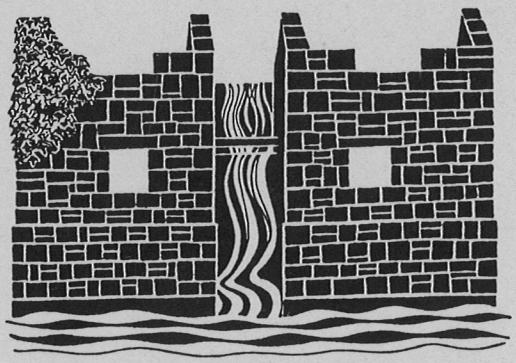
WAsc 2046
WA1 527

Gunpowder Mills
Gazetteer

GUNPOWDER MILLS GAZETTEER



GLENYS CROCKER

Cover illustration:
Incorporating mills at Kennall Vale, Cornwall.
Drawing by Rowena Oliver

GUNPOWDER MILLS GAZETTEER

BLACK POWDER MANUFACTURING SITES

IN THE BRITISH ISLES

COMPILED BY GLENYS CROCKER

for the

GUNPOWDER MILLS STUDY GROUP

OCCASIONAL PUBLICATION 2

THE WIND AND WATERMILL SECTION
THE SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS
37 SPITAL SQUARE LONDON E1 6DY

ISBN 0 903090 97 X

Printed by the University of Surrey Printing Unit

CONTENTS

ILLUSTRATIONS

ACKNOWLEDGEMENTS

The preparation of this Gazetteer has been made possible by the help of many individuals and organisations, in particular the following members of the Gunpowder Mills Study Group: the late Rowland Baker, Brenda Buchanan, Alan Crocker, Bryan Earl, Keith Fairclough, Ken Fleming, David Hansell, Sidney Johnson, the late George Kelleher, Malcolm McLaren, Kenneth Major, Edward Patterson, Arthur Percival, Phil Philo, Colin Rynne, John R Smith, Charles Trollope, Malcolm Tucker, John Upton, Jenny West and Michael Wilks. The compiler would especially like to thank Kenneth Major for his encouragement, Brenda Buchanan for help in preparing the Somerset section, Keith Fairclough for providing unpublished details of the Lea valley mills and George Kelleher for sharing his wide knowledge of the subject.

Thanks are also due to John Robertson of Glasgow for generously making available his notes on the Argyll sites, and also to Peter Brice of Clachaig, Mrs McKeller of Furnace, Hugh Campbell-Gibson and Charles Stott of Melfort, Rita Ensing of the Wandsworth Historical Society, P W Saunders of Guildford, C S Sampson of the Croydon Natural History & Scientific Society, Laurence Draper and his contacts who provided information on Fernilee, Roger Kenyon of Chaigeley School, Thelwall, Tom Pritchard of Pontneddfechan, Eoin O'Reilly of Dublin, Miles Oglethorpe of the Royal Commission on the Ancient and Historic Monuments of Scotland, and Robin Clarke, Robert Higginson, Desmond Kay and Martin Watts of the Wind and Watermill Section of S.P.A.B. The help is also acknowledged of Cork County Council, Midlothian District Council, the Faversham Society, the Nonsuch Antiquarian Society, the Dartmoor National Park, the Cornwall Trust for Nature Conservation and the Cornwall Archaeology Unit, and the Derbyshire, Lancashire, South Yorkshire and Surrey County Record Offices, in particular the staff of the Guildford Muniment Room.

Illustrations have been generously provided by Rowena Oliver, and also by E M Bottomley of the Kendal Art Society, Alan Crocker, Aidan Linehan of the Ballincollig project, Jane Matthews of Oban and Jack Salmon of the Faversham Society.

The compiler would particularly like to thank Alan Crocker for helping to collect information and for valuable discussions, the University of Surrey for providing facilities for word processing, and the Committee of the Wind and Watermill Section for readily agreeing to publish this Gazetteer.

FOREWORD

This introduction to the Gunpowder Mills of the British Isles is a comprehensive guide to the many sites which existed to make gunpowder or black powder in the old ways. Because most of the material evidence had to be destroyed when the gunpowder works closed, the examination of the remains and history of the sites becomes an enjoyable exploration.

The preparation of this study cuts across the disciplines of several groups, historians, genealogists and molinologists. The old gunpowder mills used a great deal of power, most of which was supplied by water. The water power systems themselves are important, wheel pits which form part of a chain so that the water is used over and over again is but one example of the study. The sites were, for example, amongst the earliest to use water turbines on a massive scale. Another facet of the study is contained within the design of buildings to meet the safety requirements which necessarily became more onerous throughout the nineteenth century. Massive structures still remain, because they were built to be indestructible, and these are worthy of discovery and understanding.

The industry, which made blasting powder in mining and quarrying areas and military and sporting powder elsewhere, was inextricably intermixed and this gazetteer goes a long way to sort out the pattern of ownership and products.

The Wind and Watermill Section of the S.P.A.B. have published this work so that more people can learn of this facet of our industrial past and carry the study of British gunpowder mills forward. Other countries have preserved their sites, we have not been able to do so. It is hoped that we in Britain can preserve something of this part of our past.

Glenys Crocker and the Gunpowder Mills Study Group have added to our knowledge of one industrial use of water power. It is hoped that further developments of this study can be published in the future.

J Kenneth Major
Chairman of the International Molinological Society

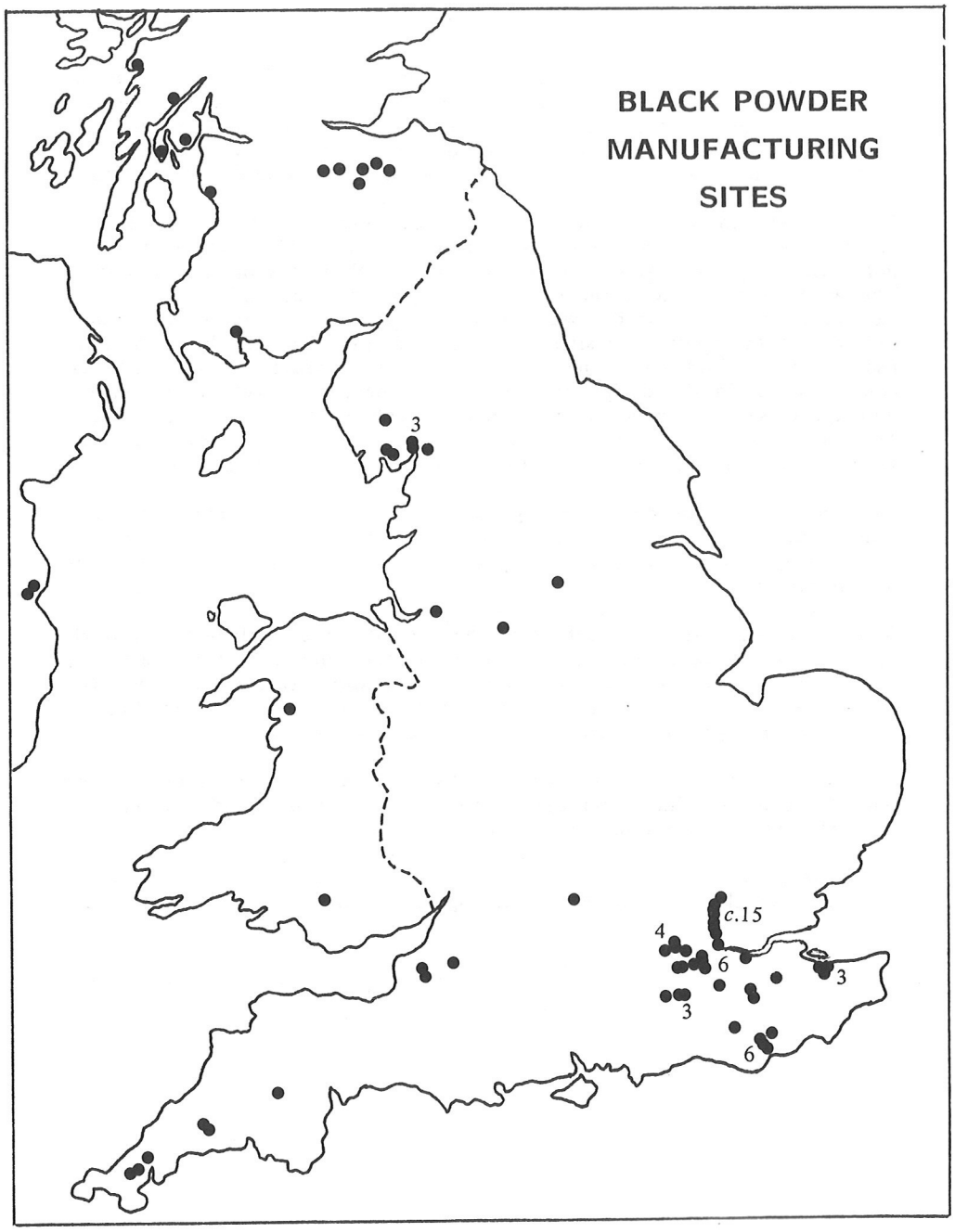


Figure 1. Distribution of black powder manufacturing sites in the British Isles. Balincollig, County Cork is outside the area shown. The numerals indicate the number of sites in clusters of three or more.

THE GUNPOWDER INDUSTRY IN BRITAIN

The manufacture of gunpowder as a mechanised industry began in England in the 16th century, although powder for military use had been made by hand, without permanent processing plant, some 200 years earlier. The major constituent of gunpowder is saltpetre which, before it became available in sufficient quantities from India, was obtained largely from manure. The method of preparing saltpetre earth was not well understood in England before 1561 when instructions were purchased from a German, Gerrard Honrick. Several mills were probably built soon afterwards. However supplies of gunpowder were very inadequate when Spain attempted to invade England in 1588 and this prompted the government of Elizabeth I to introduce a system of granting royal letters patent to certain manufacturers. Under James I these appointments developed into a monopoly which was eventually abolished by the Long Parliament in 1641.[1]

There is evidence for water powered gunpowder mills before 1561 at Rotherhithe, on the south bank of the Thames, and mills at Tolworth, also in Surrey, probably existed by this date. There were powder mills in the lower Lea valley in Essex by the late 1580s and in Ireland, near Dublin, in the 1590s. Early dates have also been suggested for Waltham Abbey in Essex and Faversham in Kent. During the period from 1589 to 1641 the industry was dominated by Surrey makers. In particular members of the Evelyn family and their associates had mills at Tolworth, Abinger, Wotton and Godstone and the East India Company was licensed to make powder for its own use and set up mills at Chilworth. There were also manufacturers operating illegally, for example at Bristol and Southwark. After restrictions were lifted on the eve of the Civil War, other centres of the industry developed in Essex, Kent, Middlesex, Surrey and Sussex. Production was almost entirely for military and naval use.

Powder mills are recorded at Oxford during the Civil War, at Derby before 1692 and near Edinburgh in 1701. However these appear to be isolated examples and do not indicate the establishment of the industry in these areas. The next major developments were connected with the trade of the seaports of Bristol and Liverpool, mills being established in Somerset in the 1720s and Cheshire in the late 1750s.

The Somerset mills produced musket powder for export and also made blasting powder, which had been adopted in the mining industry in the late 17th century. It was this new market for gunpowder which led to the establishment of the industry in Westmorland and the Furness district of Lancashire from 1760 onwards. Developments followed in Midlothian and County Cork in the 1790s, Cornwall and Derbyshire in the early 19th century and later in the century in Wales, the west of Scotland, Yorkshire and Devon.

The government, which from the beginning had obtained supplies of military powder from private manufacturers, acquired its own mills at

Faversham in 1760, followed by Waltham Abbey and Ballincollig in County Cork. Faversham and Ballincollig were sold after the Napoleonic wars but Waltham Abbey has survived as a government establishment to the present day.

Important technical advances were made in the 19th century, in particular in the production of powder for rifles and heavy guns. Powder was compacted into blocks and prisms of various sizes and a comparatively smokeless brown variety of gunpowder was developed in the 1880s. However modern explosives based on the nitration of cellulose, glycerine and other organic compounds began seriously to compete with the traditional product. These high explosives were successfully developed for blasting in the 1860s and for ballistic use in the 1890s.[2] The older product then became known as black powder to distinguish it from new types of gunpowder and the modern propellants were commonly referred to as smokeless powders. Many existing mills added plant for the manufacture of modern explosives and some closed down at about this time.

Advances were also made in the field of safety, culminating in the Explosives Act of 1875. This introduced an Explosives Inspectorate, a system of licensing based on approval of submitted factory plans and the comprehensive reporting of accidents. Existing explosives factories, of which 28 were still making black powder, were required to obtain Continuing Certificates and later factories had to obtain New Licences. The index numbers of these certificates and licences are given in entries in the Gazetteer. Their numerical order is not significant.[3]

Some firms, notably Curtis's & Harvey of Hounslow in Middlesex, pursued a policy of expansion during the 19th century and took over other factories throughout Britain. There was a major expansion of the industry before and during the First World War but when demand collapsed afterwards, a merger was arranged by Explosives Trades Limited, the forerunner of Nobel Industries Limited. This company itself became part of Imperial Chemical Industries in 1926.[4] The abbreviations 'Explosives Trades, Nobel, ICI' are used in the gazetteer for these companies. Following the merger in 1918 the industry was rationalised and most of the factories closed down, with the manufacture of explosives becoming concentrated largely at Ardeer in Ayrshire. The remaining production of black powder was transferred to Ardeer in the 1930s and the manufacture ceased there in 1977.

The distribution of known gunpowder mills in the British Isles is shown in Figure 1.

1 *VCH Surrey*, 2, 306-329
2 Hardie & Pratt; Simmons
3 Patterson (1986)
4 Reader

GUNPOWDER MILLS

Gunpowder is a mixture of saltpetre (potassium nitrate), charcoal and sulphur, in proportions which varied but were generally 75:15:10 for firearms and 70:15:15 for blasting. The manufacture involves a sequence of processes, each requiring a small amount of power.

First the ingredients are prepared. The charcoal is produced from wood, the saltpetre and sulphur are refined and all are pulverised and mixed in the required proportions. The powder is then incorporated by moistening the charge and crushing and blending it into an intimate mixture known as mill cake. This is broken up and then pressed into hard, slate-like slabs of press cake. The powder is then corned or granulated to produce grains of the required size. Loose dust is removed and recycled and the powder is glazed and dried.

Incorporation was originally carried out by hand, with a pestle and mortar, and the powder was used in its loose form. Corning was introduced in the 16th century and was at first done with hand sieves. Early water powered or animal powered mills used mechanised versions of contemporary hand operated equipment, with a set of stamps operated by a cam shaft for incorporating and an array of sieves attached to a shaking frame for corning.

Other refinements were added later. In the 18th century, stamps or pestle mills were superseded by edge runner mills for incorporating. Edge runners were also used for grinding the ingredients at the preparation stage. Pressing, using hand operated screw presses, was introduced in the 18th century. This operation was highly dangerous and safety was greatly increased with the later introduction of remotely controlled hydraulic presses. In the 19th century granulating machines with toothed metal rollers replaced corning sieves and similar machines were introduced for breaking down mill cake before pressing. Dusting was carried out in slope reels covered with sieve cloth, similar to the reels used for flour dressing in corn mills. Glazing was practised from the late 17th century onwards, by tumbling the powder in revolving barrels. In the 19th century, powder for blasting charges and for large guns was compacted into prisms and cylinders using hydraulic presses or cam presses.

