

WASC 1908

Note on
Interpretation of WA
Site 25-9-1997
B.J. Buchanan

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WALTHAM ABBEY ROYAL GUNPOWDER MILLS



The Interpretation and Display
of the Site in its National and
International Context

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25 September 1997

The site of the Waltham Abbey Royal Gunpowder Mills commands superlatives in terms of its size and location; its continuity of use for explosives manufacture and research over a period of more than three hundred years; the industrial structures which survive; and the wild life that flourishes as a result of the secrecy within which the whole place has traditionally been shrouded. The main challenge now is that of doing justice to a large, complex site of major national and international significance, the interpretation and display of which must meet the exacting standards of experts whilst at the same time remaining accessible to local needs and interests. And this has to be achieved without destroying the sense of privacy and wonder that has developed over the years through the strict controls which were formerly exercised over the WARG Mills.

WATCo is concerned essentially with the maintenance of the fabric of the WARGM, but as this charge is so intimately connected to the interpretation and display of the site, it is proper that these features should be of general concern to the Foundation Trustees. In particular, the standard of the interpretative design is of prime importance, not only in terms of attracting visitors thereby supplementing the endowment revenue, but also as a means of establishing the significance of the WARGM in its wider context.

It is appropriate to consider areas of concern relating to these matters under several main heads, although a rigid distinction between them cannot always be maintained:

1 Matters of General Interest - these are not specific to this site but are important for its understanding. They include the nature of gunpowder and its early history, and the later development of chemically-based explosives.

An Interpretation Centre is proposed by Event as the place where interest will be aroused and some of this background introduced. Here, I think the image of the passive Taoist monk contemplating the ingredients of gunpowder in a dish may convey the wrong impression of the origins of this mixture. Gunpowder was probably chanced upon in China by alchemists, in the course of their search for the Philosopher's Stone, the ability to transmute base metals into gold, and the secrets of longevity. There was thus activity as well as monkish contemplation, with the former probably driven by something of a scientific search with medical overtones. The role of Arab intermediaries was also important in the transfer of this knowledge to European scholars.

The next significant question proposed for the Interpretation Centre by Event is that of the importance of gunpowder, and here the response is too restrictive in that it relates only to its military and not to its civil use. But explosives have been of the greatest importance in mining, civil engineering, trade, and exploration. This range of uses should be kept in balance to prevent the subject being seen as no more than 'toys for the boys', especially with the recruitment of school parties in mind. The celebratory function of fireworks too is worthy of inclusion, particularly as this will allow for the introduction of the patron saint of gunpowder users, St. Barbara. Her day is December 4th, which may provide an opportunity for a second celebration in the winter months, following November 5th.

Lastly in this section there is the consideration of the ingredients of gunpowder and the processes followed. The recipe quoted, 75 - 15 - 10, is really too rigid, and probably only came to be accepted as the British military formula in the second half of the eighteenth century. Other countries continued to use different proportions for military purposes, and the traditions for mining and merchant use were different yet again. In other words there was an element of rule of thumb, as found in so much of British industry in the early days. The procedures which were followed, especially the crucial one of incorporation, could be illustrated to good effect both in the Interpretation Centre and in the field.

2 The early history of the Waltham Abbey Powdermill, which needs to be placed in its local context as one of the mills of the Lea Valley. A reference to its earlier uses, eg as an oil mill, will make the important point of the flexibility of this system of power. This setting of the powdermill within the locality would probably be best conveyed at the Centre, but information on the procurement of the ingredients of gunpowder in the early days, and on the methods used, could provide a feature of interest on the site itself.

The question of the grassy spaces between buildings was raised at the Swallow Hotel seminar, and this has prompted the thought

that possibly charcoal could be made here (with an attendant pleasant aroma, and perhaps some sales for barbecues etc.). Links may be made with the natural history of the site, through the coppicing of appropriate trees. As to saltpetre, before supplies began to arrive from India, from the 1630s and at first in small quantities, this commodity was produced in saltpetre pits from decaying nitrogenous material gathered into 'dongfields'. As there is historical evidence for one such at Enfield in 1572, it would not be entirely fanciful to create a small version at Waltham Abbey. The sulphur was of volcanic origin, usually from the Mediterranean, but as it would at first have been refined at the site, the distillation of this ingredient could also be demonstrated in the field. The making of barrels called for craftsmanship of a high order, and coopers could be seen at work, producing saleable items.

