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A PRELIMINARY ACCOUNT OF AN ARCHAEOLOGICAL EXCAVATION AT TANKARDSTOWN (KNOCKMAHON) COPPER MINE, BUNMAHON, CO. WATERFORD

by Flor Hurley

Abstract: The development of the Copper Coast Geopark has resulted in the availability of funding to carry out, archaeological survey, excavation and conservation works. Assisted by a range of detailed geophysical surveys, identifying areas of possible archaeological interest the Historic Buildings Survey Unit of the Department of Archaeology, UCC, has carried out the archaeological excavation work, uncovering the winding drum building and the boiler houses and internal layout of the two engine houses. *Journal of the Mining Heritage Trust of Ireland*, **5,** 2005, 23-28.

INTRODUCTION

The development of the Copper coast Geopark along the Waterford coast from Stradbally to Tramore provides an opportunity to bring the area's unique geological heritage to greater public awareness. An intrinsic part of this story is the human one, of the attempts to discover the mineral potential of the region, the organisation of the mining operations and the social and historical impact of this work on the area. A further important aspect of this activity concerns the surviving archaeological landscape and it is around Bunmahon that this is most apparent where, indeed, there is much evidence of the physical and social influence the mining operations of the mid- to late nineteenth century around the village. These include the mine manager's house, the terrace of miner's houses and the remains of the workers cottages.

One of the goals of this project was securing the future of the site. After it had ceased operating as a copper mine in the late 1870s, its machinery had been dismantled and removed along with many other elements of the site. Gradually time and human activity took its toll on the mine buildings. Parts of the structures were removed to supply local building needs, while its exposed coastal location also made what remained exposed to the elements. Other factors prompting the work on this site were that it is one of the most visible remnants of one of the most important mining areas in Ireland. Other mine structures survive in the Knockmahon and Tankardstown areas, but this complex is the most intact and easily accessible, as well as having a good range of the buildings one would associate with a nineteenth-century copper mine in the locality. The development of the Geopark has resulted in the availability of funding to carry out, archaeological survey, excavation and conservation works, which have enabled the site to be suitable for public presentation. Kevin Barton of Landscape and Geophysical Services Ltd has carried out a range of detailed geophysical surveys, identifying areas of possible archaeological interest and helping to understand the layout of the site. The Historic Buildings Survey Unit of the Dept. of Archaeology, UCC, has carried out the archaeological work, uncovering the winding drum building and the boiler houses and internal layout of the two engine houses.

THE SITE

The motorist passing on the R675 road linking Dungarvan and Tramore cannot fail to notice the remains of the mining complex at Tankardstown dramatically located near the cliff edge. The site contains the substantial remains of two engine houses and a chimney stack. The best-preserved building is the pumping engine house, built in 1851 to hold a 50 inch diameter Cornish engine, which had been originally installed in a nearby mine at Kilduane, in 1837. The engine was dismantled in 1877 when the mine was abandoned. An attempt was made in 1906-07 to re-open the mine, but the works carried out were on a very small scale, and some appear to have been designed to give the appearance of a more substantial operation. The pumping engine house was later provided with a coat of cement rendering and a concrete platform built by its southwestern corner (fig. 1).

Prior to excavation the second surviving building on the site, the winding engine house, was in very poor condition. This is where the steam engine, employed to raise the ore using a winding drum, was housed and in its former, largely fragmentary state, almost the entire western end had been removed gone. Most of the masonry plinth for the cylinder is also missing. The chimney stack is quite intact except for its missing brick top, which would have stood another c. 3m higher.

It is on the eastern edge of the village that the copper ore dressing floors and workshop were located, before their removal in the 1970s, and it is under the hill that gives the townland its name (Cnoc Machain) that the ore lodes naturally occurred. But of the many mine workings that stood there, little remains of the majority. Once they were either worked out or became unprofitable, the mine machinery was removed to be reused elsewhere, while the buildings dismantled, demolished or left fall into ruin. Fortunately, the best preserved of the mine complexes, that at Tankardstown, has become the centre-piece of the human element of the story that the Copper Coast Geopark has chosen to present. This is a fitting testimony to the thriving industrial base that once existed around Bunmahon and to the hard lives of the men, women and children that worked here.

Figure 1. General view of Tankardstown Cornish engine house, stack and winding house before excavation

Since its final abandonment in the early years of the twentieth century, apart from being used as a dump, the mine has received little attention. It was speculated that the body of the missing Stradbally postman, Larry Griffin may have been placed in the mine in 1930 but given the amount of water present no search could be carried out. In 1969 the complex played a role in the motion picture *The Mckenzie Break* where a truck was placed in the mine entrance and set on fire. The shaft was sealed shortly after this.