The needs of the various process buildings for power were met by constructing mill races which might be in series along the valley but were more often in parallel, being fed in turn from a long primary leat running more or less parallel to the natural stream. Sites are therefore usually long and narrow, with buildings strung out along a valley. A typical example is shown in Figure 2. In the 19th century many mills installed steam engines but water power continued to be important with the adoption of water turbines. The watercourses which provided power were also used, where the terrain permitted, for transport around sites and provided a convenient and safe supplement to tramway systems.

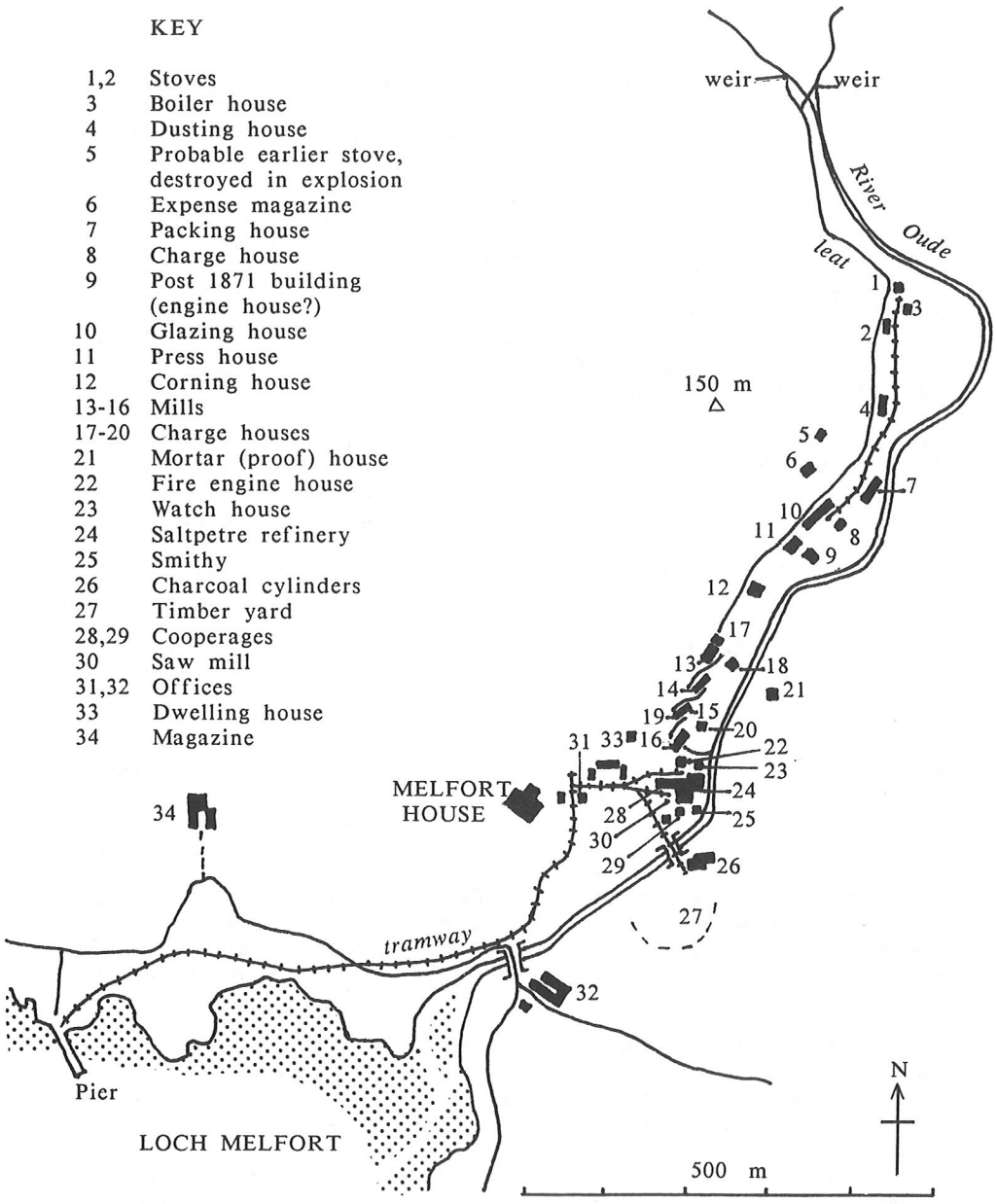


Figure 2. Sketch plan of the Melfort powder works, Argyll, in the 1870s. Buildings except 5 and 9 are identified from the 1st edition 25" O.S. Map, Argyll sheet cxxii, 13, 1971. (Description page 47-8)

Several late black powder factories did not use water power. These are Blackbeck in the Furness district of Lancashire which was built for steam, Camilty in Midlothian which used a gas engine and Ardeer and Wigtown in western Scotland which were powered by electricity.

The sites of gunpowder mills were spacious because danger buildings were placed far apart to minimise damage from accidents. The growth of trees was encouraged to help to absorb blast and as a result, abandoned sites are often places of great beauty and seclusion which in some cases have become public amenities, holiday parks or nature reserves. In other instances remains have been obliterated by subsequent landscaping or redevelopment. When mills closed, process buildings were deliberately gutted for reasons of public safety and survive mainly as empty shells or mere foundations. Some remains however are substantial. The most characteristic buildings were incorporating mills. Those which were water powered were typically arranged in pairs with a central water wheel (Figure 3) and had three massive walls and a flimsy fourth wall and roof, to direct the blast from any explosion.

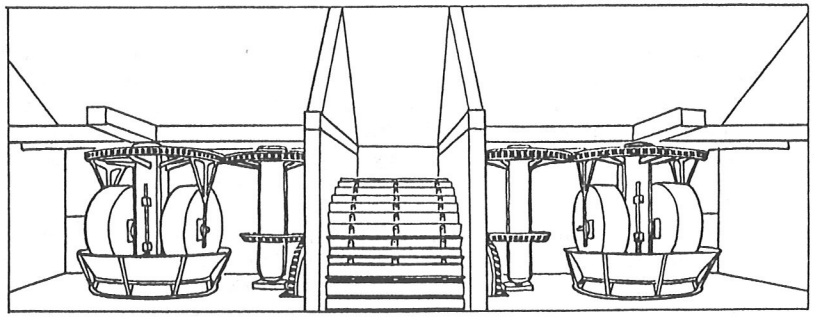


Figure 3. A pair of water powered incorporating mills based on a drawing from the Royal Gunpowder Factory, Waltham Abbey, 1830

Steam powered incorporating mills were usually in rows of about six. Edge runners, usually scattered, and bedstones, survive on some sites. Other remains include buildings used for storing and processing raw materials, which have often been reused and are not distinctive. Watercourses and derelict wheel pits are common but very little survives of water wheels. There are a few chimney stacks associated with materials processing plant and some cylinders, or retorts, which were used for the production of charcoal from the late 18th century onwards. One of the most characteristic features of sites is the prevalence of mounds which were constructed around danger buildings and magazines to absorb the shock from accidental explosions. These were not uncommon, particularly in the case of minor incidents, and most mills would occasionally experience a fatal explosion.

THE GAZETTEER

The following Gazetteer covers known sites on which traditional gunpowder, or black powder, was produced with permanent manufacturing plant. Modern explosives factories have been included only when they were built as extensions to existing gunpowder mills. Terminology can be misleading since some modern propellant factories were known as gunpowder works, in particular those of the Schultze Gunpowder Company Limited whose products were based on nitrated wood pulp. Such factories, which include those at Eyeworth in Hampshire and Barwick, near Ware in Hertfordshire, have not been featured.

Entries are arranged in major regions of the British Isles, within which sites are in general listed alphabetically under historic counties. However isolated mills for which little information is available are listed in a separate section following the main gazetteer. National Grid References in the main headings are given to four figures only since most sites are extensive, but six-figure references are used where appropriate within the text. Within entries, capital letters are used for sites which have their own headings in the gazetteer.

Each entry consists of a short description of the site and a brief historical note, followed by a summary chronology and references. These are given in abbreviated form, with further details in the bibliography. Published sources are given where possible but in some cases none exist and reference has then made to primary sources or to individuals who have provided information.

A major source of information on gunpowder mills is the series of annual reports of the Explosives Inspectorate which followed the passing of the 1875 Explosives Act and which are published in *Parliamentary Papers*. Reference has not been made to this source since coverage of accidents would have greatly increased the scope and size of the present book.

The length of entries is not related to the importance of sites but rather reflects the present state of knowledge. Indeed it will be clear that much work remains to be done on the history of many gunpowder mills and it is hoped that this publication will encourage individuals and local societies to carry out further research in order to fill in some of the gaps. The compiler will be pleased to receive any new information, perhaps with a view to preparing a revised editon in the future.

SOUTH-EAST ENGLAND

ESSEX

Gunpowder was made in the Lea valley at tidal mills near the Thames in the late 16th century but the area did not become an important centre of the industry until the ending of the gunpowder monopoly in 1641. Most of the mills closed in the course of the 17th century. However the industry continued into the early 18th century at Sewardstone whilst the Waltham Abbey mills became a government establishment and played a prominent part in the gunpowder industry until the Second World War. In the following entries the early mills, with the exception of Waltham Abbey, are grouped together under the heading 'Lea Valley'.

LEA VALLEY

Much of the following information on the early Lea valley mills is contained only in primary sources.[1] However some of the sites are discussed in an article on the Waltham Abbey mills.[2]

ENFIELD (TQ 362955) and ENFIELD LOCK (TQ 374991)

The site of the Enfield mills is assumed to be that of a modern flour mill. That of Enfield Lock was near the mouth of the former Enfield Mills millstream which now forms part of the Lea Navigation. There are no remains on the latter site.[1]

1653 Both mills may have been producing gunpowder
1665 Thomas Carter at both mills (January)
1668 Carter's will and inventory make no mention of the mills
1671 Enfield Mill converted to leather manufacture

ENFIELD, NAKED HALL MILL (TQ 374993 ?)

The location is unknown but it is guessed that these were the mills shown on the small River Lea on Seller's map of Middlesex, 1679[?], on a site which is now wasteland.[1]

1665 John Lucas (probably April onwards)
1673 John Lucas (definitely in August)
1685 Mills were the property of John Freeman who left them in his will to Polycarpus Wharton. Thereafter nothing is known.

ENFIELD, OTHER (?)

In 1697 there is a reference to a meadow in Wild Marsh, near 'ye powder-mills'.[1]

HACKNEY AND CLAPTON

Records exist of the following three mills whose sites are unknown.[1]

1652 Two gunpowder houses and a gunpowder mill on W side of lane from Humberton Street to Old Ford, occupied by William Hobley
1669 Worrall brothers powder works in Hackney
1687 Sir Polycarpus Wharton making gunpowder at Clapton

LEYTON, TEMPLE MILLS (approximately TQ 376854)

The site is possibly covered by present day sports facilities. The powder mills operated until the late 1680s and after 1690 were converted for grinding dyewoods. At some date after the Restoration, Prince Rupert was boring cannon on the site.[1]

1641-49 John Berisford
1649-68 Boreman and Josias Dewey; seems to have fallen into disrepair by 1663.
1668-75 John Samine
1687-89 Monsieur de Pain, a French Protestant refugee
1689 Powder mills blew up, killing seven.

SEWARDSTONE (TQ 373963)

The site is now beneath King George's Reservoir. The powder mills operated from the 1640s until approximately 1715-20.[2]

1640s John Berrisford
1651 John Freeman (probably by July 1651, certainly by October 1652)
1684 Mills left by John Freeman the younger to Polycarpus Wharton
1700s Edward Gibbon tenant
1709 Edward Parre
1715-20 Probably converted to other use

STRATFORD, ST THOMAS MILLS (TQ 379835 ?)

The exact location is unknown but was probably adjoining the present day Pudding Mill Lane. Gunpowder was being produced in 1597 and in 1622.[2]

STRATFORD, THREE MILLS (TQ 383829)

The site was that of the present day Three Mills complex. Gunpowder was definitely produced in 1588-9.[2]

STRATFORD, OTHER

Another mill in Stratford, owned by Bridge House, was making powder in 1613.[1]

TOTTENHAM (TQ 348896)

The site was on the E bank of the present day Lea Navigation and has been built over. Gunpowder was made in the third quarter of the 17th century but the mills were making paper by 1680.[1]

1656 Powder mill operating
1665-9 Thomas and John Worrall powder makers
by 1680 Paper mill

WALTHAMSTOW (TQ 351883 ?)

The site was possibly that of the present day British Waterways Board warehouse (the old copper mills building). John Samyne was probably producing gunpowder there from the early 1650s until his death in 1676 and he may have built an additional mill on the site. The mills were converted to papermaking in about 1690.[1]

1659 John Samyne definitely producing gunpowder
1687 John Samyne's son producing gunpowder
*c.*1690 Became a paper mill

1 Information provided by K Fairclough (GMSG)
2 Fairclough

WALTHAM ABBEY (TL 3801)

On the River Lea, close to the town of Waltham Abbey. The site is now occupied by the Royal Armament Research and Development Establishment (RARDE) and access is strictly controlled for reasons of national security. Many buildings of the former factory survive and are occupied by the present research establishment. A collection of historical material is held by the establishment's library.

The history of the factory is well documented, particularly during the period of government ownership from 1787 onwards, and there are several published accounts.[1,2,3] The date at which gunpowder manufacture started on the site has been disputed. It has been claimed that the mills were operating in 1561 and in the 1640s on the basis of evidence which does not however mention the site specifically. Recent research indicates that the manufacture did not start until 1665, probably the year in which a former oil mill was converted for gunpowder manufacture.[3] The black powder mills continued to operate until they were destroyed by enemy action in the Second World War. Experimental production of guncotton was carried out in the 1860s and the factory was later extended in order to produce modern propellants.

1665-	Hudson family: Ralph, Peter[3]
1702-87	Walton family: William, Phillipa, John, Thomas, Bourchier, James[4]
1787-1945	Royal Gunpowder Factory
1940-41	Black powder production ceased
1945	Royal Gunpowder Factory formally closed

1 Simmons
2 McLaren
3 Fairclough
4 West

KENT

The gunpowder industry was first established in the county at Faversham, probably in the 1650s, after the ending of the gunpowder monopoly, and there is no conclusive evidence to support claims that it started in the 16th century. The Faversham Home works were the first gunpowder mills to be acquired by the Crown. Further factories were established in Kent in the 18th century at Faversham, Dartford and Tonbridge.