Farmer's engraving of 1735 showing the contemporary disposition of the buildings at the Millhead, especially as they related to the procedures such as incorporation by stamps or edge runners, powered by horse or water, could provide another element of open-air activity whereby the evidence from this surviving document could be related to the likely disposition of buildings on the ground. We are very lucky to have this item of pictorial evidence.

Evidence on the mill whilst in private ownership, especially by the Walton family before the 1780s, should also be presented, since it will put the later possession by the Crown into perspective. It will also provide an opportunity to introduce a woman to the scene, Phillipa Walton, and may also show that some of the powder then produced was sold for civil rather than military use.

Lastly, there is the whole question of testing the powder, which presented problems of mathematics rather than chemistry. These problems may be explained with models of Benjamin Robins' ballistic pendulum of the 1740s, and the French mortars, introduced at the same time but not coming into general use until the 1780s. The testing of the powder could provide a very lively outdoor feature, taking place on certain days at certain times, as happens now with stationary engines 'in steam', for example the Crofton beam engines on the Kennet & Avon Canal.

3 Purchase by the Crown and Developments under the Congreves.
 Negotiations for the purchase of the site began in 1787 as a result of the poor performance of British arms in the War of American Independence. There was a continuing rivalry with the French, but it is not likely that the purchase was made in anticipation of the Napoleonic Wars with that nation, although that explanation has somehow crept into the story. This purchase initiated a more careful and scientific approach to the whole business, exemplified by William Congreve senior and his son of the same name, of whom the latter made his

reputation with the development of the Congreve rocket, used against the American east coast. As there are some buildings of this period on the site, one showing what may be the crest of the Walton family, it might be possible to use these to take the story forward. The development of the site in terms of new buildings and processes, such as the production of larger grains or pellets for larger guns, can also be unfolded in relation to this expansion. Reference should also be made to the Board of Ordnance and other official bodies of the time, such as the laboratory at Woolwich.

4 The WARGM as a producer of chemically-based explosives - it is ironic that in respect of these later developments, the physical evidence in terms of surviving structures increases, as the processes become more difficult to understand. This therefore may be the point at which visitors are encouraged to explore the rest of the features on the site, with guide notes and discreet display boards at each stopping place to elucidate the complicated procedures. This section will provide the real challenge of the site because there are few other surviving powdermills where the continuity of use had been such that evidence can be found of the production of both gunpowder and the later explosives. The human interest in these scientific endeavours can continue with reference to men such as Sir Frederick Abel. Fluctuations in production in the nineteenth century can be related to the cycle of warfare and the demands contingent upon this.

5 The Waltham Abbey Mills in a national context - the significance of WARGM rests not so much in its uniqueness, as its pre-eminence in a network of important sites. This is not the position which was taken in the Main Report of August 1994, nor that affirmed by Event in their presentation at the Swallow Seminar. But this perspective must not be neglected because it enhances rather than diminishes the importance of WARGM. At the very least, the establishment of visitor facilities at other sites associated with explosives should be supported as being good for WARGM business, for visitors to provincial centres, perhaps whilst on holiday, may then pick up literature which will bring them to Waltham Abbey. Two recently-visited examples from Cornwall may be cited to illustrate this case:

First, the Kennall Vale Works near Ponsanooth south-west of Truro, where powder for mining was produced from the early nineteenth century. Here in a deeply wooded valley with an intricate system of waterways, there survive several pairs of massive incorporating mills, with ancillary buildings. There are echoes of WARGM in the importance of the natural history of the site, which is held on lease by the Cornwall Wildlife Trust (formerly the Cornwall Trust for Nature Conservation), who manage both the woodland and the industrial remains with a view to the long-term conservation of both. A very full report on the site was published in 1986, and the sketch map included in

the appendix comes from this source. Access is by paths, but on a recent visit (23/9/97) no information was found at the site.

Secondly, when in the 1890s it was decided by the Government that insufficient cordite for the needs of the army could be produced at Waltham Abbey, the directors of the Kennall Company now known as the National Explosives Company tendered successfully for this contract, on the strength of which a large explosives plant was built on sand dunes at Towans near Hayle. A plan of this site is enclosed in the appendix. Holiday chalets have been built amongst the northerly sand dunes, and dog owners walk their pets on the rest, where however a number of significant earthworks provide clues as to the former use. This site has also been explored (23/9/97), and there are no notices to show that this was in effect an important 'daughter house' of Waltham Abbey.