METHODOLOGY

This is the first time that modern archaeological excavation techniques have been used to investigate a nineteenth-century Irish mine. Previous work on mining landscapes had centered around either prehistoric mining sites as conducted by Dr. W. O' Brien at Mount Gabriel near Schull, Co. Cork or at Ross Island, Killarney, Co. Kerry. Small-scale industrial sites of prehistoric and historic date are, however, being unearthed during the archaeological work carried out in advance of the road schemes around the country. Thus the sites that have been found have been those whose existence was unknown, or if known, the correct archaeological response has been to have as little impact as possible on the sites. This site has provided an opportunity to examine a considerable portion of an industrial site, one that is documented historically and is of regional and national significance.

While the needs of the proposed conservation works did dictate what elements of the site would be examined, three structures were revealed as upstanding buildings, namely the pumping engine and winding engine boiler houses and the winding drum building. As the first of its kind in Ireland, the exercise was certainly a learning experience. One of the first things to be dealt with was the scale of the deposits on the site. In a mining operation, enormous amount of waste rock are generated, much of which, in this instance, was dumped over the nearby cliff, but a limited amount was survived on site and required archaeological investigation. Large quantities of waste from the engines' boilers (which consumed large amounts of coal, and which produced large amounts of ash and cinders), were also in evidence. These were distributed around the site and were often intermixed with a re-deposited, clayey silt, which meant that the traditional practice of identifying an individual deposit and removing it as a discrete stratigraphic entity could not be followed. However, when as many of these areas as possible were identified, sections were removed by machine under close archaeological supervision. The scale of deposits also came into play in dealing with the large blocks of masonry that lay within the boiler houses and the pumping house cataract pit. These could not be moved by human effort alone nor could they be, as they presented a safety risk to those attempting such a task.

On a site such as this it can be tempting to try to uncover as much as possible, in order to identify the layout of the site and its components and to present as much as of the site to the public. The inherent drawback in this is that if too much is exposed, what is left can deteriorate from exposure to the elements or human activity if not properly conserved.

THE EXCAVATION

The excavation was laid out with the twin goals of exposing enough of the mine structures to aid an enhanced understanding of the site and its operation, and to facilitate a program of conservation of the surviving buildings and any that hitherto lay buried. This concentrated the excavation area on the interior of the pumping engine house, its condenser pit, a narrow area around its western and southern sides and the pump house boiler house. The flue leading from this to the chimneystack; the winding engine house, its boiler house and flue would also be examined. For the most part the work was carried out by hand. A JCB was used to remove large blocks of collapsed masonry and to clear large areas of redeposited soils.

THE PUMPING ENGINE HOUSE (FIG. 2)

