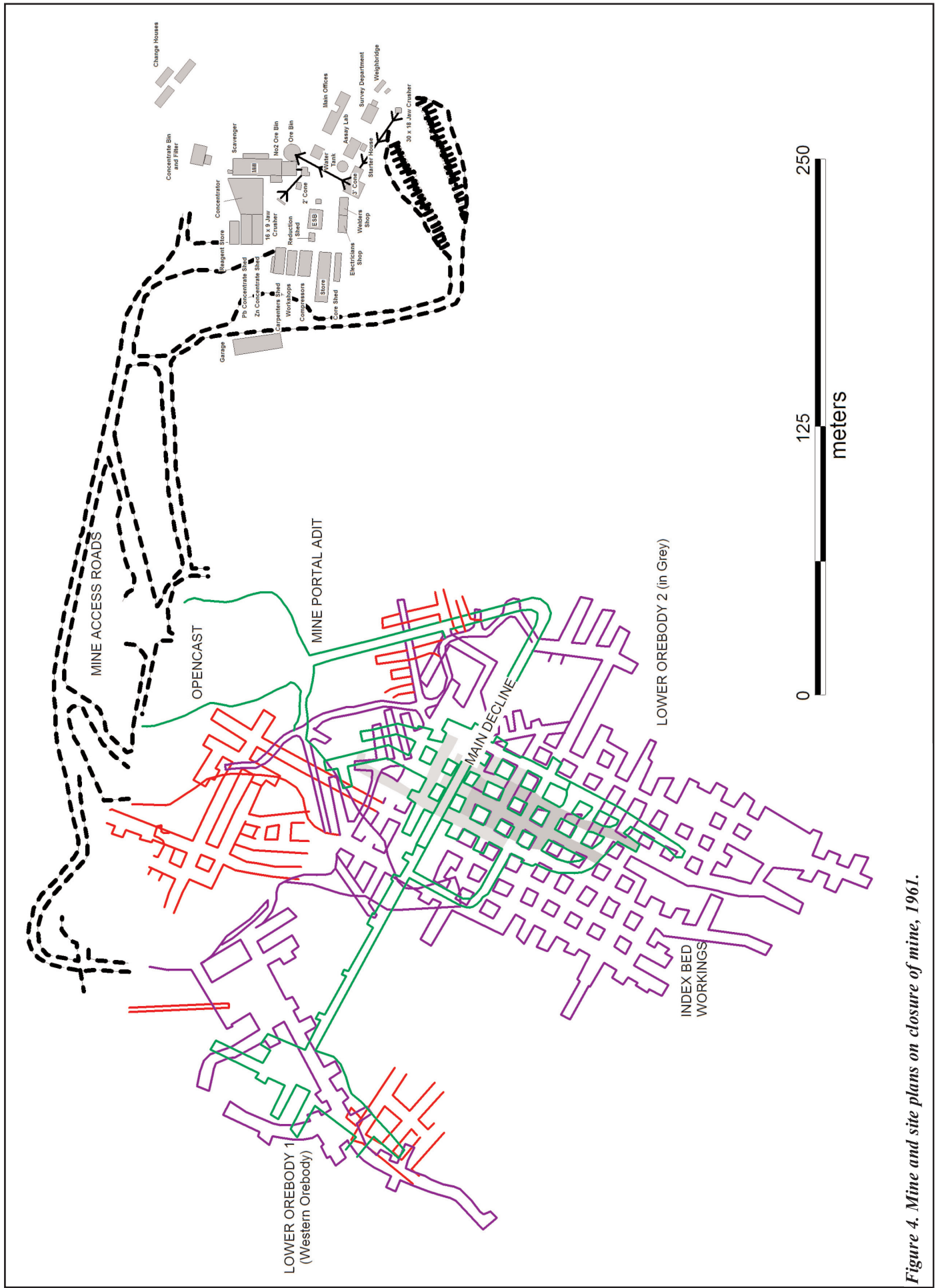


Figure 4. Mine and site plans on closure of mine, 1961.