I was fortunately able to discuss these sites with Nicholas Johnson, the County Archaeologist for Cornwall, who assures me that a letter from WARGM to his Chief Officer would be helpful in gaining permission to put up signs, and in establishing an entry in the tourist literature. At the same meeting I was able to speak to the National Trust officer for the eastern region, who expressed interest in an exchange of information between their property at Orford Ness and WARGM. It seems that some personnel may have worked at both. These examples encourage the hope that Waltham Abbey can soon begin to function as a centre for the exchange of information, perhaps in time producing a brochure containing details of such sites. It would then be acting as the national museum for the explosives industry, a status to which it should aspire.

6 The Waltham Abbey Mills in an international context - this aspect of the subject is one with which I have been particularly concerned, and through organizing the Gunpowder Section meetings of the International Committee for the History of Technology (ICOHTEC), my contacts are now very extensive. We first met as part of the ICOHTEC Symposium in Bath in 1994, the outcome of which was the volume entitled Gunpowder: The History of an International Technology (Bath University Press, 1996). This includes a chapter on Waltham Abbey which provides the only scholarly account of this subject now accessible in print. There is also an account of the restored powder mills at Ballincollig in Ireland, also previously owned by the Crown. Papers at Budapest in 1996 included accounts of the Greek powder works at Dimitisana (recently opened to the public) and of the French ones at Sevran-Livry near Paris (to which I organized a visit last spring). Waltham Abbey featured again at Budapest in papers by Wayne Cocroft and the American scholar Seymour Mauskopf. The 1998 Symposium of ICOHTEC in Lisbon will include a paper on and visit to the major powder works at Barcarena nearby, already surveyed. It is hoped these will open as a museum. I am also familiar with the powder mills at

Frederiksvaerk in Denmark, to which I organized a visit for the Gunpowder Mills Study Group. This has recently passed into the hands of the local authority, and I am currently following the advice of the Army Museum in Copenhagen in an effort to re-establish contact. I must add a note of caution about the Penny Royal Mills in Tasmania which I have twice found closed, and about which doubts as to authenticity have been expressed by Australian colleagues.

I have not so far mentioned the Hagley Museum near Wilmington, USA, on the site of the Du Pont works in the Brandywine Valley, because it and its Curator of Industry and Technology, Robert Howard, deserve special mention. Hagley sets the standard in site conservation and the care of materials associated with the industry, not only buildings and artefacts but also books, papers, and illustrations. There is a fine library and archive on the site, which has benefitted from Du Pont support. It may be possible to learn from this and to secure similar help for Waltham Abbey from comparable bodies such as ICI. Perhaps too in terms of books and documentary material, some help may come from the MoD. In addition, this is a good moment to collect books from university libraries as these institutions rid themselves of earlier texts thought to be no longer relevant. Attractive premises for a library, lectures, and seminars, would add to the prestige of WARGM whilst at the same time helping to increase the number of year-round visitors. I realise such a project must be long-term, for according to the Main Report (Aug.1994,p.53) the setting up of an Academic Institute has been timed for the distant future of Stage 5. However, long before then it may be possible to establish a programme of post-graduate studies on aspects of the explosives industry, perhaps in association with the Science Museum or Imperial College, London. We would thus from the beginning associate ourselves with institutions of the highest standard, which could then lay the foundations for further progress.

Conclusion - these concluding comments may seem to take the discussion away from the practical matter of the display and interpretation of the site, but the acknowledgement of WARGM's national, international, and scholarly importance will not only enhance its standing in those spheres, it will also add significantly to its importance in local eyes, not least by helping to provide more and better facilities for the locality.