DARTFORD (TQ 5676)

On the River Darent, a tributary of the Thames, approximately 3 km S of the centre of Dartford at Wilmington. The site, which is on private land, lies N of the A2 road and is approached by a footpath leading S from Powder Mill Lane. This is entered at the W end from Hawley Road (A225) and at the E end from Darenth Road. The factory formerly covered some 50 acres of land on both banks of the river. There is a modern industrial estate W of the river and it was during further development, involving widening of the river channel, that features of the powder mills were discovered in 1983. Prompt action by the Kent Archaeological Rescue Unit and effective cooperation between the developers, the local authority and the water authority resulted in a revised scheme which preserved some of the structures. An archaeological excavation was carried out and remains of two pairs of water powered incorporating mills were consolidated for public view.[1] Arrangements for public access have not however been finalised.[2]

The works occupied an ancient mill site on the Manor of Bignores. The site was probably that of the first established paper mill in England which was started by John Spilman in the late 16th century. Black powder was manufactured there from 1732 until the early 20th century and guncotton and incandescent gas mantles were produced in later years.[3] The factory was largely in decay by about 1920.[1]

1732-48	Edward Pyke and Thomas Edsall[4]
1755-57	Pyke and Thomas Edsall Sr. and Jr.[4]

1757-78	Edsall: Thomas Sr., Thomas Jr.[4]
1788-	Pigou & Andrews[1]
*c.*1850	Amalgamated with Messrs Charles Laurence & Son of BATTLE, Sussex: Pigou, Wilks & Laurence[1]
1858	Visit by Lammot du Pont[5]
1876	Continuing Certificate no. 53
*c.*1890	Guncotton factory erected adjacent to black powder works[3]
1898	Incorporated with Curtis's & Harvey Limited[3]
1907	Closed (black powder)[6]
by 1909	Incandescent gas mantles and guncotton manufactured[3]

1 Philp
2 Information provided by B Philp (GMSG)
3 *Rise & Progress*, 362
4 West
5 Wilkinson, N B
6 Patterson (1986)

FAVERSHAM

A detailed account of the Faversham mills has been published by the Faversham Society and this forms the basis of the following summary.[1] There were three black powder factories in the town of which the earliest, the Home Works, was definitely in operation by 1653. The business expanded in the early 18th century and the second factory, the Oare Works, was operating by 1719. The Home Works became the Royal Gunpowder Factory in 1760. Following an explosion in 1781 the Marsh Works was built farther from the town to house the more dangerous processes. The government let and then sold its Faversham works after the Napoleonic wars. The first guncotton (nitrocellulose) factory in the world was opened at the Marsh Works in 1846 but closed after a serious accident the following year. In the late 19th century high explosives factories were built N and NNE of the town at Harty Ferry and Uplees. These closed at the end of World War I but a smaller high explosives factory, the Abbey Works, opened in 1924 closer to the town, alongside the Creek. This remains in operation, with most of its original buildings, but now produces CO_2 cartridges. Black powder was made at the Oare and Marsh works until 1934 when ICI transferred the manufacture to ARDEER in Scotland.

Faversham has the only restored incorporating mill in Britain and this is thought to be the oldest surviving example in the world (Figures 4 and 5). The museum of the town's history at the Fleur de Lis Heritage Centre contains displays on the local explosives industries.

HOME WORKS (TR 0161)

The mills were on a linear site on the Westbrook, on the W edge of the medieval town centre, between TR 004610 and TR 013616. There was a

series of mill ponds, the highest of which had served a monastic corn mill in the middle ages. The water supply has been greatly reduced by abstraction, the mill ponds have been filled in and most of the land has been used for housing development. However at Chart Mills (TR 010614) one surviving incorporating mill of *c.*1760 has been restored by the Faversham Society and the foundations and stone beds of three others have been excavated, consolidated and exposed. It is planned to restore the mill to full working order. Other surviving features include a 17th century charcoal burner's house in Lower Road, near the site of the top mill pond, and the beds of several mills at the lower end of the site near the tidal Creek. There are also houses and school buildings which had associations with the factory.[2]

by 1653	Daniel Judd
1701-40	Grueber: Francis Sr., Francis Jr.[3]
by 1740	Thomas Pearse[3]
by 1755	Benjamin Pryce[3]
1760-	Royal Gunpowder Factory (purchased 1759[3])
1815-	John Hall (leased 1815-, purchased 1825)
1876	Continuing Certificate no. 39
1898	Incorporated with Curtis's & Harvey Limited
1918-	Explosives Trades, Nobel, ICI
1934	Closed

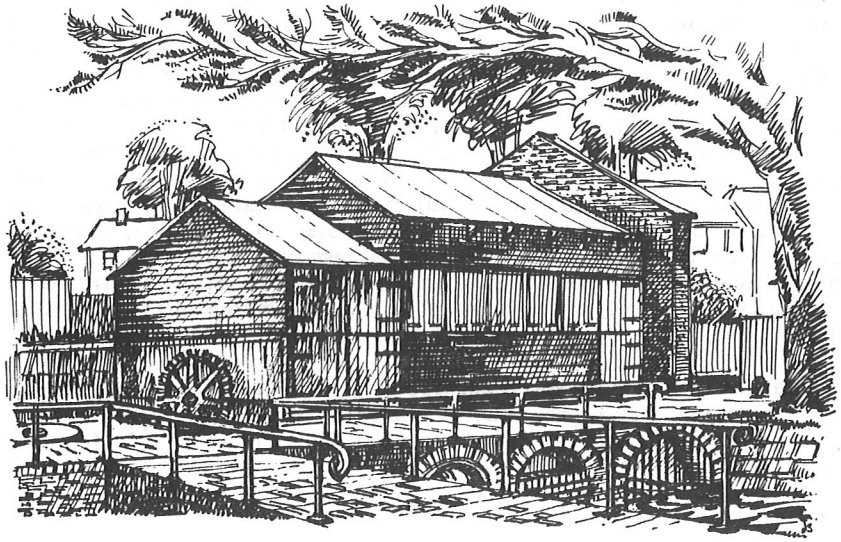


Figure 4. Exterior of the restored Chart Mills, Faversham (© J Salmon)

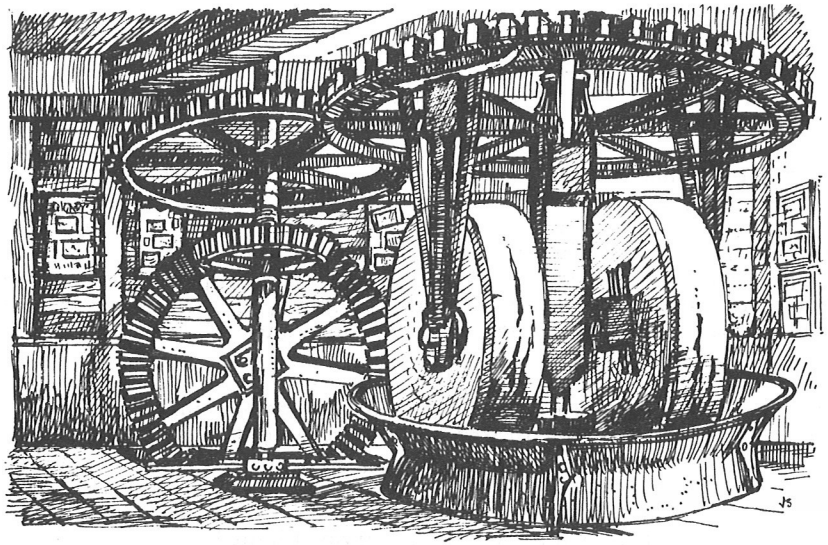


Figure 5. Interior of the restored Chart Mills, showing an incorporating mill of c.1760 (© J Salmon)

OARE WORKS (TR 0062)

The mills were in the parish of Davington, on a linear site between TR 003622 and 006626, along a stream which rose within the factory at the SW end. The SE end has been destroyed by gravel working and most of the leat system is now dry but there are interesting remains to the left of the track running N from Bysing Wood Road to Oare Road. The land is private but there are no gates. Features include mid 19th century tinshops, partly derelict, a cooperage building, the site of the proof range marked by a row of *Wellingtonias*, remains of corning and glazing houses and slight remnants of the water wheel of an incorporating mill. Construction is due to start shortly of the Western Link Road which will follow the track from the N end and then deviate slightly E of it.[2]

early 18thC	Francis Grueber[3]
1730-43	Francis Grueber Jr.[3]
1745-60	Richard Chauncy and Thomas Vigne[3]
1761-2	Toby Chauncy (Jan 1761 - Oct 1762)[3]
by 1768	Stephen Grueber with Pigou and Andrews[3]
by 1798	Andrews & Pigou
1812	Acquired by John Hall
1876	Continuing Certificate no. 37
1898	Incorporated with Curtis's & Harvey Limited
1918-	Explosives Trades, Nobel, ICI
1934	Closed

MARSH WORKS (TR 0163)

The works occupied a site with a frontage to Oare Creek, covering the area between TR 013624, 012632, 012627 and 017628. The site is now very flat and it is not clear how water power could have been available, although it is thought that some was used. Most processes were probably horse or steam, and latterly electrically powered. The manufacturing site has been worked out by gravel extraction and is privately owned. Public access is not encouraged because of danger from wet pits. Some administrative and service buildings are in current industrial use. These include the gatekeeper's house and other cottages, offices and stores near the Ham Road entrance and the saltpetre store and refinery alongside the dock.[2]

1786 Opened as extension to Royal Gunpowder Factory
1832- John Hall & Son (leased 1832, purchased 1854)
1846 Guncotton factory built
1847 Guncotton factory closed after explosion
1876 Continuing Certificate no. 38
1898 Incorporated with Curtis's & Harvey Limited
1918- Explosives Trades, Nobel, ICI
1934 Closed

1 Percival
2 Information provided by A Percival (GMSG)
3 West

MAIDSTONE (TQ 7554)

Bridge Mill, on the River Loose, near its confluence with the Medway, was converted from a fulling mill to a gunpowder mill between 1698 and 1704. There was an explosion there in 1731. In the mid 18th century the mill became a corn mill. Later it became an oil mill and around the end of the 19th century was taken over for paper manufacture by Albert E Reed.[1]

1 Spain, 182-3

TONBRIDGE, LEIGH MILLS (TQ 5747)

The site is in the parish of Leigh-next-Tonbridge, on a large mill stream fed by the River Medway, some 2 km W of Tonbridge and 1.5 km E of the village of Leigh. It is approached at its W end near a bridge at TQ 566464. The site is on private land and is an overgrown wilderness, with remains of several wheel pits which are arranged in parallel between upper and lower mill streams. There are more substantial remains of apparently later water powered incorporating mills with fragments of iron edge runners lying nearby.[1]

The Leigh mills have been confused with those of TONBRIDGE, OLD FORGE.[2] They were established in 1811 by members of the local Children and Burton families and are noted for their association with the scientist Sir Humphrey Davy.[3] They were later purchased by Curtis's & Harvey. Black powder was produced for military use and later smokeless sporting powders were made, this manufacture being transferred to Tonbridge when the works at GLEN LEAN in Argyll closed down.[2] The factory closed and became derelict in the 1930s.[4]

1811 Licence granted to George and John Children, James Burton, William Ford Burton, Sir Humphrey Davy and Anthony Bartholomew Valle[5]
1859 Purchased by Curtis's & Harvey[2]
1876 Continuing Certificate no. 21
1885 New plant installed for government prismatic powder[2]
1897 Black powder manufacture ceased[6]
by 1909 Smokeless sporting powder produced[2]
1918- Explosives Trades, Nobel, ICI
1931 Still operating[7]
1930s Closure[4]

1 Visited 1986
2 *Rise & Progress*, 357
3 Hoole
4 Information provided by D Hansell (GMSG)
5 Melling
6 Patterson (1986)
7 *ICI Magazine*, June 1931

TONBRIDGE, OLD FORGE (TQ 5943)

In the parish of Tonbridge, 3 km S of the town near the present Old Forge Farm. The powder mills occupied an earlier ironworking site and were themselves succeeded by a corn mill.[1] Some records have been wrongly attributed to the TONBRIDGE, LEIGH MILLS.[2]

1768 Powder mills authorised by Act of Parliament[3]
1807 Application by Thomas Hewlett to build additional mills[4]
1835 Powder mills not shown on Tonbridge tithe map

1 Straker, 222
2 *Rise & Progress*, 357
3 13 George III, 12
4 Maidstone Quarter Sessions, 16 July 1807

MIDDLESEX

Early antiquaries and historians claimed ancient origins for the powder mills on Hounslow Heath. However the first mills were not built until the early 17th century and the industry did not become established in the long term until after the abolition of the gunpowder monopoly in 1641. One of the major explosives firms in the country, Curtis's & Harvey, was established at Hounslow in 1820. The Hounslow and Bedfont sites were owned by the Earls and Dukes of Northumberland from 1656 to 1871.

BEDFONT (TQ 1175)

The powder mills occupied upper and lower mill sites on the Duke of Northumberland's River near its confluence with the River Crane. On the lower site, north and west of Baber Bridge in Staines Road, there are foundations of buildings, blast mounds, water courses and steam engine beds. This area is reached by footpaths leading N from Baber Bridge (TQ 112745) and E from River Gardens Bridge (TQ 109746). An archaeological excavation has been carried out on the site of water powered and later steam powered incorporating mills.[1]

The earliest powder mills were probably based on an earlier corn mill at the upper site (TQ 108746) and appear to have become a sword mill before reverting to gunpowder in the 1650s. The nearby NORTH FELTHAM mills were then added, followed by the lower Bedfont mills which had been manufacturing paper. The works expanded *c.*1800. From the 1820s onwards they operated as an annexe of Curtis's & Harvey's factory at HOUNSLOW, specialising in small arms powder.[1]

1609+	Powder mills on upper site[1]
1654	Sword mills on upper site (set up 1630) converted to gunpowder[2]
1655-68	Thomas Carter[2]
1668	Thomas Groves, relative of Thomas Carter[2]
by 1673	Richardson family: Robert, John[2]
1690	Lower mills (paper) acquired and converted to gunpowder[1]
1704	Elizabeth Richardson, widow of John)[2]
1704-10	Mr Bosseville[2]
by 1725	John Barnard & Nicholas Godshall[2]
1746-	John Barnard & James Underhill[2]
by 1755-61	Samuel Underhill[2]
1761-1831	Tayler family: Richard Tayler & Heneage Legge (1789 lease); Richard, son of Richard (1792-); Taylor, Gardner & Co (by 1801)[2]
by 1810	Partners: Richard Tayler, Heneage Legge, Joseph Alcock, Archibald Crawford, John Gardner[2]
1830-31	Richard Tayler sole proprietor[2]
by 1833	Leased to Curtis's & Harvey[2]
1918-	Explosives Trades, Nobel
1926	ICI, formal closure[2]

1 Philo & Mills
2 Bedfont Research Group
3 West

HOUNSLOW (TQ 1373)

The site, which is on the River Crane, is now occupied by Crane Park, which is open to the public. It is entered in Hounslow Road 3 km SW of Hounslow (TQ 125732). The ground has been landscaped but blast mounds and a few foundations of buildings can be identified. There is a tower which is locally known as the 'shot tower' and is connected in popular imagination with the gunpowder industry. Some of the watercourses form an island which is managed as a nature reserve. A study of the history of the site has been prepared in connection with this project.[1]

1757	Edmund and John Smyth[2]
1758	Edmund and John Smyth and Edmund Hill[2]
1760	John Smyth and Edmund Hill[2]
1763-1800	Edmund Hill[1,2]
1812-13	John Butts[1]
1819-20	Harvey & Grueber[1]
1820	Firm of Curtis's & Harvey established at Hounslow[3,4]
1876-	Continuing Certificate no. 49
1918-	Explosives Trades, Nobel[3]
1926	ICI, closed[1]

1 Over
2 West
3 Reader
4 *Rise & Progress,* 355-7

NORTH FELTHAM (TQ 1174)

On the River Crane a short distance S of the BEDFONT site. Access is by a footpath leading S along the W bank of the river from Baber Bridge on the Staines Road (TQ 112745).[1]

Gunpowder was made from the mid 17th to the mid 18th century by the proprietors of the Bedfont mills. The mills were then converted to other industrial uses. They were later acquired by Curtis's & Harvey and reverted to explosives manufacture as a cartridge factory. A water turbine survives from the later period.[1]