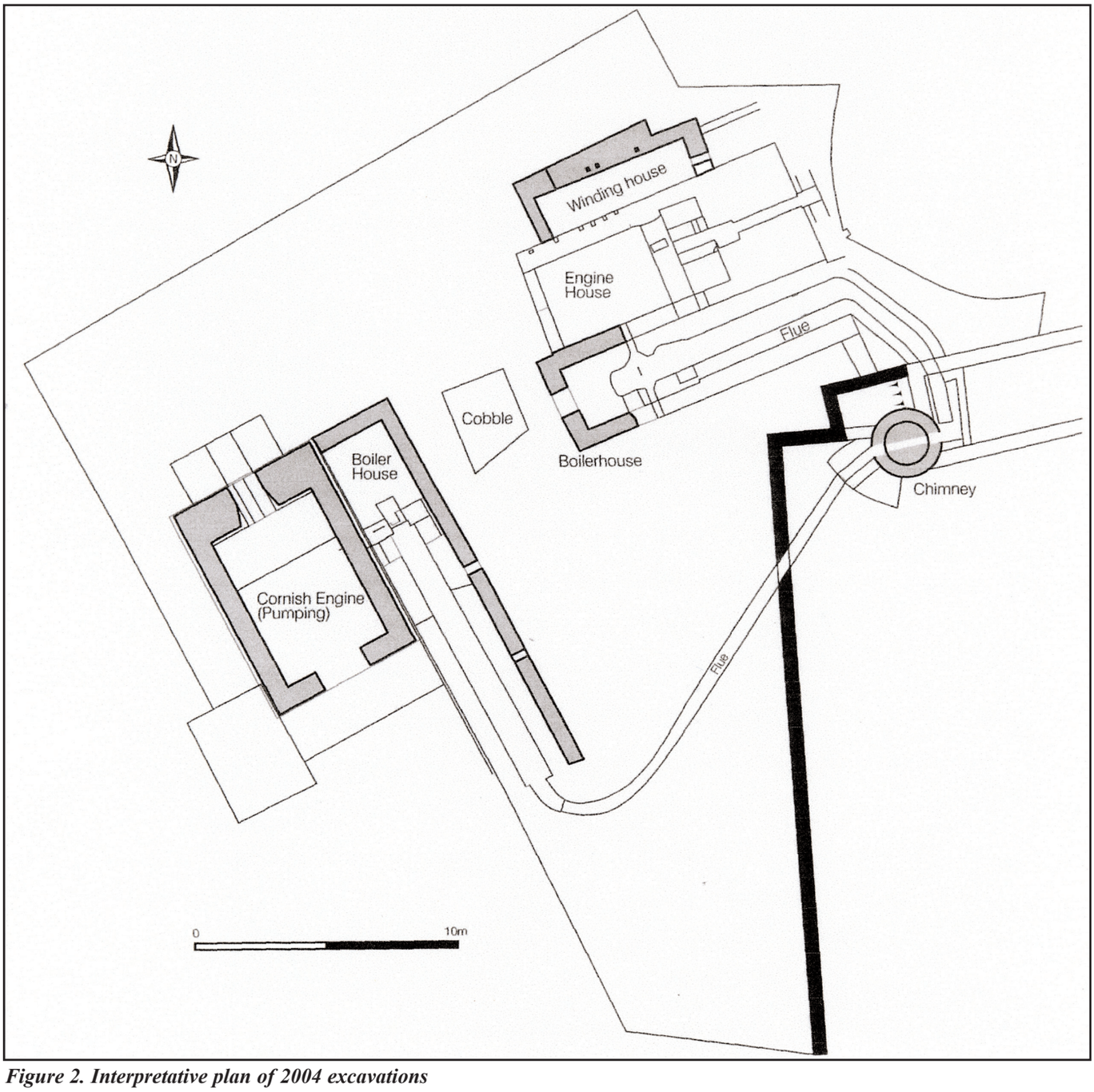

Figure 2. Interpretative plan of 2004 excavations

This rectangular structure originally had a large masonry platform at its southern end upon which the pump cylinder stood vertically. Approximately 1m of this had been removed in the past, in some areas almost undermining the sidewalls. Hand clearance of this area revealed the edge of the cataract pit in the northern end of the building. This was in fact partly hand excavated to determine its depth and to locate the 'crow hole' or crawl-way at the base of the masonry platform, used to secure the cylinder bolts. The remaining stone overburden was cleared by machine. Two small recesses were found on the face of the platform measuring 0.35m by 0.17m which ran into the body of the platform. Their function is unknown, but may have been associated with supports for the timing mechanism governing the engine operation. The base of the cataract pit has a step on its northern side, being 0.30m lower than the rest of the floor. A number of the bedstones upon which the cylinder sat were found dumped in the cataract pit, which suggests that the top of the masonry plinth was damaged when the pump was being removed in 1877 and the debris thrown into the cataract pit.

In the southern wall, at ground floor level, is a large arched doorway, which was used to install the pump cylinder and associated plant. Immediately outside this was an earthen ramp comprising a layer of stone chips on top of a compacted surface. A low, short wall foundation 0.65m long, but only one

Figure 3. General view of boiler house for Cornish engine as excavated, looking north

course deep was found on the eastern edge of the ramp, separating the ramp from the western wall of the pump house boiler house.

On the northern side of the pump house lay the condenser pit, close to the entrance to the mine shaft. To help locate this and the shaft, the topsoil in this area was cleared back by machine. The condenser pit was uncovered by this activity as it contained over 3m of fill. This was mostly comprised of modern rubbish and layers of stony fill. The feature itself consisted of a shallow rectangular mortared pit, 1.10m wide, 0.30m deep and at least 1.80m, long running directly north from the centre of the northern wall of the pump house. A small square opening, 0.45m in height and width ran from the base of the condenser pit under the pump house wall into the cataract pit.

The top of the shaft was not uncovered but its approximate location was noted by the presence of modern debris, visible on the surface and in the northern section of the trench exposing the condenser pit. As this is a potentially hazardous feature and would present a safety issue during conservation works, it was not excavated.