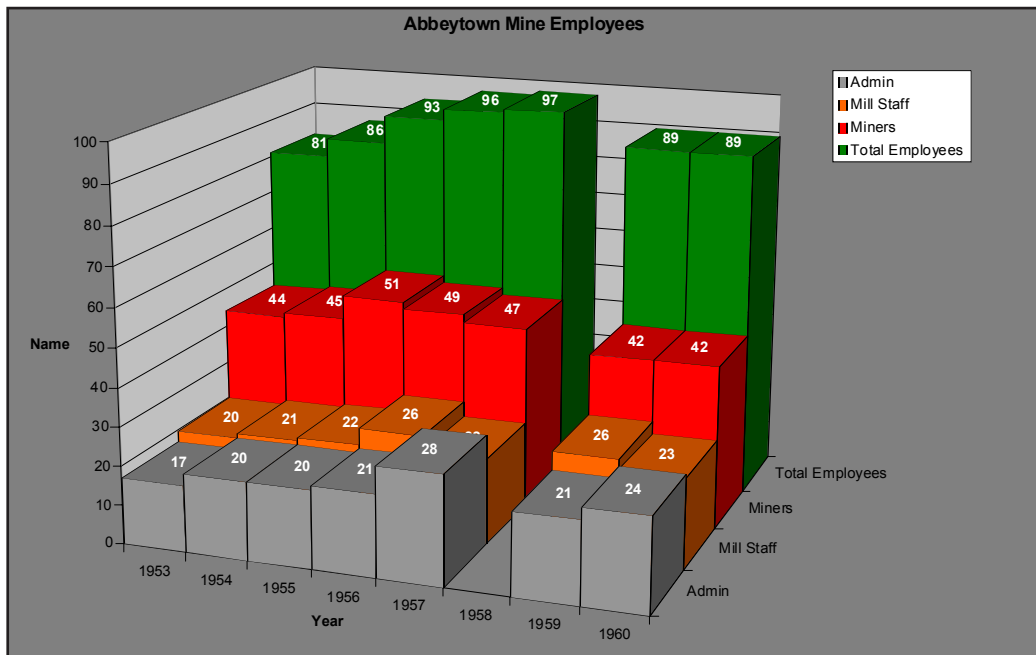


Figure 5. Staffing at the Abbeytown Mine, 1953 to 1961

Below: Summary History of Mining At Abbeytown

mine. These limestone reserves to the west of the previous extraction area were identified in the late 1990s and early part of the 21st century and planning permission to extract this limestone was granted in 2003 (JBA, 2002). The company use the crushed rock aggregates in the concrete and asphalt manufacturing plants within the site.

Post mining, the JCI mine workings appear to have been flooded to close to the top of the main decline, but lowering of the quarry floor has lowered the water level in the main decline to near to the upper access to the lower workings which are completely flooded and not accessible. The Western Oreboddy workings are not accessible. Much of the Index Bed workings and overlying levels are accessible (although the Index Bed Workings are flooded downdip). Some roof instability in the pillar and stall workings is evident.

The old workings are currently accessible from a single entrance via the current quarry operation. Access is permitted by Harrington Concrete (Sligo) Ltd. to members of MHTI who can demonstrate that they are properly experienced, suitably equipped and adequately insured.

### ACKNOWLEDGEMENTS

The author would like to thank Mr Frank Harrington and Harrington Concrete (Sligo) Ltd. for permission to access the mines. The Geological Survey of Ireland and Matthew Parkes assisted with access to mine records and other data. Scans of photographs from the 1960s were provided by Graham Tulloch of the British Geological Survey.