1668-1752	Powder mills under same ownership as BEDFONT[1]
1752	Converted to copper, brazil, snuff mills etc[2]
1871	Acquired by Curtis's & Harvey[2]
1895	North Feltham Cartridge Factory[2]
1918	Explosives Trades
1920	Closed[1]

1 Information provided by P Philo (GMSG)
2 Over

STANWELL (TQ 03 74)

There was a powder mill on the River Colne *c.*500 m SW of Hithermoor Farm, in the late 18th and part of the 19th century. Between 1832 and 1844 it was acquired by Curtis's & Harvey who had already been working it for some years. It was later converted to a snuff mill and became a corn mill around the end of the 19th century. This burned down in 1925.[1]

by 1791 Edmund Hill
after 1832 Acquired by Curtis's & Harvey
by 1896 Snuff mill

1 *VCH Middlesex*, 3, 43

SURREY

The earliest known water powered gunpowder mill in England was a tidal mill at Rotherhithe in the historic county of Surrey, and Surrey makers dominated the industry in the late 16th century and during the operation of the gunpowder monopoly up to 1641. The industry operated in the county until 1854 at Tolworth, *c.*1875 at Ewell and until 1920 at Chilworth. The early history of the industry is discussed in some detail in the *Victoria County History of Surrey.*

ABINGER (TQ 1147)

The site of Abinger or Elwix mill is on the Tillingbourne, 2 km ESE of the village of Abinger Hammer. Remains of a water wheel pit now form a feature in the garden of a dwelling house.[1]

The powder mill was probably operated by Richard Hill, gentleman of Shere and one time lord of the manor of Abinger, who was a partner with the Evelyns of TOLWORTH in their patent of 1589, but operated independently. Powder making ceased in the 17th century.[1]

1589 Richard Hill co-patentee with George and John Evelyn[2]
1595 Mill leased to George Bromell for making gunpowder[1]
1622 Reference to a powder bay at Elwix mill; partly converted to a copper mill[1]
by 1667 Corn mill and copper mill on the site[1]

1 Brandon
2 VCH Surrey, 2, 312

ABINGER HAMMER (TQ 1047)

Gunpowder manufacturing buildings including a cylinder house, saltpetre earth and boiling houses and a proposed mill are described in sale particulars and an associated plan of *c.*1790s. The site was on the Evelyn estates and was in the vicinity of the forge of Abinger Hammer which had recently ceased operating.[1]

1 SRO (Guildford Muniment Room) 53/107

BALHAM (TQ 2974)

A horse-powered gunpowder mill was active at Balham House sometime between 1701 and 1723. It is suggested that it was operated by William Walton, gunpowder maker at WALTHAM ABBEY.[1]

1 Information provided by K Fairclough (GMSG)

CARSHALTON (TQ 2866)

Known as Shepley Mills after an 18th century leather dresser. The site is at the confluence of the Croydon and Carshalton headwaters of the River Wandle and can be seen from a footpath along the W bank of the Carshalton stream entered from River Gardens (TQ 282655) in the vicinity of the original mill site. This was occupied by a corn mill and probably a fulling mill in the middle ages followed by a dyewood mill and then a powder mill. Only water channels survive but the area over which the powder mills extended, on both sides of the confluence and on the east bank of the Croydon Wandle, has remained in industrial use to the present day. Later uses have included leather, oilseed milling, snuff milling, calico printing and engineering.[1]

1650s William Molins, powder maker; Abel Richardson, partner; John Jarvis, partner and manager; John Pepper, chief workman; Lewis Fossan, clerk[2]
1653-6 John Jarvis[1]
1657 Thomas Fossan[1]
1661 Bartholomew Fossan, skinner, and Lewis Fossan, goldsmith, both of London, sold business to Josias Dewye[3]
1692 Mills purchased by Dewye[1]
1698 Josias Dewye died leaving mills to his nephew John Dewye[1]
1703-11 John Dewye held Ordnance contracts[1]
? John Dewye succeeded by John Dewye Parker[1]
by 1740 Three mills converted to copper, fourth to dyewoods[1]
1 Information provided by M Wilks (GMSG)
2 *VCH Surrey*, 2, 322-4
3 SRO 212/9/3

CHILWORTH (TQ 0347)

On the Tillingbourne, a tributary of the River Wey, 4 km SE of Guildford. The site extends from W of Blacksmith Lane (TQ 022474) up the valley to Postford Pond (TQ 040480). Public access is allowed to the central portion of the site which is owned by Guildford Borough Council and is a Scheduled Ancient Monument. This area contains ruins of steam powered incorporating mills (Figure 6) and many edge runner stones. The lower end of the site contains reused industrial and service buildings of works which can be seen from a public footpath. Remains of a late 19th century smokeless powder factory at the upper end of the site are on private land but many features can be seen from a public footpath. Little more than foundations remain of the Admiralty cordite factory which was built during the First World War at the Postford end of the site.[1]

An account of the history of the mills has been published[2] which provides the basis for the following summary. There are also two published articles.[3] The mills were on the site of an earlier corn mill, fulling mill and wire mill, and operated from the mid 1620s, when they were established by the East India Company, until 1920. They were expanded in the 17th century, in order to supply government contracts, by Sir Polycarpus Wharton who was ruined and imprisioned for debt. The mills operated on a smaller scale in the 18th and much of the 19th centuries. A major expansion started in the 1880s with the construction of plant for the manufacture of brown prismatic or 'cocoa' powder by a subsidiary of a German company. This was followed by the building of modern explosives factories in the 1890s and during the First World War.

1626-36 East India Company[4]
1636 George Collins and Samuel Cordwell granted monopoly
1653-73 Vincent Randyll, owner of Chilworth Manor, proprietor; also George Duncombe and John Woodroff (1655), Josias Dewy (1656)
*c.*1673 Mills visited by John Aubrey and described in his *History of Surrey,* 1718-19
1677 Sir Polycarpus Wharton took a 21 year lease and extended mills
*c.*1680 Lower, Middle and Upper Works on John Seller's map of Surrey
1704 Lower Mills converted to paper making
*c.*1710 Broadsheeet issued: *The hard case of Sir Polycarpus Wharton, baronet*
by 1716 Mr Gaubar (Grueber). Not known if mills working at this time[5]
1728 Francis Grueber; Upper Works derelict[1]
1759 Edward Pryce first supplied the government[5]
1765 Mills not in working condition[5]
by 1766 Pryce and Isaac Dent
by 1770 Pryce bankrupt, Dent alone[5]
1790 Dent died leaving business to William Tinkler
1796 Edmund Hill, powder maker of Isleworth, purchased manor; Tinkler continued as proprietor of mills
1819-81 Sharp family: John; John & Thomas; J T & S Sharp

1876 Continuing certificate no. 11
1881 Sold to J Marcus Westfield
1885 Chilworth Gunpowder Company formed as a subsidiary of *Vereinigte Rheinisch-Westphälische Pulverfabriken*
1892 Smokeless powder factory built
1915 Cordite factory built by the Admiralty
1918 Explosives Trades
1920 Closed

1 Crocker (1985)
2 Crocker (1984)
3 Warner
4 Brandon
5 West

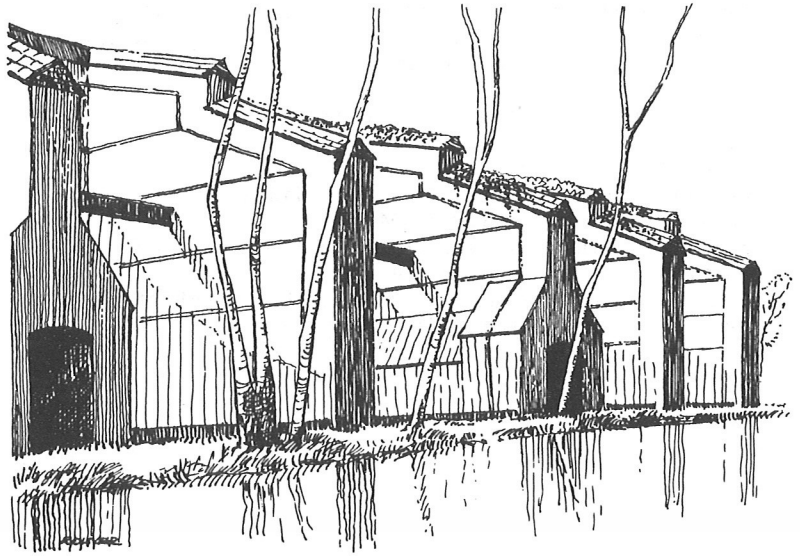


Figure 6. A row of six steam powered incorporating mills at Chilworth dating from the 1880s (© R Oliver)

EAST MOLESEY LOWER (STERT) MILL (TQ 1568) and UPPER MILL (TQ 1468)

On the River Mole, the lower site being 200 m above the original confluence with the Thames and the upper site about 1 km further upstream. Both occupied the sites of earlier corn mills. The upper site became part of a private park in the late 18th century. It is still in private grounds and only water courses remain. Powder manufacture ceased at the lower site in the 1660s but was followed by a succession of

industries up to the present day. The site is now occupied by offices and light industry.[1]

Both powder mills were established during the Commonwealth period by John Samyne who had set up as a powder maker in 1645 and was appointed a commissioner for saltpetre in 1653. At about this time he built several new mills which probably included those at East Molesey. He acquired others at WALTHAMSTOW, LEYTON and HACKNEY in the Lea valley in Essex.[2, 3]

1650s	John Samyne[2, 3]
1666	Inhabitants petitioned the king to order removal of powder mills[2, 3]
1670	John Samyne passed over the mills to his son Peter[3]
1676	Peter Samyne leased both mills to James Clarke; the lower mill was apparently no longer a gunpowder mill[3]
early 18C	Robert Stiles[4]
by 1728	Powder mill leased to Robert Norman[4]
by 1754	Robert and James Norman[4]
1757-62	James Norman (March 1757 - Dec 1762)[4]
1763	Susannah Norman, widow of James, (January); Susannah Norman and Thomas Sutton (March)[4]
1767	Susannah Norman married Beaumont Hotham who formed a partnership with Thomas Sutton[3]
1780	Hotham and Sutton, having acquired the two Molesey manors demolished the mill[3]

1 Information provided by R G M Baker (GMSG)
2 Baker
3 Greenwood
4 West

EWELL (TQ 2164)

On the Hogsmill River, NE of the village of Ewell, between the railway line (TQ 216632) and Ruxley Lane (TQ 205642). The site has been landscaped to provide an open space and the river has been rechannelled. No buildings survive and only half an edge runner can be seen. Another is embedded in a garden path in Church Street. The later mill owners lived at Avenue House, now a public library known as Ewell Court, near the decorative pond on a tributary stream.[1] After the mills closed *c.*1875, edge runners from the site were used at Beddington snuff mill.[2]

The mills were active in the 18th and 19th centuries. The grant of the Rectory of Ewell to powdermakers in 1560 is probably related to the mills at TOLWORTH which were on the Hogsmill River 3 km downstream.[3] No documentary evidence has been found for the Ewell mills before the mid 18th century. Jonathan Eade, who ran them with

Alexander Bridges from 1754 onwards, supplied the government in the war of 1740-48 but there is no evidence that he was at Ewell then.[4]

1754-81	Jonathan Eade and Alexander Bridges[4]
1781	Alexander and Robert Bridges, sons of Alexander Sr.[4]
1798	Robert Bridges and John, son of Alexander Jr., in trust for their nephew Henry, son of Alexander Jr.[4]
1802	Henry Bridges on Enclosure map
1855	Sir Henry Bridges[5]
*c.*1855	Messrs Sharpe & Company[5]
1862	Sharpe, Adams & Company[5]
1865	Messrs Sharpe & Davy[5]
1870	J C Sharpe & Company[5]
*c.*1875	Closed[6]

1 Visited 1984
2 London Borough of Sutton Public Library. Peatling Papers X: Mills
3 Titford, 75-6
4 West
5 Science Museum Library, Simmons Collection
6 Information provided by Nonsuch Antiquarian Society

GODSTONE (TQ 3651)

On the Gibbs Brook near Leigh Place (TQ 362508), 1 km SE of the village of Godstone. The history of the mills is closely related to that of the TOLWORTH and WOTTON powder mills since all were owned by members of the Evelyn family, who held gunpowder patents in the late 16th and early 17th century.[1] George Evelyn probably began manufacturing gunpowder at Tolworth and later extended his operations to Wotton. His sons John and Robert worked at Godstone. The Godstone mills may have closed after the monopoly passed to Cordwell and Collins at CHILWORTH in 1636.

1589	George Evelyn of Wotton acquired the manor of Godstone and Leigh Place[2]
1599, 1604	Patents granted to John and Robert Evelyn and others[1]
1613	The Earl of Worcester refers to John Evelyn of Godstone obtaining saltpetre[3]
1621-32	Series of government contracts with John Evelyn[1]
1624	John Evelyn of Godstone erecting new mills[4]
1635	Last delivery of powder by John Evelyn of Godstone[5]

1 *VCH Surrey*, 2, 314-8
2 Manning & Bray, 326-7
3 *Rise & Progress*, 232-3
4 *Rise & Progress*, 238
5 PRO WO49-70

ROTHERHITHE (TQ 3680)

There are records of a gunpowder mill on land east of the town, which was held from the 1530s onwards by members of the Lee family, and of a gunpowder mill erected by Henry Reve on land called 'the Crenge' in 1554-5.

1543 Lease of 1563 indicates that premises on the east of Rotherhithe had been occupied by the Lee family for making gunpowder for 20 years[1]
1554-5 Henry Reve has erected a mill on 'the Crenge'[2]
1562 Francis Lee, Brian Hogge and Robert Thomas had erected five new mills and tendered to supply the government[1]
1563 Lease for 21 years to Francis Lee of tenement, gunpowder mill and wharf on east of Rotherhithe, late in the tenure of Thomas Lee deceased, now of Francis Lee his son[1]
1578 Francis Lee gunpowder maker to the Queen at Redreff (Rotherhithe)[1]
1600 Richard Neede of Rotherhithe, powder maker[3]

1 *Rise & Progress*, 210-11
2 *Rise & Progress*, 208; *VCH Surrey*, **2**, 310
3 *VCH Surrey*, 2, 314

TOLWORTH (TQ 2166)

Also known as Long Ditton, Malden and Worcester Park mills, the site was in the manor of Tolworth but on the boundary between a detached part of the historic parish of Long Ditton, the parish of Malden and the former parish of Cuddington. It is on the Hogsmill River which enters the Thames at Kingston and is on the NW side of Old Malden Lane, which runs parallel to the river. The site is now occupied by nursery gardens and industrial buildings and there is an area of woodland on the SE side of the road which may have been used by the gunpowder industry in its later years. The Tolworth site is some 3 km downstream from that of the EWELL powder mills.