PUMPING ENGINE BOILER HOUSE (FIG. 3)

A rectangular depression on the eastern side of the pump house was the only surface indication of the location of this structure, with large blocks of bonded masonry being present in its northern end. A small trench was placed across the southern end of the feature to determine its form and condition. This revealed a masonry platform against both side walls with a central passageway. The edges of the platforms were in a poor condition, with much of the masonry being loose. A deposit of sandy silt containing much mortar and loose stone filled the trench. All of this material was removed by machine under close archaeological supervision, working from the more intact northern end of the building southwards. The central passageway, which had a flagged floor, was cleared by hand. A thin layer of coal dust overlay a paved area at the northern end, the area where the boiler was loaded with coal. Adjacent to this was a rectangular pit with a small shaft or opening in the base of its northern end. On the south side of the pit were two short ramps leading from the firing level into the central passageway. The two masonry platforms, on which the boiler would have been supported, were in a good condition at their northern end but their central and southern sides had collapsed. Traces of two brick vents in the eastern wall were also exposed at ground level.

Figure 4. Detail of slots in winding drum structure. These are in wall dividing drum from winding engine house at rear of picture.

The overall length and width of the building when cleared was 16m and 3.45m respectively. The southern end of the structure had been badly damaged in the past and the exact nature of its end wall is unclear. There was no trace of a mortared wall, although there is a clear division between the soils outside the building and the interior deposits. The flue exits from the southern end of the boiler house and turns sharply away to the northeast, towards the chimney, going under a stone wall. It is built of rubble, with large capstones. Internally it measures 0.65m high by 0.35m wide.

WINDING ENGINE HOUSE

This building and its two associated structures lay at right angles to the pump house remains. The structure was in a poor condition prior to excavation work, with only its eastern wall and small parts of the north and south walls remaining in situ. The masonry platform for the cylinder had been robbed of much of its stone. The overburden was removed mechanically to remove large blocks of masonry, with the remainder being hand cleared. This revealed the cataract pit, which had been

altered by the insertion of short cross-walls at a later date. What may be the bob wall crossing the centre of the building had been reduced down almost to its foundation. The floor of the building at its western end was made up of loose stone and mortar, the only remains, indeed, of its original floor surface, which was presumably damaged when the winding engine was removed.

The masonry platform for the cylinder had been reduced down to the level of the crow hole. This was 0.47m wide and ran out under the eastern wall of the building to terminate in a rectangular pit 0.83m long by 0.60m wide. It also had a rectangular entrance from the cataract pit 0.94m wide. There is a distinctive break in the masonry of the southern wall of the winding engine house, which indicates that the wall was built against the possible bob wall: no such break is present in the northern wall. The possible bob wall is 0.90m thick, while the wall separating the winding drum from the engine house is 0.80m thick. The other walls have widths of 0.60m (southern wall) and 0.40m (western wall).

What may be the bob wall is unusual in that it is only the lower 2m of this wall that is quite wide, which would have been level with the top of the masonry plinth. Above this is a narrower section of wall continuing up from the eastern side of the possible bob wall. Such a narrow wall would have been highly unlikely to support the balance bob. Since the wall has no evidence of being rebuilt, how the balance bob was supported is unclear, but the possibility exists of it resting on wooden beams.

WINDING DRUM BUILDING (FIG. 4)

This is attached to the northern wall of the winding engine house. It was not visible prior to excavation, although a large block of masonry was present, having fallen either from this building or the engine house. On excavation a sub-rectangular structure (internally rectangular) was uncovered, measuring 7.30m long by 2.80m wide. The northern wall was the most substantial, varying in width from 0.92m to 1.15m. Its north-eastern corner was stepped back and varied in width from 0.45m to 0.55m. The western wall was of a similar thickness.

The most noticeable feature of the structure was the vertical slots built into the side walls. These were for timbers supporting the winding drum. There were six of these in the southern wall and three in the northern wall measuring, on average 0.12m by 0.15m. The distance between the easternmost three on the southern wall was virtually identical (c.0.49-0.51m) with the distance between the next two being just over twice that. Two of the slots on the northern wall correspond with two on the southern wall. Large horizontal slots are found at the base of the two side walls, the northern one containing the remains of the timber beam. A small rectangular opening in the base of the eastern wall could be for drainage.

WINDING ENGINE BOILER HOUSE

This lay on the southern side of the winding engine house. In plan, it is very similar to that for the pumping engine, having the masonry platforms to support the boiler on either side. These had malleable red clay on their surface. The building measured 11.80m long by 3.85m wide externally. A single ramp is present on the southern side of the firing area. Although this is not as clearly differentiated as that in the other boiler house. There are two vents (?) running through the side walls, the northern one into the winding engine house. The firing area is not paved, having an earthen floor with a deposit of coal dust on top of it. The western end wall has the remains of an opening 1.10m wide, through which coal could be loaded. On the outside of this was found a cobbled surface, where the coal to feed the boiler(s) would have been unloaded before being stored or used. No such feature survived in the boiler house for the pump. A doorway in the southern wall gave access to the building and, as in the other boiler house, no discernable wall was present at its eastern end.