B. J. Buchanan.

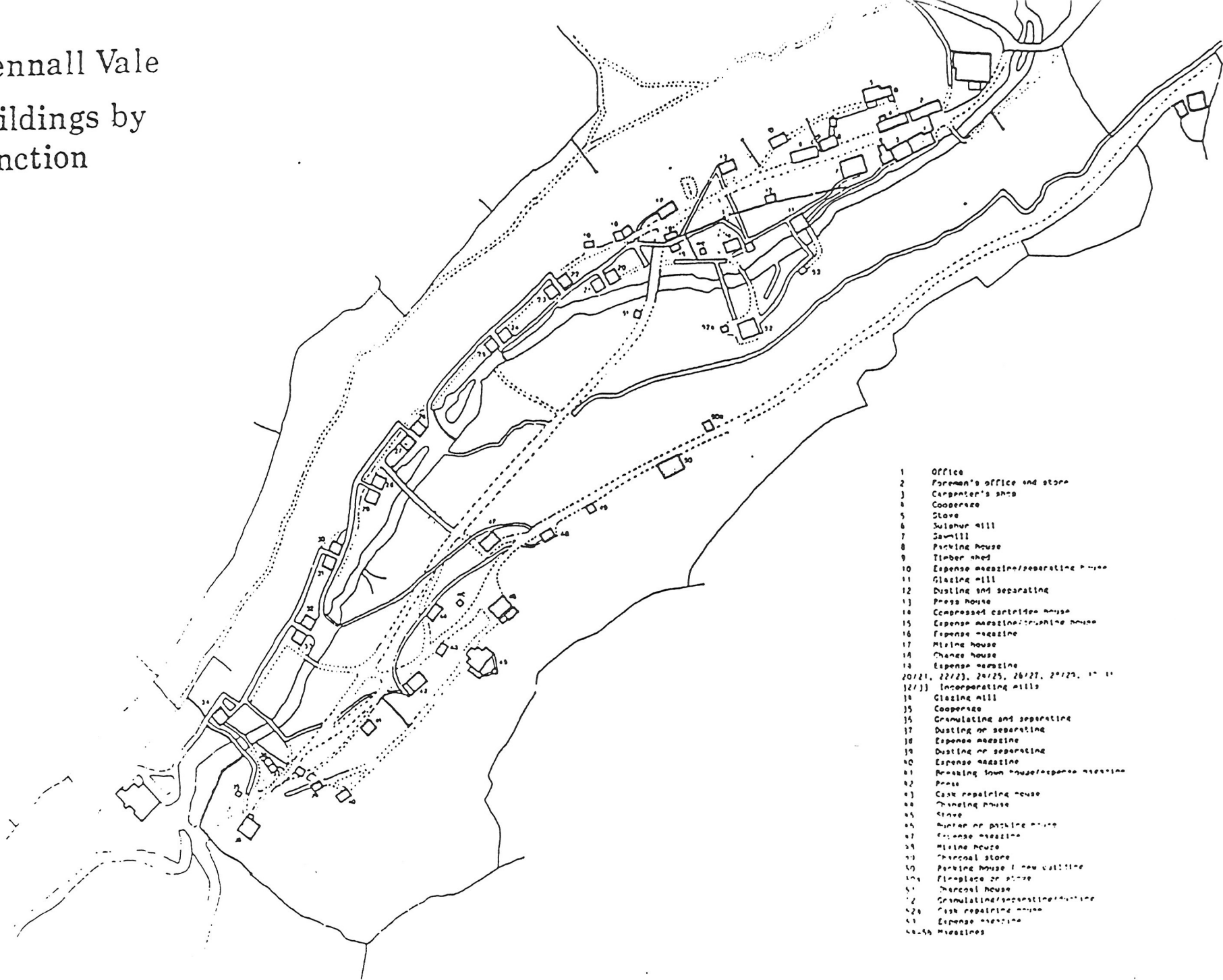
APPENDIX

- A. The Kennall Vale Powder Mills, Cornwall.
- B. The Hagley Cordite Factory, Cornwall.
- C. The Hagley Museum, plan for visitors (USA)
- D. The Hagley Museum, leaflet placing the powder mills in the local context of the Brandywine Valley, Delaware.
- E. Beaver Tin Mine (Cornwall). A handy leaflet to carry round the site, showing 18 features on a recommended route, to gether with background notes etc. Visitors get to wear hard hats and ducoats. Included as an example of how a non-gunpowder museum is responding to the challenge.

B. J. Buchanan.

Enclosed are 5 photo-copies.