The mills were probably the ones established in the late 16th century by the Evelyn family who later operated at WOTTON and GODSTONE. In 1607 the Earl of Worcester, keeper of the nearby Nonsuch Park, was granted the gunpowder patent but subcontracted the manufacture to the Evelyns.[1] The Earl built Worcester House near the gunpowder site and the area became known as Worcester Park, an alternative name for the powder mills. The mills probably closed when the site was incorporated into Nonsuch Park,[2] and were re-established in the early 18th century. They were then active until the mid 19th century when they closed and were replaced by a corn mill, followed by a succession of other industries. The site was cleared in 1950.[2]

1560 Rectory of Ewell granted to Thomas Reve and George Evelyn[3]
1567 Manor of Long Ditton conveyed to George Evelyn[4]
1589 George and John Evelyn and Richard Hill granted patent[1]
1607-20 Patent held by the Earl of Worcester[1]
1720-64 William Taylor[5]
by 1774 William Taylor, son of William Taylor[5]
1818-19 William Taylor on Enclosure map
1834 William Taylor[6]
1849 Frederick Taylor[6]
1854 Closed after explosion[2]

1 *VCH Surrey*, *2*, 314
2 Greenwood
3 Titford, 75-6
4 Manning & Bray, **3**, 13
5 West
6 Science Museum Library, Simmons Collection

WIMBLEDON (TQ 2672)

On the River Wandle where it forms the boundary between Wimbledon and Wandsworth and also known as Wandsworth powder mills. The location suggested by John Senex's map of Surrey of 1729 is along a stretch of the river upstream from the later Garratt oil mills at TQ 260727. Documents of 1666[1] and 1671[2] refer to 3 acres of pasture land 'on the one side of Dyers Land and on the other side of the Powder Mills'.[1] Dyers Land was probably in the present Summerley Street and Trewint Street area.[3]

by 1666 Powder mills[1]
1687 Sir Peter Rich, powder maker at Wandsworth and MOLESEY[4]
1729 Wimbledon Powder Mills on Senex's map of Surrey
1753 Wimbledon Powder Mills on Bowen's map of Surrey

1 SRO 212/107/2
2 GLRO E/BER/S/T/II/B1/10
3 Information provided by Miss R J Ensing (Wandsworth Historical Society)
4 Tomlinson, 115

WOTTON (TQ 1247)

The existence of early powder mills on the Tillingbourne near Wotton House is testified by correspondence of members of the Evelyn family who had powder mills also at TOLWORTH and at GODSTONE and who owned the Wotton estate from 1579. The mills were probably at Pigeon

House pond, immediately NE of the house but there are other possible sites. There were also brass and wire mills at Wotton in the 1620s. Traces of industry were removed by the remodelling of the landscape which was carried out by later members of the Evelyn family from 1642 onwards.[1] The estate is privately owned.

1579	Estate acquired by George Evelyn
1589	Patent granted to George Evelyn, his son John, and Richard Hill who was probably at ABINGER mill.
1603	George Evelyn died
by 1625	Powder mills closed

1 Brandon

SUSSEX

The gunpowder industry was established in Sussex in the third quarter of the 17th century and continued for two hundred years. Several of the mills were built on the sites of former iron works. There were five mills on the River Asten near Battle and two on the River Brede, at Sedlescombe and near the village of Brede. There was also a short-lived later establishment at Maresfield, 30 km west of the main group, in the mid 19th century.

The Sussex mills were renowned for their high quality sporting powder, known as Battle powder, and a special dispensation was granted in the 1772 Explosives Act (11 George III, 61) to allow the continued use of pestle mills, which were in general prohibited, for this manufacture. Steam power was introduced at an early date at Battle, perhaps because of problems with water supply. There is also evidence that wind power may have been used, in the form of a blue and white printed plate depicting 'Powder Mill, Hastings'.[1]

1 SPAB Wind & Watermill Section. Newsletter **30, 31** (1987)

BATTLE AND SEDLESCOMBE

The Battle and Sedlescombe mills were closely related and are most conveniently grouped together. The Battle sites are listed from N to S, downstream along the River Asten, which is now known as Powdermill Stream.

FARTHING (TQ 737147) Represented by a mill pond.[1]

HOUSE MILLS (TQ 742146) On the site of an earlier iron works.[2,3] This became the principal mill of the group and the proprietor's house, which is still occupied, was built adjacent to the mills. The pond is still in water, there are edge runner stones built into the walls of outbuildings and a saltpetre pan has survived on the site (Figure 7).[1]

PEPPERING-EYE (TQ 743139) The earliest site (1676). The mill pond has been drained but the bay survives. There is also a building and there are edge runners in the garden patio of an adjacent house.[1]

LOWER PEPPERING-EYE (TQ 745136)[1]

CROWHURST (TQ 758118) Part of a building survives.[1] The site was previously used for iron working.[2]

SEDLESCOMBE (TQ 781176) Edge runners in the garden of a house are visible from the footbridge crossing the stream.[1]

1676	Peppering-Eye leased to John Hammond of Battle with permission to erect a powder mill[4]
1710	Lease to William Hammond of Battle, powder maker[4]
by 1750	William Gilmore at gunpowder mills in parish of Sedlescombe[4]
1756	Lester Harvey married Jane, daughter of William Gilmore and subsequently succeeded to the Battle and Sedlescombe works[4]
?	William Gilmore Harvey, son of Lester Harvey[4]
1806	Steam engine under construction by Boulton and Watt for Mr W G Harvey[5] apparently installed at the House Mills[4]
1817	Firm of Curtis's & Harvey formed and removed to HOUNSLOW. Harvey succeeded by a Mr Gill[4], probably Henry Gill, previously at KENNALL VALE in Cornwall[6]
?	Charles Laurence, proprietor of Peppering-Eye and Crowhurst works, amalgamated the entire group of mills[4]
*c.*1850	Messrs Charles Laurence & Son amalgamated with Messrs Pigou & Wilks of DARTFORD, Kent[7]
1874	Battle works closed[4]

1 Austen, Cox & Upton
2 Cleere & Crossley, 312-3; Straker 350-2
3 Blackman
4 Birmingham Public Libraries, Boulton & Watt Collection, PF 383
5 Earl, 41
6 Philp

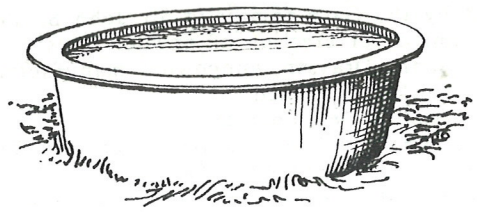


Figure 7. Saltpetre boiling pan (1.3 m diameter) at the site of the House Mills, Battle (© R Oliver)

BREDE (TQ 8019)

On the River Brede, 2 km WNW of the village of Brede. The mills were converted from an iron works which closed down in 1766 and they operated from 1770 to 1825. The ponds were then drained for hop gardens and the buildings were demolished.[1] Only an incorporating mill stone remains at the end of the bay of Powdermill Reservoir.[2]

1766 Iron works closed down[1]
1769 Powder mills leased to Messrs Durrant & Jeakens[3]
1787 Explosion at Brede Powder Mill belonging to Messrs Brooke, Jenkins & Co reported in local press[3]
1797 Purchased from the Weston family by Durrant & Jeakens[3]
? Partnership dissolved; John Jeakens sole proprietor[3]
1808 Rebuilt after explosion[3]
1825 Closed[3]

1 Cleere & Crossley, 318; Straker, 343
2 Austen, Cox & Upton
3 Austen, E, 92-4

MARESFIELD (TQ 4623)

At a pond (TQ 462231) on a tributary of the River Ouse known as the Batts Bridge Stream, 1 km SW of the village of Maresfield. The powder mills closed in the 1850s after operating for only ten years. Subsequent demolition and landscaping has removed all traces of the industry except for one incorporating mill stone.[1] 'Powder Mills' are marked on a spurious map of Maresfield Forge dated 1724, which was claimed to have been copied by Charles Dawson, FSA, perpetrator of the Piltdown forgery, from an original map. In fact the mills were built in 1849 on the site of an earlier iron works which had closed in 1812.[2]

The Maresfield Patent Gunpowder Company patented a method of boiling the three ingredients of gunpowder together in a vacuum pan. Lammot du Pont of Delaware, who visited in 1858, was concerned about the credibility of the management.[3]

1848-9 Land sold by the Gage family to Sir John Shelley[2]
1849 Licence granted for erection of powder mills[2]
1852 Leased to Henry Drayson, gunpowder manufacturer of Framfield[3]
1854 Explosion; works abandoned[2]
1857 Patent no. 2983, 1 December 1857
1858 Visit by Lammot du Pont. Drayson had left; Frederick G Spray, plant superintendent and managing partner[3]
1859 Maresfield Patent Gunpowder Company bankrupt[2]

1 Austen, Cox & Upton
2 Cleere & Crossley, 342; Lampson; Straker, 400-403
3 Wilkinson, N B

SOUTH-WEST ENGLAND

CORNWALL

Blasting with gunpowder in Cornish mines is first recorded in 1689 and according to legend was introduced from Somerset. However the manufacture of gunpowder was not established in the county until the early 19th century. Black powder production reached its peak in the mid 1870s. It then declined as a result of competition from new explosives and depression in the local mining industry and ceased in the early 20th century. An account of the industry is given in *Cornish explosives* by Bryan Earl, on which the following summaries are based.

BISHOPS WOOD (SW 8349)

Also known as the St Allen works, the site is on the River Allen, 3 km N of Truro. Access is from the car park of a designated Forest Walk in the present St Clement Wood (SW 824478). A footpath follows the mill leat. There are decayed remains of buildings including a row of incorporating mills on the west of the river between SW 830480 and 831486.[1]

The works were established in the 1860s by the Cornwall Blasting Powder Company. Their success was short-lived and attempts to sell them off from 1879 onwards failed. The factory was small, employing 13 or 14 men and was powered by both water and steam.[2]

1863 Established by Cornwall Blasting Powder Company.
1876 Continuing Certificate no. 22
1879 Works offered for sale
1887 Dismantled

1 Visited 1987
2 Earl, 61-3

COSAWES (SW 7738)

Midway between Perranarworthal and Ponsanooth, on a tributary of the River Kennall. The site is privately owned and occupied by a residential caravan park. A waterwheel, a few small service buildings and edge runners survive. A compact limestone edge runner is erected outside the entrance to the site (SW 768378).[1]

Cosawes was the first powder mill to be established in Cornwall, in 1809. After a few years it was sold out to the owners of the KENNALL VALE mills which had been established *c.*1812. In later years it was used as a magazine and general storage site for the Kennall works.[2]

1809 Established by Frank Nicholls and Henry Gill
1813 Partnership dissolved. Henry Gill continued as proprietor but shortly sold out to Sampson and Lanyon of Kennall Vale.

1876 Continuing Certificate no. 42
1898 Purchased by Curtis's & Harvey and closed

1 Visited 1985
2 Earl, 29-33, 42

HERODSFOOT (SX 2061)

On the West Looe River, 1 km NW of the village of Herodsfoot and 5 km SW of Liskeard. The site is most conveniently approached from the west. It is now occupied by Deerpark Forest Cabins, a residential holiday development built by the Forestry Commission. The millpond has been considerably enlarged to create a landscape feature. The manager's house is occupied and service buildings have been reused. There are decayed remains of some water-powered process buildings and in some cases these have been used as bases for the timber cabins.[1]

The mills were established in the 1840s and Quaker entrepreneurs were involved, production being for civil use only. The black powder factory closed in the 1890s but was later reopened by a branch of an Austrian company to produce ammonium nitrate explosives. The manufacture of explosives continued on the site until 1963. The Herodsfoot works were closely connected with those at TRAGO nearby.[2]

1845 Established by East Cornwall Gunpowder Company
1874 East Cornwall Gunpowder Company Limited
1876 Continuing Certificate no. 24
1898 Purchased by Curtis's & Harvey and closed
1900 Reopened by Safety Explosives Company
1902 Ammonal Explosives Limited, a branch of G Roth of Austria
1914-18 Ministry of Munitions, then abandoned
1938 Reopened by Burrowite Explosives of Trago
1963-5 Closed

1 Visited 1987
2 Earl, 56-60, 264-294

KENNALL VALE (SW 7537)

On the River Kennall immediately W of the village of Ponsanooth. The entrance is near the village at SW 754375 but access is restricted as the site is a nature reserve. A detailed archaeological and historical report has been prepared.[1]

A striking feature of the works is the arrangement of leats on five levels in series on the steep north side of the valley. This system served a glazing mill and seven pairs of massive granite incorporating mills of which there are substantial remains (cover illustration). Other remains include the boiler house and granite chimney stack of a stove.[1]

The mills were established in the early 19th century by a subsidiary of the Fox Foundry Company and successive owners were closely connected with the mining industry. The proprietors bought out the nearby COSAWES works at an early stage. The mills were progressively expanded until about 1880, with a major extension being opened in 1844 in Roches Wood, on the upper part of the site. A wide range of gunpowders, including sporting powders, was manufactured.

The directors of the Kennall Company established the National Explosives Company at Hayle in 1889, for the manufacture of high explosives. Curtis's & Harvey acquired the Kennall works in 1898 and produced specialised types of cartridge and fuse powders. Production ceased *c.*1910[1] but in the 1920s the saltpetre refinery was reused by Messrs Beckford Smith for the preparation of gutta percha for fuse.[2]

1811-12 Licensed. Benjamin Sampson, John Ferris Devonshire and Edmund Allen, partners[2]
1827 Benjamin Sampson sole proprietor[1]
1828 Richard Lanyon manager[1]
? Cosawes factory acquired[2]
1840 Benjamin Sampson (Cloak), nephew of Benjamin Sampson I, and Richard Lanyon[2]
1844 'Roches' factory licensed[2]
1850s Saltpetre refinery built south of main works[1]
1863 Richard Lanyon succeeded by his son William Henry[2]
1864 Benjamin Sampson (Cloak) died and was succeeded by William Shilson[2]
1868 W H Lanyon left[2]
1875 William Shilson succeeded by his sons Charles and David Henry[2]
1876 Continuing Certificate no. 29
1898 Purchased by Curtis's & Harvey[2]
*c.*1910 Closed[1]
1920s Messrs Bickford Smith reused saltpetre refinery[2]

1 Smith, J R
2 Earl, 33-56

TRAGO (SX 1865)

On the River Fowey, 7 km W of Liskeard and 5 km NNW of the HERODSFOOT site. The mills were closely connected with Herodsfoot in the 19th century when black powder was manufactured and also in the 20th century when modern explosives were produced.[1] No traces now remain, the site being occupied by a large shopping complex.[2]

1850 Established by East Cornwall Gunpowder Company of Herodsfoot
1876 Continuing Certificate no. 25
1898 Purchased by Curtis's & Harvey Limited; closed

1902 Leased to Ammonal Explosives Limited
*c.*1908 Marpal Limited
1919 Nobel, closed
1931 Reopened by Burrowite Explosives
1960 Closed

1 Earl, 60, 264-286
2 Visited 1985

DEVON

CHERRY BROOK (SX 6377)

On Dartmoor, midway between Two Bridges and Postbridge. The land is owned by the Duchy of Cornwall and leased to a tenant farmer and access is restricted. However the remains are visible from a footpath which crosses boggy ground from Higher Cherry Brook Bridge (SX 635770).

Figure 8. A chimney stack at Cherry Brook, Dartmoor (© R Oliver)

There are substantial remains of two chimney stacks (Figure 8) and of three pairs of water powered incorporating mills on the open moor which are served in series by a long leat taken from the East Dart river (Figure 9). There are also ruins of a further incorporating mill and at least two others, which show evidence of alteration, in a range of buildings on the south side of the site. A mortar used for proving gunpowder stands on the approach lane to Powder Mills Farm (SX 627768). The buildings adjoining the farm, which originally included a school are now used as craft workshops.[1]

The mills were established in 1844 by a Plymouth alderman, Mr George Frean. About a hundred men were employed at times, some walking long distances to work.[2] A new company acquired the mills in 1880 but the industry then declined in the region and the mills closed by the end of the 19th century.