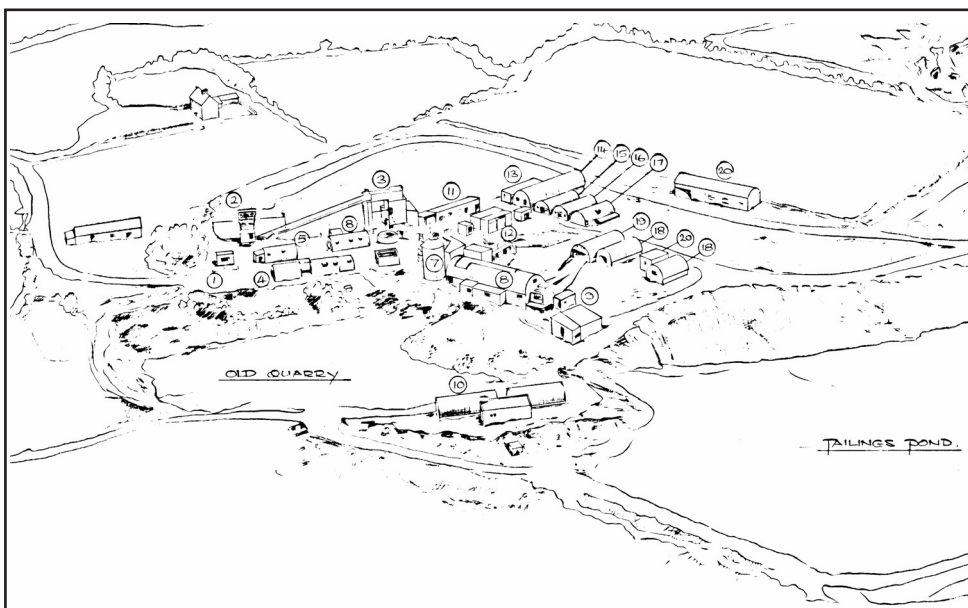
Period	Operator	Type of Works	Extent of works
Pre-18 <sup>th</sup> C	Abbey monks	Silver production from argentiferous galena	Unknown
1747 – 1752	Charles O'Hara	Lead and silver mining	Unknown
1786 - 1792	Sir Edward Crofton	Lead and silver mining	Unknown
1870s to 1880s	Middleton and Pollexfen	Lead and silver mining	100s – 1000s tonnes?
1917 – 1918	Kirwan and Mallagh	Zinc, lead and silver mining	100s – 1000s tonnes?
1928	Fordham	Exploration	Geophysical exploration
1930 – 34	Thornton	Exploration	Drilling
1934	Federated Trust of London	Exploration	Trenching
1936	British Metal Corporation	Exploration	Drilling
1945 – 50	Abbeytown Mining Company (Reid and McGuinness)	Exploration, some surface mining, plant establishment	Drilling, plant for processing existing ore, preparation for major mining operation
1950 – 1961	AMC (JCI)	Opencast and underground zinc and lead mining	730,831 tons ore

November 1950 to March 1958	
Open Pit	229,269t
Index Bed Workings	283,732t
Lower Oreboddy 1 (Western Oreboddy)	28,515t
<b>TOTALS</b>	<b>537,622t @ 2.608%Zn/1.121%Pb</b>
January 1959 to September 1961	
Index Bed	268t
Lower Oreboddy 1 (Western Oreboddy)	11,145t
Lower Oreboddy 2 (Under Index Bed)	142,170t
M Zone	35,734t
<b>TOTALS</b>	<b>185,537t @ 1.986%Zn/2.11%Pb</b>
Total mined 730,831t @ 2.45%Zn/1.375%Pb	





*Photo 1. Aerial Photograph (GSI Archive).  
 1a Left. Index of Buildings from  
 Aerial Photograph (Tara Mines  
 Ltd).*



**Abbeytown Mine Buildings Index**

- |    |                          |     |                                |     |                     |
|----|--------------------------|-----|--------------------------------|-----|---------------------|
| 1. | Weighbridge              | 6.  | Assay Lab                      | 14. | Stores              |
| 2. | Jaw Crusher              | 7.  | Fine Ore Bin                   | 15. | Compressor House    |
| 3. | Screens and Cone Crusher | 8.  | Concentrator                   | 16. | Mechanical Workshop |
| 4. | Admin                    | 9.  | Filtration and Bagging         | 17. | Chemical Stores     |
| 5. | Mine Engineering Office  | 10. | Miners Changing Buildings      | 18. | Stores              |
|    |                          | 11. | Electrical & Welding Workshops | 19. | Scraper Hauler      |
|    |                          | 12. | ESB Sub-station                | 20. | Garage              |
|    |                          | 13. | Core Shed                      |     |                     |