Kennall Vale
buildings by
function



- 1 Office
- 2 Foreman's office and store
- 3 Carpenter's shop
- 4 Cooperize
- 5 Stave
- 6 Swisher mill
- 7 Sawmill
- 8 Packing house
- 9 Timber shed
- 10 Expense magazine/separating house
- 11 Glazing mill
- 12 Dusting and separating
- 13 Press house
- 14 Compressed cartilage house
- 15 Expense magazine/trough house
- 16 Expense magazine
- 17 Mixing house
- 18 Change house
- 19 Expense magazine
- 20/21, 22/23, 24/25, 26/27, 28/29, 30/31 Incorporating mills
- 32 Glazing mill
- 33 Cooperize
- 34 Granulating and separating
- 35 Dusting or separating
- 36 Expense magazine
- 37 Dusting or separating
- 38 Expense magazine
- 39 Pressing room house/expense magazine
- 40 Press
- 41 Cash repairing house
- 42 Grinding house
- 43 Stave
- 44 Repair or packing house
- 45 Expense magazine
- 46 Mixing house
- 47 Personal store
- 48 Packing house (new building)
- 49 Fireplace or stove
- 50 Blacksmith house
- 51 Granulating/separating machine
- 52 Cash repairing house
- 53 Expense magazine
- 44-54 magazines

John R. Smith, The Kennall Gunpowder Company: An Archaeological & Historical Study (1986) #



Plate 68 The National Explosive Company's factory in 1906. A considerable number of additions were made later, up to 1917. (Part of 25 in. Ordnance Survey sheet LXII. 10, surveyed in 1876, revised in 1906 and published in 1907)

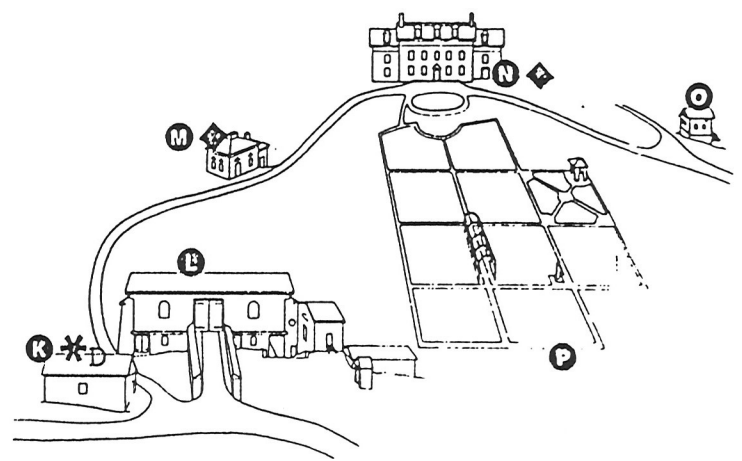
Bryan Earl, Cornish Explosives (1978)
 The Hayk Factory, p. 215

Millwright Shop
 Tannery
 Eagle Roll Mills
 5, 6, 8, 10 Roll Mills
 Pump House
 Narrow Gauge Railroad
 Glaze Mill
 Graining Mill
 Birkenhead Roll Mills
 Dry House Site
 Engine House
 Pack House Site
 Composition House
 Sweepings Room
 Pack House
 Dry Table Area
 Press House
 Ingredients House
 Change House
 Quarry
 Walking Tour

- * A. Main Museum Building
- B. Museum Store
- C. Ticket Kiosk
- D. Refreshments
- * E. New Century Power House
- F. Steam Plant
- x G. Blacksmith Shop
- x H. Belin House
- I. Brandywine Manufacturers' Sunday School
- J. Gibbons/Stewart House
- * K. Jitney Waiting Room
- L. Barn & Cooper Shop
- ◆ M. First Office
- ◆ N. Eleutherian Mills Residence
- O. Lammot du Pont's Workshop
- P. 19th-century garden

- ◆ Public Rest Rooms
- ▲ Picnic Area
- * Jitney Stop
- x Area not open to public
- ⓪ Demonstrations—
Schedule posted Black
Powder Exhibit Building