1844 Established by Mr George Frean[2]
? C F Williams[2]
1876 Continuing Certificate no. 48
1862 Plymouth and Dartmoor Gunpowder Company in Brendon's Plymouth Directory
1880 Purchased by newly formed West of England Gunpowder Company[3]
*c.*1897 Closed[4]

1 Visited 1987
2 Harris, H, 128-33
3 Earl, 63
4 Patterson (1986)

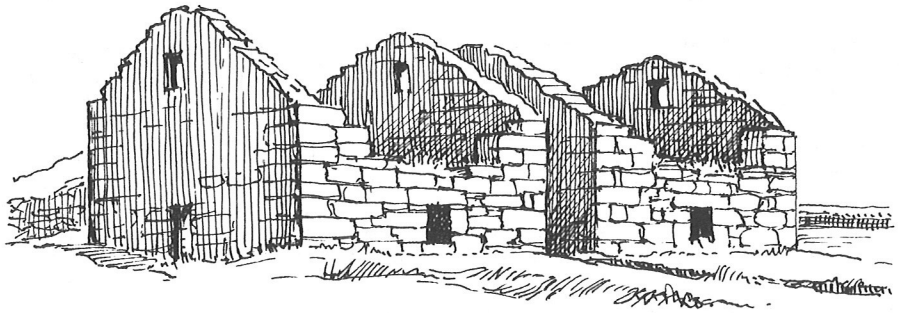


Figure 9. Granite incorporating mills at Cherry Brook (© R Oliver)

SOMERSET

Gunpowder was produced on at least three sites in the north of the county, at Woolley, Littleton and Moreton.[1,2,3] The Woolley mills were founded in the 1720s and continued in production until the early 1800s. In 1803 the manufacturing activities at Woolley were consolidated with those at Littleton near Winford. Production then came to be concentrated at Littleton and the Woolley mills gradually closed down. Least is known about Moreton which, together with Littleton, came into the hands of Curtis's & Harvey but was closed down in the course of the first half of the 19th century. Local tradition that Dead Mill at Lower Swainswick (ST 762671) was associated with powder making is not corroborated.[4]

The north Somerset mills represent the first significant development of the gunpowder industry in England outside the south-east region. They functioned as an outpost of Bristol's merchant interest and they became part of an international trading network through its port. The mills manufactured musket powder for export on the triangular route of the

slave trade with West Africa and America and they also made blasting powder for local coal mines and for sale to Wales and Cornwall.

A gunpowder magazine was built by the corporation of Bristol in 1722 at Tower Harratz in the city wall, near the present Temple Meads railway station. This was closed at the end of the 18th century, by which time a Powder House had been built on the River Avon, below the city at Shirehampton. Only the landing stage and a small shed survive, and private houses now stand on the site of this formerly substantial building.[4]

Records relating to the Woolley mills throw interesting light on manufacturing methods in the 18th century.[5]

LITTLETON (ST 551643)

Located near Winford, 9 km SSW of Bristol. The site is privately owned and access is therefore limited. Some of the buildings have been converted to agricultural and residential use and others have decayed.[4]

Papers in private hands suggest that the mills began to operate in the mid 18th century. The mills are featured on Donn's map of the Bristol district of 1769, which also shows a second gunpowder mill nearby (ST 556638). This site is now occupied by a building firm and confirmation of its earlier use has not yet been established.[4]

1769	Mills featured on Donn's map of the Bristol district
1803	Manufacturing at Littleton and Woolley consolidated and gradually became concentrated at Littleton
1820+	Acquired by Curtis's & Harvey
1839	Owned by Curtis's & Harvey but unoccupied, according to tithe schedule

MIDDLETON (ST 561595)

The site is now submerged beneath Chew Valley Lake, a reservoir which serves the city of Bristol.[4]

1799	Earliest reference appears in entries for burials in Compton Martin parish registers
1817	Morton Mill marked as a powder mill on 1st ed. O.S. map
1820+	Acquired by Curtis's & Harvey and subsequently closed in first half of 19th century

WOOLLEY (ST 749688)

On the Lam Brook at the village of Woolley, 5 km N of Bath. The site is privately owned. The incorporating mills (destroyed) were probably

arranged in series on the steep hillside below the upper mill pond, fed by a 1200 m leat from a dam at Lower Langridge (ST 743695). The corn mill site below the works was probably used also. The remains of ancillary buildings include an early 18th century brick vaulted store room, the site of a probable 30 ft (9 m) diameter by 2 ft (0.6 m) water wheel and three small rollers of uncertain function.[6]

*c.*1722	Works founded by John Parkin and partners
1803-	Gradual closure and change, or reversion, to agricultural holding

1 Athill
2 Buchanan & Tucker
3 Buchanan (1985)
4 Information provided by B J Buchanan (GMSG)
5 Buchanan (1976)
6 Information provided by M T Tucker (GMSG)

NORTHERN ENGLAND

CHESHIRE

THELWALL (SJ 6588)

On the left bank of the Mersey at Woolston Weir (SH 654875), 1 km downstream from Thelwall viaduct which carries the M6 motorway over the river and the Manchester Ship Canal (constructed 1887-94).[1] There are no remains and the site is on an isolated tract of land between the canal and river embankments and the viaduct.

Information on the early history of the mills is contained in records of the Stanton family of Snelston Hall, Derbyshire.[2] The Stanton family operated the mills until they were destroyed by an explosion in 1855.[1]

1758-	Works built by John Stanton, Sir Ellis and Robert Cunliffe and John Craven[2]
19thC	Stanton family: John, James, James & Son, James[3]
1855	Explosion followed by closure[1]
1859	James Stanton no longer listed in Liverpool Directory[3]

1 Corbridge
2 DRO D157m/3554
3 Gore's *Directory of Liverpool*

DERBYSHIRE

FERNILEE (SK 0176)

On the River Goyt near the village of Fernilee, 8 km NW of Buxton, but now submerged beneath Fernilee Reservoir. A building from the factory survives at Windgather Youth Hostel (SJ 994786)[1]

The factory was established by Thomas Williamson in 1801.[2] Derbyshire directories show that it remained in the Williamson family until the late 1880s. It was then acquired by the Chilworth Gunpowder Company Limited whose original factory was at CHILWORTH in Surrey.[3] The works employed 120 men just before the First World War.[4]

1801 Licence granted to Thomas Williamson[2]
1846 Thomas Williamson and Joseph C Buxton proprietors[2]
1871 James Williamson of Fernilee Hall, gunpowder manufacturer, listed in census return
1876 Continuing Certificate no. 15
*c.*1888 Acquired by Chilworth Gunpowder Company[3]
1918 Explosives Trades
1920 Closed[5]
1938 Fernilee dam built[4]

1 Information provided by L Draper (Surrey Industrial History Group)
2 Smith, J H
3 Chilworth Gunpowder Company Limited, Annual Report 1889
4 *Goyt valley*
5 Patterson (1986)

WESTMORLAND AND FURNESS

The gunpowder mills of the historic county of Westmorland and the Furness district of Lancashire, which are now in Cumbria, form a distinct group and are therefore listed under a joint heading. The industry was established in the Lake Counties from 1760 onwards and continued until the 1930s. It was primarily concerned with the manufacture of blasting powder and Quaker entrepreneurs were involved in the early stages. Most of the sites are now used for holiday accommodation. There are two published studies of the mills and the following accounts are based largely on these.[1,2]

1 Wilson (1964)
2 Marshall & Davies-Shiel

BASSINGILL (SD 5187)

On the River Kent, 800 m downstream from the site of OLD SEDGWICK. Traces of wheel pits can be seen S of Old Force Bridge on the east bank.[1] There was a head of water of 10 ft (3 m) and originally there were two water wheels. In later years one large water wheel drove six incorporating mills.[2]

The plant consisted of incorporating mills only which were built as an extension to OLD SEDGWICK. They were retained when the proprietors, W H Wakefield & Company, moved their main factory from Sedgwick to GATEBECK in 1852.

1790 established by John Wakefield
1876 Continuing Certificate no. 13
1918- Explosives Trades, Nobel, ICI
1935 Closed[3]

1 Visited 1986
2 Wilson (1964)
3 Patterson (1986)

BLACKBECK (SD 3486)

Near the village of Bouth, 4 km WSW of Newby Bridge. The site is now occupied by a caravan park which is approached by a long lane on the line of a former railway track. The works' office and weigh house stand at the entrance to the site. The mills were steam driven from the beginning and there are remains of the brick lined tunnel which carried smoke from the engine house to a chimney stack on the fellside.[1]

The mills were established in 1861 by F.C. Dickson & Company. They produced blasting powder for home and foreign consumption[2] and in particular supplied quarries in the Peak District of Derbyshire and North Wales.[3]

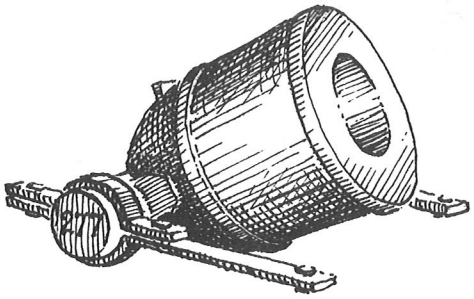
1860 Licenced[4] ; F C Dickson & Company[3]
1876 Continuing certificate no. 40
1918- Explosives Trades, Nobel, ICI
1928 closed[4]

1 Visited 1985
2 *Rise & Progress,* 365
3 Wilson (1964)
4 Patterson (1986)

ELTERWATER (NY 3305)

In Great Langdale, immediately above the village of Elterwater, 6 km W of Ambleside. The site is privately owned, having been developed by the Langdale Partnership as a holiday resort with properties sold on a time-share basis. It is entered from the B5343 road.

The factory was triangular in shape and covered about 20 acres. A leat from Great Langdale Beck fell by about 40 ft (13 m) in several stages and divided at the top of the site into an intricate system of channels and mill ponds. The original owner built a dam for controlled storage of water at Stickle Tarn, 4 km upstream from the mills (NY 288076). The watercourses form a major landscape feature of the development which comprises newly built lodges and converted original stone buildings. Several edge runners and bedstones of incorporating mills survive and a



mortar which was used for proving gunpowder is displayed in the restaurant (Figure 10).[1]

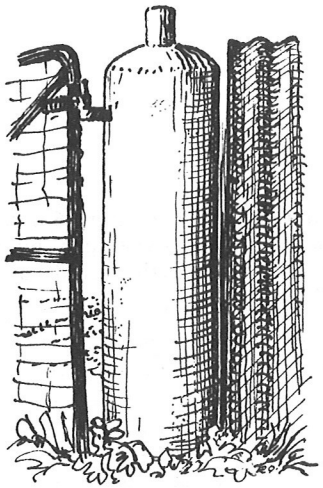
The factory supplied blasting powder to the Langdale slate quarries and Consiton copper mines and exported powder to West Africa.

Figure 10. Standard 8 inch (20 cm) mortar of the Napoleonic wars,[5] used for proving gunpowder at Elterwater (© R Oliver)

1824 Licence obtained by David Huddleston, a retired banker[3] Elterwater Gunpowder Company
1876 Continuing Certificate no. 34
1918- Explosives Trades, Nobel, ICI
1928 Closed[4]

1 Visited 1986
2 Marshall & Davies-Shiel
3 Wilson (1964)
4 Patterson (1986)
5 Information provided by C J N Trollope (GMSG)

GATEBECK (SD 5586)



Near the village of Gatebeck, 8 km SSE of Kendal, on the Peasey Beck. The site is now occupied by a holiday caravan park. The principal features of interest are the charcoal cylinders or retorts (Figure 11) which have been set up as gate posts at the entrances to the caravan site (SD 543853) and the depot at the north end of the former factory (SD 549858).[1]

The mills were opened in 1852 by W.H. Wakefield & Company who transferred their main manufactory here from OLD SEDGWICK, but retained their incorporating mills at BASSINGILL. Power was provided by water wheels, steam engines and water turbines. The mills took advantage of the reservoir at the head of the stream which had been

Figure 11. Charcoal cylinder (height 2.5 m) at Gatebeck (© R Oliver)

constructed in 1820 to feed the Kendal & Lancaster Canal. A head of water of 50 ft (15 m) was developed in four stages. In 1895 a dam was built on Fall Beck, a tributary of Peasey Beck, and this provided water under pressure to hydraulic pumps and later Pelton wheels. The mills had the earliest plant in England for manufacturing saltpetre from sodium nitrate, which was set up in 1864.[2]

1850 Licence granted to W H Wakefield & Company
1852 Opened
1876 Continuing Certificate no. 19
1882 Took over the Lowwood Gunpowder Company Limited[3]
1918- Explosives Trades, Nobel, ICI
1936 Closed[4]

1 Visited 1985
2 Wilson 1964
3 *Rise & Progress*, 415
4 Patterson (1986)

LOWWOOD (SD 3584)

Near the village of Haverthwaite in the Furness district of Lancashire. The mills were on the east bank of the River Leven which flows out of Lake Windmermere. The manufacturing area is on private land and is very overgrown with decayed walls and scattered edge runner stones. The mill leat and a stove and adjacent boiler house can be seen from a public bridleway from SD 347836. The imposing clock tower and adjoining saltpetre and sulphur refining houses in the centre of Lowwood village (Figure 12) are occupied by modern businesses. The nearby stable block and charcoal store and a more distant magazine have been converted into dwellings.[1] The works tramway was connected to Haverthwaite Station on the Lakeside branch of the Furness Railway (1869) which is operated as an amenity. Two surviving tramway vans from the gunpowder works have been rescued by the railway preservation society.[2]

Lowwood is the only gunpowder factory in Cumbria from which business records survive. These cover the period 1798 - 1846.[3] Barrel stencils found on the premises indicate an extensive export trade.[4,5] The mills were established primarily to supply 'Africa' powder for export through the slave trade but later produced blasting, sporting and military powders.[6] The Lowwood Gunpowder Company later became part of W H Wakefield & Company of GATEBECK.[7]

1798 Licence granted to Mr King of Finsthwaite, Mr Wilson of Rigmaden and Mr Daye Barker[4]
1799 Daye Barker & Company[5]
1863 Lowwood Gunpowder Company Limited[4]
1876 Continuing Certificate no. 23

1882 Absorbed into W H Wakefield & Company of Gatebeck[7]
1918- Explosives Trades, Nobel, ICI
1935 Closed[8]

1 Visited 1987
2 Lister
3 LRO D.D.Lo.
4 Wilson (1964)
5 Marshall & Davies-Shiel
6 Palmer
7 *Rise & Progress*, 415
8 Patterson (1986)

Figure 12. The clock tower, office block and raw materials processing area at Lowwood (© E M Bottomley)

NEW SEDGWICK (SD 5188)

The site is 5 km S of Kendal, on the west bank of the River Kent, opposite and immediately upstream from that of OLD SEDGWICK. It is owned by the National Trust and is occupied by a holiday caravan park. A timber weir was constructed across the river upstream and a long leat built of dressed stone carried water to a group of six incorporating mills. These were powered by a water wheel of 36 ft (11 m) diameter which worked with a head of 20 ft (6 m). Several smaller water wheels served other process buildings between the leat and the river. There were also five small water turbines by Gilbert Gilkes of Kendal. The large wheel pit survives together with traces of buildings, mounds and tramway tracks.[1, 2]

The factory was established in 1858. It was taken over by a Manchester syndicate in the 1860s. Later Mr Henry Swinglehurst of Hincaster bought out the other partners and traded as the Sedgwick Gunpowder Company.[3]

1857 Licensed
1858 Mills opened
1864 Sedgwick Gunpowder Company
1876 Continuing Certificate no. 33
1918- Explosives Trades, Nobel, ICI
1935 Closed[4]

1 Visited 1985
2 Wilson, *Sedgwick*
3 Wilson (1964)
4 Patterson (1986)

OLD SEDGWICK (SD 5187)

On the east bank of the River Kent, 5 km S of Kendal, immediately downstream from the site of New Sedgwick on the opposite bank. The site is now occupied by houses and no traces of the mills survive.[1]

The mills were the first in the Lake counties and were established on the site of an earlier corn mill by John Wakefield, a member of a Kendal Quaker family, in 1764.[2] They were built for the manufacture of blasting powder but Wakefield was disowned by the Society of Friends for supplying powder for military use.[3] The site was restricted in area and the firm expanded first by building extra plant nearby at BASSINGILL and later by moving their main factory to GATEBECK.