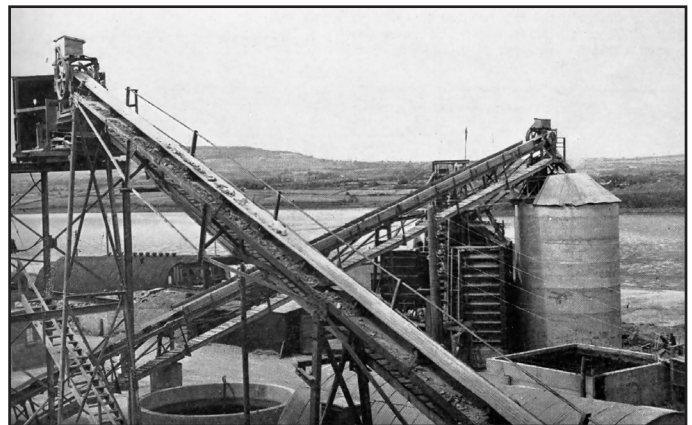
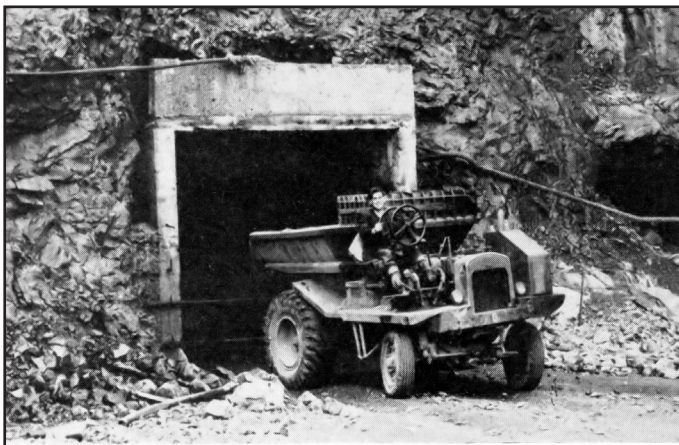
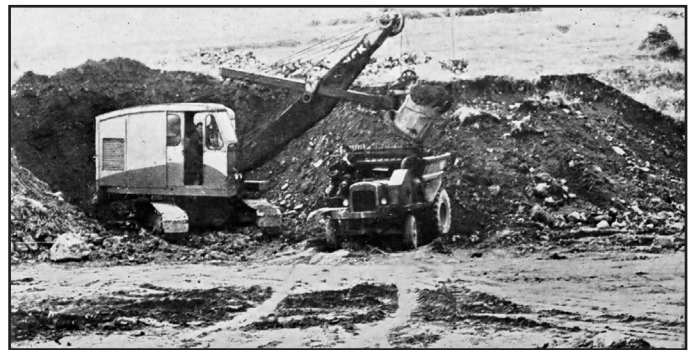
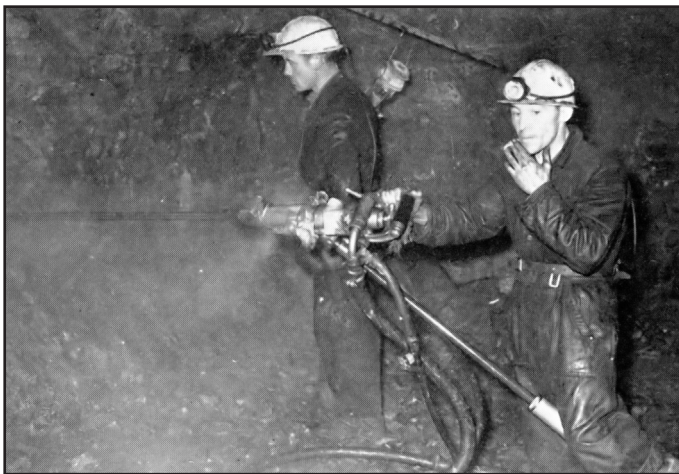


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*Photo 2 Left column top. Miners drilling at Abbeytown.  
Photo 3 Left middle. Dumper exiting mine portal.*