The flue rises in height and turns sharply towards the southeast. It continues turning, running under a wall before terminating at a 90° bend into the chimney stack (fig. 1). The end wall of the flue abuts the chimney directly below where the flue enters the stack, with the scarring on the stack suggesting that this part of the flue was quite low. None of the capstones for this section of flue survive.

TRAMWAY

To take the copper ore down to the processing area in Knockmahon, a gravity tramway was built. running close to the edge of the cliff, the cutting for which survives near the Tankardstown site.

A small trench measuring 2m by 1m was excavated across this to determine if any remains of the tramway survived or any physical trace of its presence remained. It had been dismantled in 1877, and from the complete lack of evidence in the admittedly small trench, this appears to have been thorough. There was no trace of the rails, any supporting elements like sleepers or of waste material that may have fallen from the ore wagons.

OTHER FEATURES

Several ancillary features were uncovered during the excavation. Between the two boiler houses was a small cobbled surface, measuring 3.50m by 2.50m. It did not extend up to the walls of the boiler houses, but finished a short distance from each of them. It was covered with fine silt mostly comprised of coal dust. Several walls are present around the chimney, all of which were visible prior to excavation. The largest of these is runs north-south. The southern part of this forms the western wall of a two-roomed structure, the walls of which stand to roughly half their original height. As this was outside the excavation area it was not examined at this time.

Two parallel low walls run east from the chimney. Both abut the stack, but the northern one appears to form part of the western side of the flue from the winding engine boiler house before turning sharply eastwards, the flue running through the wall. The eastern side of the flue here is a short separate wall, not bonded into the two low walls. On the northern and western sides of the chimney is an S-shaped wall. This abuts the northern of the two walls running eastwards, indicating that it is a later build. Another short low wall links the western side of the

chimney to the bend in the S-shaped wall. This too is a later insertion, not being bonded into either construction.

Outside the eastern end wall of the winding engine house is the rectangular pit linked to the crawl hole within the building. This has a compacted earthen surface around it, with a low stone wall curving from the north to the east. This appears to be a retaining wall, with the material behind it made up of waste from the mining operation. A linear feature was observed running northeast from the rear wall of the winding drum building, lying parallel to the sidewall of the winding engine house. The purpose of this was not determined due to time constraints.

FINDS

Although the comprehensive geophysical testing carried out on the site had identified a number of potential targets, the amount of material found was surprisingly small, while the range of items found was also limited. This is perhaps not surprising, given the dismantling of the site after the closure of the mine in 1877-79. Some of the material, indeed, probably relates to the abortive attempts to re-open the site between 1906-08. Given the short time span involved between the two episodes, attributing exact time periods to the use of the items located is difficult. Added to this is the easy public access to the site, resulting in the dumping of waste around the top of the mineshaft and the condenser pit.

The different phases of activity at the end of the sites life is reflected in the distribution of the items recovered. Of the thirty-nine items recovered from secure contexts during the excavation, the majority, twenty-nine came from within the winding engine house, with only two coming from the pump house boiler house. This reflects how thorough had been the removal of useful items, most likely from when the mine closed but also over the intervening years.

The amount of material found in the winding engine house tallies with the use of that building during the 1906-08 activity by the Bonmahon Copper Mines Development Syndicate. The removal of the pump in 1877 would have caused the workings to flood. Any serious attempt to reopen the mine would have required the removal of the water using new pumps. The fact that so few artifacts were found in the pump house or its boiler house indicates how little attention was paid to this vital element of the new mining venture.

The majority of the finds recovered were metal. For the most part these were iron staples or brackets, bolts, nuts and rods. Only one item could be described as being possibly mechanical, a long circular iron rod which has both ends flattened, with three rectangular holes in each end. A fragment of an iron pin survives in one hole, whichs has a diameter of 42mm and a length of 890mm. The flattened ends measure 250mm with the holes being 10mm² and occur at 9mm intervals. This item and a washer were all that was found in the demolition debris of the pump house boiler house.

Four non-ferrous items were found. An un-diagnostic flint flake in re-deposited soil north of the winding drum house; part of an earthenware ridge tile stamped 'BRIDGWATER', from the demolition debris of the winding engine house and a rectangular piece of lead sheeting from the adjoining boiler house. Five sherds from the one earthenware pot came from the upper fill of the winding engine cataract pit. The paucity of items found could be explained by the thoroughness with which the site was stripped of its machinery and fittings after its initial closure. It is probable that some of the items found in the demolition debris within the winding engine house date to the early twentieth century attempt to revive mine operations.

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