1764 Mills established by John Wakefield
1790 New incorporating mills built at Bassingill
1850 Closed and removed to Gatebeck

1 Visited 1985
2 Wilson (1964)
3 *Westmorland Gazette* (letter), 12 September *1986*

YORKSHIRE

WORSBOROUGH DALE (SE 3503)

On the Blacker Dike, a tributary of the River Dove, 2 km SSE of Barnsley. The entire works is under the spoil heaps of Barrow colliery.[1] The mills were established in the mid 19th century. Census returns of 1851 include gunpowder workers from outside the area, particularly from Kent. The mills were acquired by Kynoch Limited in the 1890s. An album of photographs survives showing exteriors of buildings, 1893.[2]

1849 Opened[3]
by 1853 John Shortridge & Charles Wright[4]
1876 Continuing Certificate no. 1
1893 Shortridge & Wright sold to Kynoch Limited[5]
1911 Closed[3]

1 Visited 1987
2 SYRO 372/B
3 Patterson (1986)
4 Wilkinson, J
5 Kelleher

WALES

GLAMORGAN

GLYN NEATH (SN 9108)

An illustrated history and description of the works has been written by a former employee and others.[1]

The site extends for some 3 km along the River Mellte and is within the Brecon Beacons National Park. It is one of several industrial archaeological sites in the area which are being conserved and promoted as tourist amenities by the Neath Development Partnership and other bodies. It is accessible to the public and is entered at the lower end of the site at the NE end of the village of Pontneddfechan (SN 904073). The foundations of incorporating mills can be identified and there are substantial remains of other buildings including corning houses (Figure 13), a stove house and magazines. The mills were powered by water wheels and turbines and there is a long leat which crossed the river three times by means of aqueducts. These however have been largely destroyed.[2]

The factory was established in 1857 on a site previously occupied by the Dinas Bridge Fire Brick Works. It produced black blasting powder for mines and quarries. Manufacture ceased in 1931 but high explosives and detonators continued to be stored on the site up to and including the Second World War.[3]

1857 Licence obtained by the Vale of Neath Powder Company
1864 Acquired by Curtis's & Harvey[4]
1876 Continuing Certificate no. 26
1918 Explosives Trades, Nobel, ICI
1931 Closed

1 Pritchard, Evans & Johnson
2 Visited 1986
3 Information provided by S Johnson (GMSG)
4 *Rise & Progress*, 357

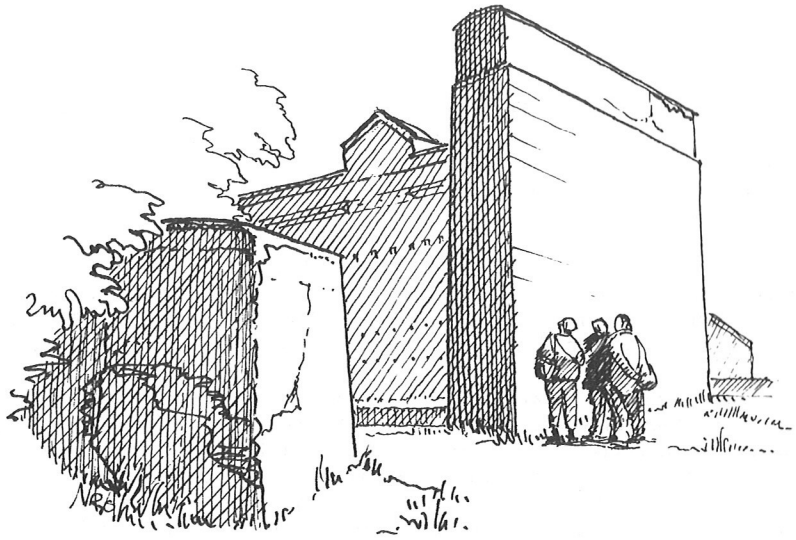


Figure 13. Ruins of the new corning house at Glyn Neath, which was built in the 1920s (© R Oliver)

MERIONETH

DOLGELLAU, TYDDYN GWLADYS (SH 7327)

On the W bank of the River Mawddach, near its confluence with the River Gain, 9 km N of Dolgellau, between SH 734275 and 735266. The mills were associated with the nearby Gwynfynydd gold mine which was active mainly from the 1880s to the early 20th century and was reopened in 1981. The site can be reached from the mine road running NE from the Pont ar Eden at Ganllwyd. This is not however open to motor vehicles beyond the car park at SH 733250. There is also access on foot by forest roads and paths leading from the Coed y Brenin Forest Visitor Centre off the W side of the A470 road at SH 716277.[1]

There is a ruined row of six incorporating mills with a waterwheel pit at one end and a tunnel beneath for bottom drive. These were served by a leat from the Pistyll Gain, a scenic waterfall on the tributary stream. There are also remains of a few other process buildings.[1]

1887 Opened (or re-opened?[2]) under new licence no. 127
1901 Closed[3]

1 Visited 1987
2 Harris, M C
3 Patterson (1986)

SCOTLAND

Although there is an isolated reference to a powder mill on the Water of Leith in 1701, it was not until the end of the 18th century that the gunpowder industry became firmly established in Scotland. It was introduced, probably by manufacturers from Kent, mainly to produce blasting powder. The early mills were located in the Lothians, on either side of the Pentland Hills within about 30 km of Edinburgh. Their sites at Fauldhouse, Gorebridge, Marfield and Roslin, are marked on James Knox's *Map of the Shire of Edinburgh,* published in 1812. Most ceased operation during the 19th century but Roslin continued until 1954. There was also a late factory established at Camilty, in the 1880s.

A second group of powder mills was established on the coast of Argyll from the 1830s onwards. Unlike the eastern mills which were located in relation to markets, these were situated in relation to the supply of raw materials and convenient sea transport. Entrepreneurs from the Glasgow area were active in setting up the industry and iron manufacturers, who had moved to Scotland from the Lake District in the 18th century in order to obtain charcoal, were involved also. The last of this group, Kames, closed in 1921. The coast of Ayrshire was chosen for the site of Alfred Nobel's dynamite works which opened in 1872. This factory, at Ardeer near Stevenston, became the centre of explosives manufacture in Britain when the industry was rationalised after the First World War. It was the last factory in Britain to manufacture black powder, the plant closing in 1977. A new factory operated for a short time at Wigtown during the Second World War.

ARGYLL

GLEN LEAN (NS 1281)

At the village of Clachaig, 5 km WNW of Sandbank, near Dunoon. The site is on private land on the S side of the B836 road from Sandbank to Auchenbreck. The River Little Eachaig was dammed a short distance upstream to provide a main leat from which the mills were served in parallel.[1] There are ruins of massive stone process buildings between the road and the river. The manager's house opposite has a moulding featuring two barrels above the door (Figure 14). The mills were taken over by Curtis's & Harvey in the 1840s and the gravestone, 1861, of Curtis's favourite dog Dash is at the base of the wall above the mills.[2]

Figure 14. Moulding above door of manager's house at Clachaig, Glen Lean (© A G Crocker)

The mills were established by Robert Sherriff in the 1830s[3] and made blasting powder until the late 19th century. They then closed temporarily but were reopened in the 1890s for the manufacture of Amberite, a smokeless sporting powder.[4] They closed a few years later when the manufacture was transferred to TONBRIDGE in Kent.[5]

1832	Established[6]
1834-40	Glenlean Gunpowder Company[7]
1840-6	West of Scotland Gunpowder Company, Alex B Seton, Manager[7,8]
1846-	Curtis's & Harvey, Clyde Powder Mills[7]
1855	New water powered mills, schoolhouse and cottages[8]
1876	Continuing Certificate no.10
1878	Temporary closure[4]
1891	Reopened for manufacture of Amberite[4]
1892	End of black powder manufacture[6]
1903	Works closed[10]

1 O.S. 6" map, Argyll sheet 173 SE, 1st ed 1869; 2nd ed 1898
2 Visited 1985
3 Shaw, 470
4 Boothroyd
5 *Rise & Progress,* 357
6 Patterson (1986)
7 Glasgow Post Office Directories
8 *Glasgow Chronicle,* 30 October 1840, 3
9 *North British Daily Mail,* 2 October 1855
10 McConnell (1984)

KAMES (NR 9671 AND 9772)

The Kames Gunpowder Company had its saltpetre works on the coast at Kames, 2 km S of Tighnabruaich on the Kyles of Bute, and its powder manufactory some 2km inland at Millhouse.[1] The former saltpetre refinery and associated buildings at Kames are occupied by a haulage contractor.[2] The firm's shipping used the more northerly of the two existing piers, which was known locally as the Black Quay.[3]

There were two sites at Millhouse, the Low Mills south of the road and the High Mills, which appear to be later, north of the road.[1] There are substantial remains, particularly of the Low Mills,[4] on private land. The works' bell and former office, which is now a dwelling house, and several worker's cottages can be seen on the road through the village.[2] A mortar used for proving gunpowder also survives. There are complex water courses through the sites, fed by a leat from Craignafeich Burn, which flows out of Loch Ascog. There were also two reservoirs. Steam engines and water turbines were added later.[3]

The mills operated from 1839 to 1920.[5] They were purchased by Curtis's & Harvey in 1876 and made blasting and sporting powder for the home and export markets.[6] Research has been carried out on the families employed at the mills.[7]

1839	Kames Gunpowder Company established[5] Partners Thomas Grey Buchanan, John Macallum[8]
1858	Visit by Lammot du Pont[9]
1876	purchased by Curtis's & Harvey.[5] Continuing Certificate no. 20
1918-1921	Explosives Trades, Nobel, ICI closed[3]

1 Plan of Kames Powder Mills, 31 August 1869 (SRA TD/489/77)
2 Visited 1985
3 McConnell (1984)
4 Information provided by M Oglethorpe (RCAHMS) 1986
5 Patterson (1986)
6 *Rise & Progress*, 358
7 McConnell (1987)
8 Information provided by J Robertson, Glasgow
9 Wilkinson, N B

LOCH FYNE (NN 0201)

At the village of Furnace on the W side of the A83 road, 10 km SW of Inveraray[1], on private land. There are substantial ruins of a row of six bottom-driven incorporating mills, foundations of other buildings and a mill pond and leat. There is a terrace of workers' cottages, which are still occupied, on the E side of the road.[2]

The Loch Fyne Gunpowder Company mills were started in 1841 by Robert Sheriff who also owned those at GLEN LEAN. Many workers moved to Furnace when the MELFORT mills closed *c.*1874, including the manager William Robinson who was killed in an explosion in 1883.[3,4] The business was purchased in 1879 by Messrs John Hall of FAVERSHAM in Kent.[5] It closed in the 1880s.[6]

1841	Licence granted at Inveraray Quarter Sessions to Robert Sheriff, senior and junior, of Dunoon[4]
1872-3 by 1875	Robert Robin & Son, Goatfield, Lochgilphead[7] Sold to Mr Carl Heuser of Glasgow[4]
1876	Continuing Certificate no. 28
1877	Trustees of Mr Robert Robin of Glasgow[4]
1879	Messrs John Hall & Son of Faversham, Kent[5]
1887	Closed[6]

1 O.S. 6" map, Argyll sheet 140 SE, 1st ed. 1871-2
2 Visited 1986
3 Information provided by Mrs McKeller of Furnace, grand-daughter of William Robinson
4 Patterson (1968)
5 *Rise & Progress*, 361
6 Patterson (1986)
7 Return of owners of lands and heritages, Scotland, 1872-3. HMSO, 1874

MELFORT (NM 8414)

On the River Oude, 1 km NW of the village of Kilmelford and by road 24 km S of Oban. The land is privately owned. A sketch plan of the site is shown in Figure 2.

The manufacturing buildings were strung out along the steep-sided valley and were served by a long leat which carried water from both the Oude and its tributary the Ead Tarsuinn. The remains are very decayed but are identifiable from a large-scale map of 1871.[1] The river flows into Loch Melfort, a sea loch which was used for transport. A group of cottages and the service and administrative buildings near the loch have since 1983 been converted into holiday accommodation by the Melfort Club. Offices and indoor leisure facilities are provided in the former cooperage and saltpetre complex (Figure 15) and the quay is used for sailing. In Kilmelford churchyard there is the tombstone of William Macdonald, a native of Uist, who was killed in 1860 in an explosion.[2]

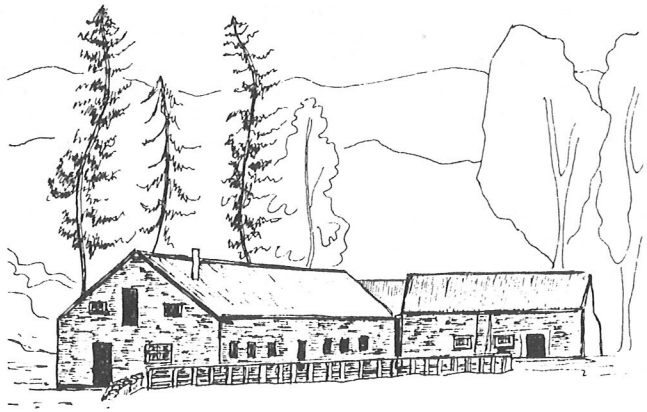


Figure 15. Cooperage and saltpetre buildings at Melfort. (© J R Matthews)

It has been stated that the mills operated from 1838 to 1867 [3,4] but both dates are incorrect. The site was purchased in 1838 by the proprietors of the Bonawe Furnace, to supply charcoal for ironworking, but the mills were established 15 years later.[5] They closed temporarily after an explosion in 1867[6] and continued until 1874.[3] There were 68 employees in 1871.[7] The manager then was William Robinson from Kent.[7,8] Many workers moved to the LOCH FYNE gunpowder works at Furnace when the mills closed.[8] Some of the buildings were later used as a sawmill.[9]

1838	Harrison Ainslie & Company purchased the site[3]
1853	Powder mills established[5]
1867	Explosion and temporary closure[6]
1874	Estate sold[3]
1875	Melfort Gunpowder Company site vacant[9]

1 O.S. 25" map, Argyll sheet cxxii, 13, 1871
2 Visited 1986
3 Royal Commission, *Argyll*
4 Shedden
5 *Oban Times*, 1 December 1866, 2
6 *Oban Times*, 9 March 1867, 2; 24 August 1867, 2
7 1871 Census Return, Kilmelford
8 Information provided by Mrs McKeller of Furnace
9 Argyll & Bute District Council Archives. Valuation Roll. Argyll, Kilninver and Melfort, 1874-5

AYRSHIRE

ARDEER (NS 2941)

The Ardeer Works, which after 1926 became part of the Explosives Group/ Division of ICI, was established in 1872 by the British Dynamite Company. This company was formed to manufacture the product invented by Alfred Nobel, who personally selected the site.[1,2] Black powder was made at Ardeer from 1935 to 1977.[3] The manufacture was transferred to the works from FAVERSHAM in the 1930s. When the Lake District mills also closed down during this decade, production became concentrated at Ardeer, with some processes being carried out at ROSLIN until 1954.