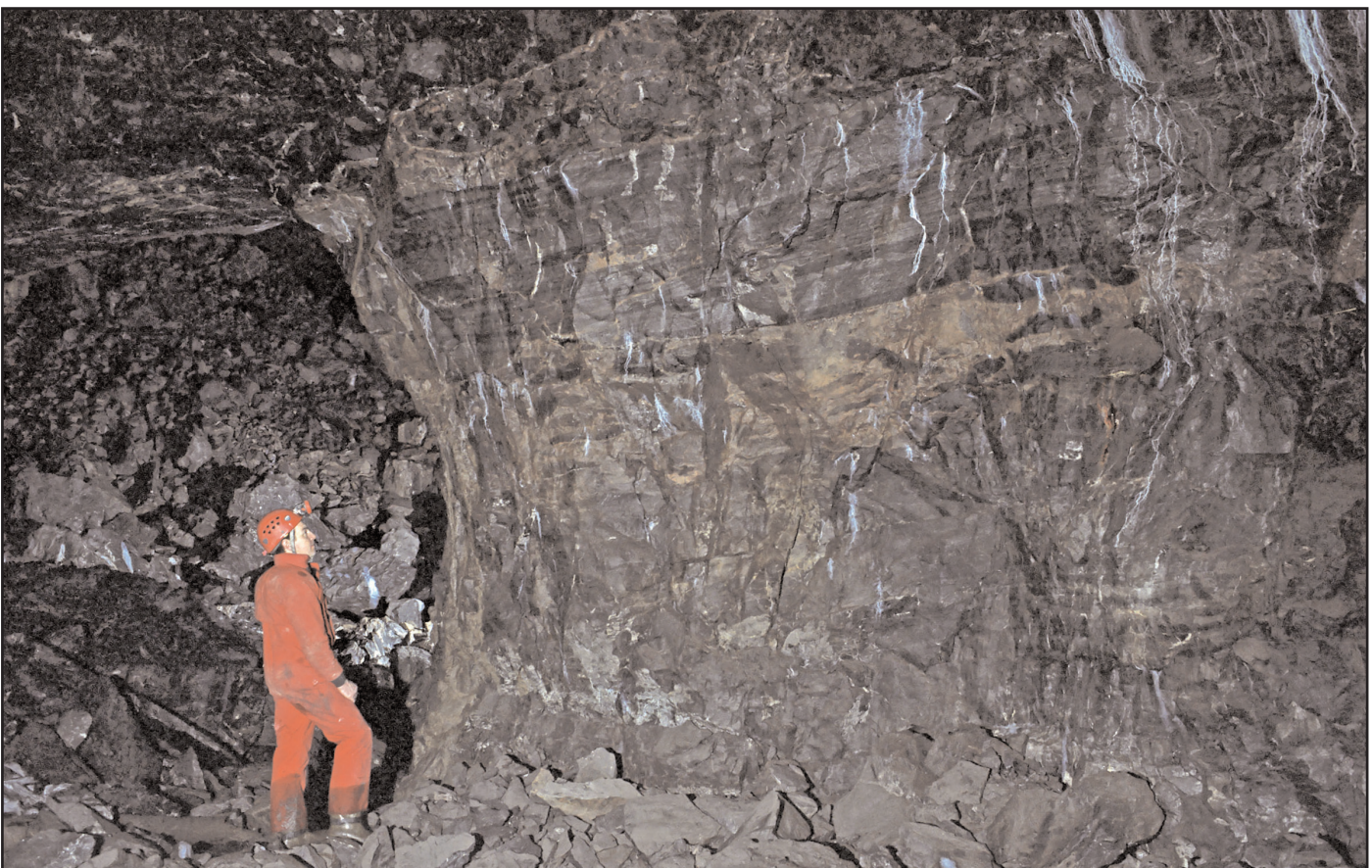
*Photo 4 Bottom left. The mine buildings. On the left are the miners changing rooms. The tall bin is the Fine Ore Bin with the concentrator immediately right. The low flat roofed building is the filtration and bagging building with the garage and stores on the right of the picture.  
Photo 5 Top right. Loading ore from opencast workings.  
Photo 6 Above. Conveyors. Screen and cone crusher to left, fine ore bin to right. Ballysodare Bay and Knocknarea in the background.*





*Photo 7 Above. Recent photograph in the western part of the Main Index Bed stall and pillar mining area.*

*Photo 8 Below. Mineralization in a pillar of Index Bed sandstone in the main Index Bed workings.*







*Photo 9 Above. Old mine railway in upper workings above the Main Decline. Looking down a hole in the floor into the main decline (see also photo 10).*

*Photo 10 Right. Top of Main Decline, looking up at hole in roof to area of Photo 9 above. taken.*

*Photo 11 Below. Looking up the main decline from just above the access drift into Lower Orebody 2. Note supports for ventilation on left wall and ruts on floor from mine vehicles. This section of mine would have been flooded prior to lowering of the water in the mine when the quarry floor was lowered.*