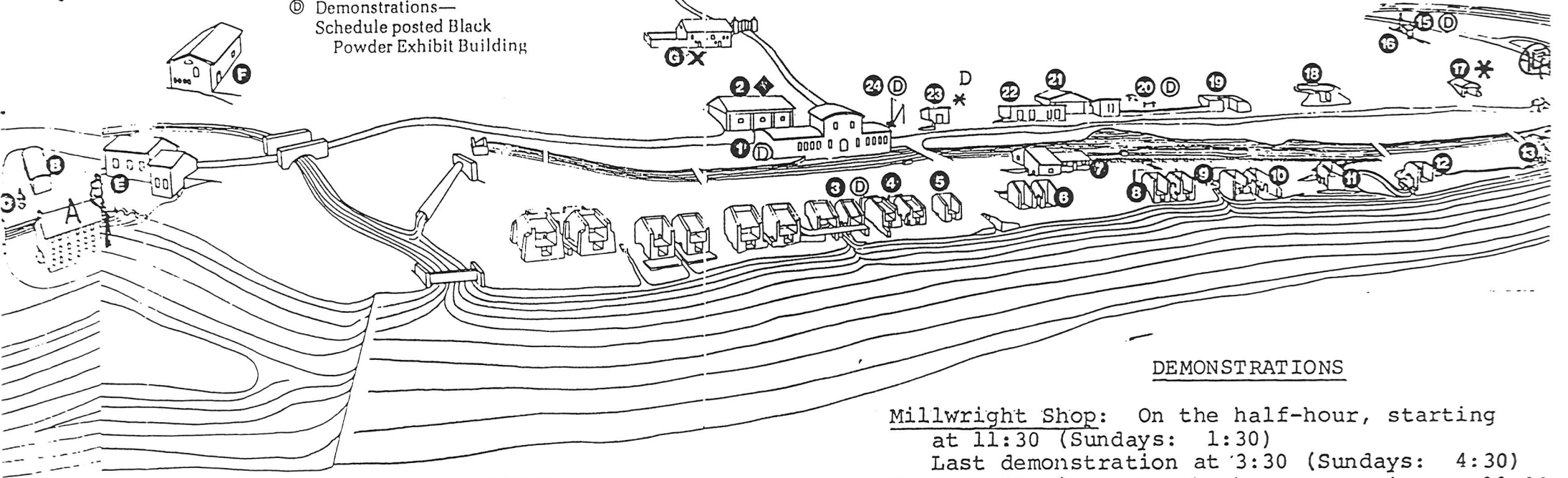
THE HAGLEY MUSEUM.



Early 19th-century photo of powdermen at work.



ROAD CONTINUES TO ELEUTHERIAN MILLS.



DEMONSTRATIONS

Millwright Shop: On the half-hour, starting at 11:30 (Sundays: 1:30)
 Last demonstration at 3:30 (Sundays: 4:30)
Eagle Roll Mill: On the hour, starting at 11:00 (Sundays: 2:00) Last demonstration at 4:00
 Check with guide in Millwright Shop for changes in schedule.

BUS DEPARTURE POINT
 Good weather, near no. 23
 Foul weather, near "A"

12 NEW MEXICO SHAFT
As you walk up the road on your right in a small cutting is a short tunnel that leads into New Mexico Shaft that is below the manhole cover just off the road. This shaft which can be seen from below on the mine tour.

13 OLD LABORATORY
The only remaining building, the former mine laboratory, of an experimental plant built in the late 1920s. It was not a success.

14 & 15 CARPENTER'S SHOP & STABLES
Probably the oldest buildings on the mine dating from the 1850s & 1880s. The carpenter's shop was used right up to the mine's closure. The old stables later were used as stores.

16 SAMPLE HOUSE
Here all the samples from underground development and prospecting were brought for assaying. Knowledge of the tin content of the underground lodes was an essential part of the decision whether to extract the ore or to leave it in the ground. 1% tin content was usually considered to be economic.

17 TOILETS, CAFÉ & SHOP
Formerly the power house and the stores. These two buildings were converted in 1995 and 1997. The cafe has quite incredible panoramic views across the site to the cliffs and the sea beyond. If you have finished exploring the site please leave your hard hats in the box in the foyer.

18 COUNT HOUSE
The original mine offices which date from the 1850s and would have been the administrative centre of the mine.

© PUBLISHED BY THE TREVITHICK TRUST, 1997
cover illustration: The headgear of Victory Shaft, drawing by K Newton
inside: Bird's-eye view of the Geevor Mine site, drawing by Clive Carter

THE TREVITHICK TRUST

GEEVOR TIN MINE GUIDE TO THE SUGGESTED ROUTE

GEEVOR EXPERIENCE

YOU ARE WELCOME TO SELECT YOUR OWN ROUTE IF YOU WISH

MAIN MUSEUM BUILDING
Watch the Geevor film.
This will help to give some understanding of the history and how the mine worked.
View the museum displays
View the three-dimensional mine model
FOLLOW THE MINE TRAIL

Compressor House
Winder House
Mine Rescue
Drill Shop and Victory Shaft Bank
Tour the extensive Mill
(tin concentration plant)
Take the guided tour underground*

You will see a number of guides wearing orange overalls. Feel free to ask them for information or direction.

* NOTE: If you are short of time do the underground mine visit before the mine trail. The underground mine has limited capacity to take visitors and there can be a significant wait at peak periods. Admission to the underground is on a 'first come - first served' basis. Preference is given to booked parties. If you are unable to get underground please retain your ticket and you may come back in the future for your underground visit.

CAUTION
THIS IS AN INDUSTRIAL SITE
AND SOME OF THE PATHS
AND STEPS ARE
STEEP AND UNEVEN

FOR SAFETY REASONS SMOKING IS
NOT PERMITTED IN ANY OF THE BUILDINGS
CHILDREN MUST BE UNDER THE DIRECT
CONTROL OF AN ADULT

PLEASE TAKE CARE

Geevor, an amalgamation of many old small mines, some whose names are now forgotten, restarted on a small scale around 1911. when a group of miners who had returned from Africa, started to prospect the recently closed Wheal Carne & North Levant mines.

By 1920 Victory Shaft, so named in celebration of the first world war victory, had been started. This shaft was to be the principal shaft throughout the rest of the life of the mine and was used both for hoisting men and ore, servicing the underground workings later to reach out under the sea.

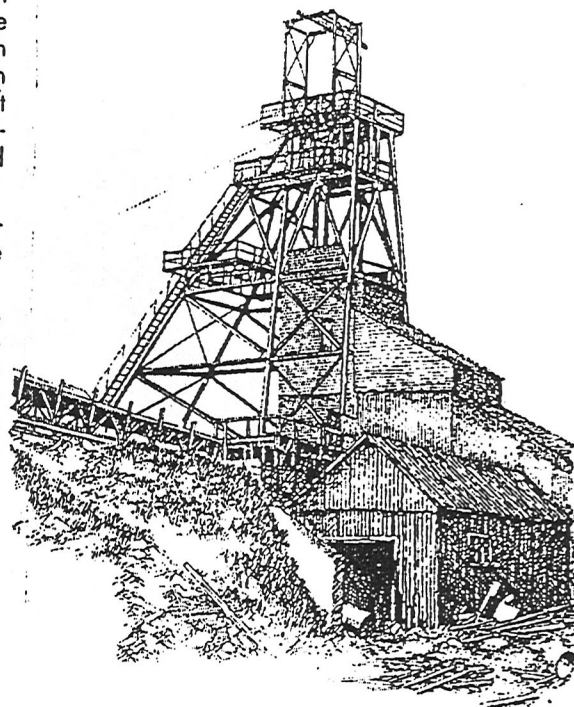
Following the closure of the neighbouring Levant mine in October 1930, Geevor was the only working mine in the St. Just mining district. Over the years Geevor acquired and expanded into the old mines around her. By the 1980s the mine was working parts of Levant and was prospecting in Botallack mine. October 1985 saw the collapse of world tin market. Geevor struggled on, with various rescue packages, hoping for a recovery in the tin price. This never came and the last shift came up in February 1990. The pumps were finally turned off in 1991 and the mine is now flooded to sea level.

The mine at it's peak employed over 400 men (surface and underground), the majority from the Pendeen/St. Just area.

In 1992 Cornwall County Council acquired the site and in 1993 it was opened to the public as a mining heritage centre. Significant land reclamation and safety work on old shafts and other dangerous features has since been carried out. In May 1996 the Trevithick Trust* took over management of the mine.

The objectives are to conserve the site as an educational resource for the future and to operate it in a manner that benefits the local community. Mining runs like a thread through Cornwall's history and has shaped much of its landscape and thinking. Geevor is the real thing. Today you are seeing the site at an early stage of conservation and improvement.

*The Trevithick Trust is an educational charity whose objectives are to conserve Cornwall's Industrial Heritage and, where appropriate, to manage individual sites.

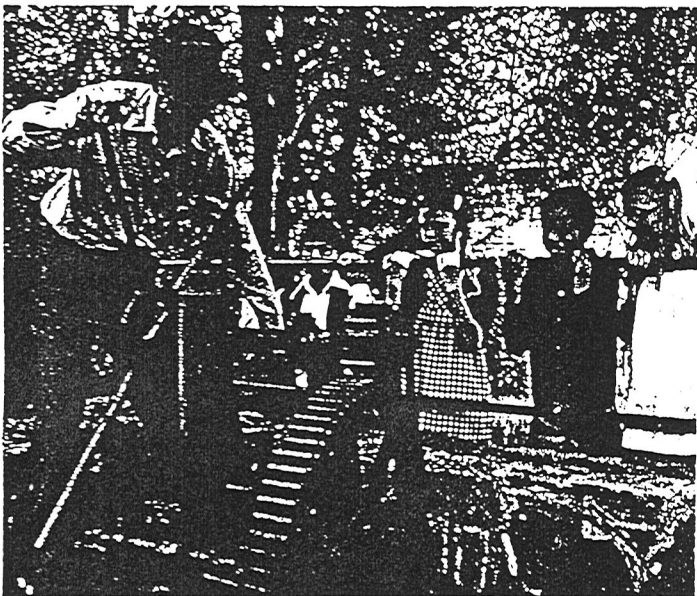


Come to Hagley and enjoy

Mill Buildings and a workers' community recalling life and work in mid 19th-century America's largest black-powder works

First du Pont Residence filled with antiques and memories of the five generations who lived there

Exhibits and Models telling the industrial history of the Brandywine region and the nation



Children watch a sluice-gate demonstration

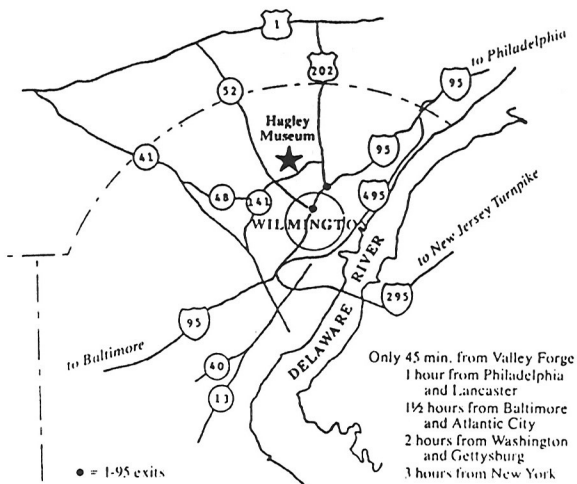
The Powderman's Rounds with demonstrations of restored machinery, including waterwheel, water turbine, and steam engine

Changing Seasons amidst 200 acres of trees, shrubs, and flowers along the Brandywine River

Gifts, Accessories, and Books in the Hagley Museum Store

 Hagley Museum, Wilmington, Delaware

For Your Information



Hours and Admission The Museum is open 9:30 A.M.—4:30 P.M. Tuesday through Saturday, and Monday holidays; Sunday 1:00 P.M.—5 P.M. The Museum is closed Thanksgiving, Christmas, and New Year's Day. Admission for adults is \$2.50; senior citizens, \$2.00; students, \$2.00, children under 14, free. Groups are welcome by reservation; special rates are available. Admission fees are subject to change.

Planning Your Visit Wear comfortable walking shoes and allow 3–4 hours for a leisurely visit. Last jitney-bus tour leaves one hour before closing. The Museum offers ample free parking, snack-vending machines, and picnic areas. There are restaurant and overnight accommodations in the vicinity.

Join Us The Hagley Museum is a part of the Eleutherian Mills-Hagley Foundation, a nonprofit, tax-exempt educational institution. You can help support our many programs by joining the Hagley Associates. Admission cost may be applied to your first-year membership dues. Associates receive free admission, discount at the store, publications, and invitations to special events.

For further information or group reservations write Tour Office, Hagley Museum, Box 3630, Wilmington, DE 19807, or telephone (302) 658-2400.

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Hagley Museum

19th-Century Industry and Life in the Brandywine Valley