1872 Factory established by British Dynamite Company[2]
1876 Nobel's Explosives Company[2]
1918- Explosives Trades, Nobel, ICI
1935 New Licence no. 3
1977 Black powder manufacture ceased[3]

1 *Rise & Progress*, 395-402
2 Reader
3 Patterson (1986)

MIDLOTHIAN

CAMILTY (NT 0661)

On the Camilty Water, which becomes the Linhouse Water, a tributary of the River Almond, 5 km ESE of West Calder.[1] The site is in private grounds and some buildings remain.[2]

Ordnance Survey maps indicate that the factory was established on the site of an earlier corn mill and that a large pond was formed for the gunpowder works.[1,3] Power was provided by a gas engine.[4] Blasting powder was produced for local markets and the factory was the most modern of its day, being built after the passing of the 1875 Explosives Act.[5]

1889 Established by Midlothian Gunpowder Company.[5] New Licence no. 143
1895 Saltpetre factory added[5]
1898 Incorporated with Curtis's & Harvey Limited[5]
1918- Explosives Trades, Nobel, ICI
1931 Closed[4]

1 O.S. 6" map, Edinburghshire sheet 11 NE, 2nd ed 1895
2 Information provided by E M Patterson (GMSG)
3 O.S. 6" map, Edinburghshire sheet 10, 1st ed 1853
4 Patterson (1986)
5 *Rise & Progress*, 355, 363

GOREBRIDGE (NT 3461)

At Stobsmill on the Gore Water, a tributary of the South Esk. Most of the factory buildings were on the north side of the river between the present B704 road through Gorebridge and the A7 road from Edinburgh to Galashiels, with some water powered mills on the south side of the river. Little remains of the buildings and part of the site is occupied by a water treatment plant. The land is private.

The mills were established by an English company headed by Messrs Hitchener & Hunter.[2] Also involved were John Merricks[3] and a Mr Christie.[4] Merricks left soon after the mills opened to set up business nearby at ROSLIN. The mills closed in the 1860s[3], Hitchiner & Hunter's Liverpool office being listed in directories until 1865.[5]

1794 Established by Messrs Hitchiner & Hunter[2]
*c.*1865 Closed[5]

1 O.S. 6" map, Edinburghshire sheet 13, 1st ed 1854
2 Shaw, 469-70
3 Midlothian D C
4 *Rise & Progress*, 363
5 Gore's *Directory of Liverpool*

MARFIELD (NT 1857)

Within a southward bend of the North Esk, 1 km SE of Newhall near Carlops.[1] The mills operated in the early 19th century.

1812 Powder Mills on Knox map
1830 Explosion[2]
1853 Powder mills and neighbouring paper mills both ruined[1]

1 O.S. 6" map, Edinburghshire 17, 1st ed. 1853
2 Shaw, 470

ROSLIN (NT 2763)

A report on the site, its history and potential as a public amenity, has been prepared by Midlothian District Council[1] and a film was made when the works closed in 1954[2].

The site is on the North Esk, 1 km S of the town of Roslin. It is open to the public, some steps having been taken towards the creation of a Country Park. It is entered at a sharp bend on the B7003 road at NT 268627 from which it extends about 1 km upstream to a weir. Some buildings have been cleared and others selected for conservation, in particular the shell of a pair of water powered incorporating mills (Figure 16).[3]

The mills were established at the beginning of the 19th century by John Merricks, previously of GOREBRIDGE, and his new partner John Hay. There were 60 employees in 1845. The works continued into the 20th century, producing modern explosives as well as black blasting and sporting powder.[4] Water power was later supplemented by steam and gas engines.[5] The company eventually became part of ICI and when black powder manufacture became concentrated in Scotland in the 1930s, Roslin carried out finishing processes on powder incorporated at ARDEER.

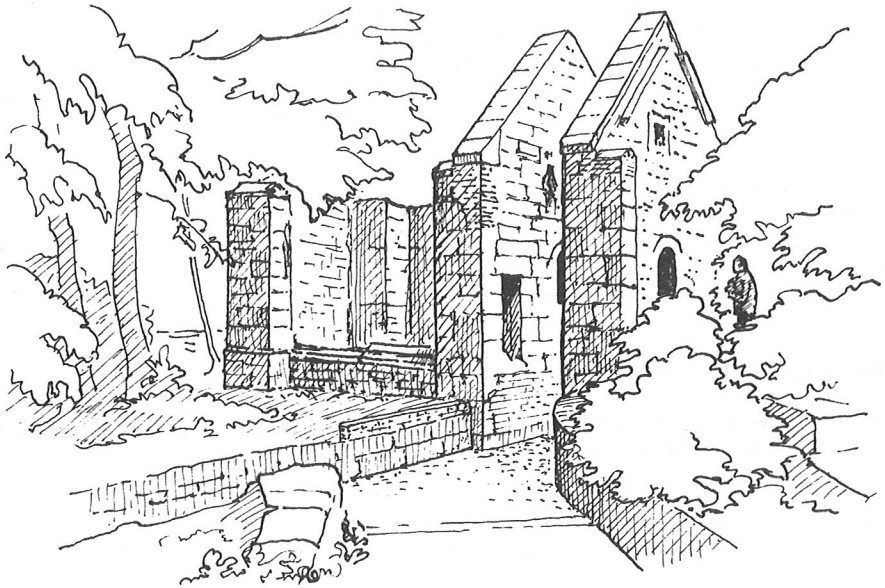


Figure 16. Water powered incorporating mills at Roslin (© R Oliver)

*c.*1805 Established by John Merricks and John Hay
1858 Visit by Lammot du Pont[5]
1876 Limited company formed: Hay, Merricks & Company Limited Continuing Certificate no. 2
by 1905 Gelignite manufacture started
1914-18 Wartime production of gunpowder, incendiary bombs and gelignite
1918- Explosives Trades, Nobel, ICI
1930s New building phase
1954 Closed

1 Midlothian D C
2 *Goodbye to Roslin*, 1954 (Film held by National Film Archive, London)
3 Visited 1985
4 *Rise & Progress*, 363
5 Wilkinson, N B

WEST LOTHIAN

FAULDHOUSE (NS 9561)

Shown on the Knox map of 1812, the mill was on the Breich Water, a tributary of the River Almond, 2 km E of Fauldhouse.[1] It was established on an earlier corn mill site in 1812, was still operating in 1817 but not listed in Pigot's directory of 1837,[2] and it had reverted to corn milling by 1855.[1]

1812 Established by O'Neil & Company[2]
1814- 47 year lease by William Christie[2]
by 1837 Probably closed[2]
by 1855 Fauldhouse Mill (corn)[1]

1 O.S. 6" map, Linlithgow sheet 11, 1st ed 1856
2 Shaw, 470

WIGTOWNSHIRE

WIGTOWN (NX 4259)

The remains of a Second World War black powder factory survive 5 km N of Wigtown and 200 m E of the A714 road to Newton Stewart. The site is approached by a lane, 500 m N of Carsegowan Farm, which leads to a farm cottage and the former entrance lodge. It is surrounded by the old security fence and much of the ground is waterlogged.[1]

The factory was built by the Ministry of Supply in 1940 and closed in 1945.[2] It was established as a shadow factory to use in case of loss by bombing of ARDEER and ROSLIN, which by then had the only

remaining black powder plant. It was built on soft subsoil and there has been uneven subsidence. However the ranges of brick incorporating mills, which had adequate foundations, stand intact. The buildings were surrounded by mounds through which in some cases shaft drives were carried from external electric motors. All the heavy machinery was removed for scrap at the end of the war.[3]

1 Visited 1985
2 Patterson (1986)
3 Information provided by E M Patterson (GMSG)

IRELAND

Gunpowder mills operated in the Dublin area, on tributaries of the River Liffey, in the late 16th and 18th centuries. In the 1790s mills were established in County Cork. These were acquired by the British government during the period of the Napoleonic wars. They afterwards reverted to private ownership and continued in operation until the early 20th century. The history of the gunpowder industry of Ireland is covered by an unpublished study of the country's war industries.[1]

1 Kelleher

COUNTY CORK

BALLINCOLLIG (W 5971)

The site is 8 km W of Cork City and stretches for 2.4 km along the River Lee. Since 1979, Cork County Council has been developing a Regional Park, of which the powder mill complex is to be the focus. A programme of archaeological and conservation work is being carried out in association with the Department of Archaeology, University College Cork and other organisations.[1]

The mills were water powered, with a series of mill races running into the river from a 2.4 km long canal which was also used for transport within the factory. There are substantial remains of process buildings including the ruins of twelve pairs of incorporating mills separated by high blast walls, and charge houses for holding the materials prepared for processing (Figure 17). Some workers' housing survives and is still occupied.[1] There is an early Jonval-type water turbine of *c.*1854 in the sawmill complex of the powder mills, on land now owned by the Ministry of Defence.[2]

There has been considerable interest in the history of the factory.[2, 3] The mills were established in the late 18th century and were purchased by the British Board of Ordnance in 1804. A Cavalry Barracks was established in the town in about 1810. The mills became dilapidated after the Napoleonic wars and were eventually offered for sale in 1832.[1] They

were purchased by a Liverpool businessman Sir Thomas Tobin who renovated and expanded them, some 500 people being employed in 1856.[2] The factory supplied the market in Ireland and also had a large business in export powder for Africa, which was shipped from Liverpool.[4]

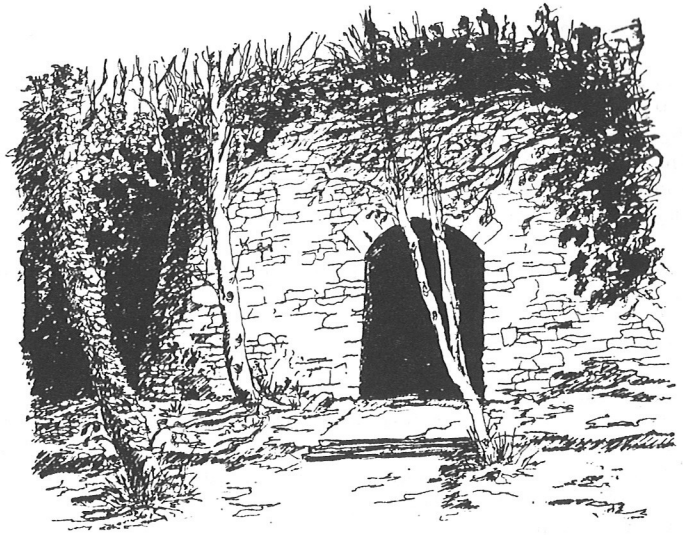


Figure 17. Charge house at Ballincollig. (© Aidan Linehan)

1794	Mills established by Charles Henry Leslie[1]
1804	Purchased by Board of Ordnance; Royal Gunpowder Mills[1]
1833-4	Purchased by Sir Thomas Tobin; Ballincollig Royal Powder Works Company[2]
1858	Visit by Lammot du Pont[5]
1876	Continuing Certificate no. 30
1898	Purchased by Curtis's & Harvey Limited[1]
1903	Closed[6]

1 Cork County Council
2 Ballincollig Community School
3 Kelleher
4 *Rise & Progress,* 363-4
5 Wilkinson, N B
6 Patterson (1986)

DUBLIN

RIVER PODDLE (O 1534?)

There were powder mills in the 1590s near Dublin Castle on the River Poddle, a tributary of the Liffey which now runs mainly underground.[1]

1589 Dublin Corporation made contract with Robert Poynter to supply powder[1]

1 Kelleher

RIVER CAMAC (O 0731)

Three consecutive gunpowder factories were built on a tributary of the Liffey, the River Camac, between Clondalkin and Baldonnel, in the 18th century. They were operated by the Grueber, Caldbeck and Arabin families.[1] The exact location of Arabin's mills is unclear[1] but he lived in Corkagh House.[2] By 1822 Arabin had ceased manufacturing and had become an agent for Curtis's & Harvey of London.[1]

1717	Nicholas Grueber awarded government contract for 21 years[1]
-1730s	Grueber[1]
1733	Explosion[2]
*c.*1775(?)	William Caldbeck[1]
1783	New Corkagh Mills built[2]
1787	Explosion[1,2]
1798	Mill still in existence but probably closed soon afterwards[1]
1790s-	Arabin[1]
1807	Henry Arabin and Richard Chevenix gunpowder manufacturers in Ireland[1]
by 1822	Arabin no longer manufacturing[1]

1 Kelleher
2 Joyce

ADDITIONAL SITES

BELFAST. An illegal factory was reported near Belfast in 1796. (Kelleher)

BIRMINGHAM. Report of explosion at Willis Powder Factory, 1827. (*The Times*, 19 December, 1827, 3d)

BRISTOL. Illegal manufacture in the early 17th century by Baber, Parker and others. (*VCH Surrey*, 2, 319)

DERBY. A mill near St Michael's Mills. 'The mill commonly called Gunpowder Mill', together with two sluices and the little Byflatt (island) on which the mill stood, was given by the Mayor and Burgesses of Derby to George Sorocold of Derby in 1692 with permission to erect a water-house, a water wheel and other engines. (Williamson, 67)

LONDON. An accident occurred at a powder house in Fleet Lane in 1588, injuring a man who was collecting payment for saltpetre. (Webster, 135)

METHEGLIN. Location unknown. Mentioned in an article describing the Faversham mills in 1863. (*London Society*, 4 (July 1863), 66-76)

OXFORD, OSNEY MILL (SP 50 06) Anthony Wood stated that in 1642 'the gunpowder myll was at Osney where the fulling myll stood.' This is consistent with the setting up of Royalist headquarters in Oxford during the Civil War. The original corn mill was associated with the 12th century Osney Abbey. The last rebuild of 1845 consisted of a corn mill, saw mill and bone mill which burned down in 1946. (Wood; Foreman)

SOUTHWARK. An illegal horse mill set up by Thomas Thornhill, saltpetre man, was operating on Bankside in 1630. (*VCH Surrey*, 2, 319)

WATER OF LEITH. A gunpowder mill in 1701. (Shaw, 469)

BIBLIOGRAPHY

Abbreviations used in the text: DRO, LRO, SRO, SYRO : the Derbyshire, Lancashire, Surrey and South Yorkshire County Record Offices; PRO: Public Record Office; SRA: Strathclyde Regional Archives; RCAHMS: Royal Commission on the Ancient and Historic Monuments of Scotland; VCH: Victoria County History

Athill, R The gunpowder mills of North Somerset. *The Countryman*, 1971, 134-9

Austen, B , Cox, D & Upton, J, eds *Sussex industrial archaeology: a field guide.* Chichester, Phillimore, 1985

Austen, E *Brede: the story of a Sussex parish.* Rye, Adams & Son, 1947

Ballincollig Community School Local History Society. *Journal.* 1986

Baker, R G M *The old mill.* Robert Vince Advertising. [1970s]

Bedfont Research Group. *Bedfont.* Hounslow & District History Soc., 1987

Blackman, H The story of the old gunpowder works at Battle. *Sussex Archaeological Collections*, **64**, 1923, 109-122

Boothroyd, G Glenlean Gunpowder Factory. *Shooting Times and Country Magazine*, 28 June - 4 July 1984, 24

Brandon, P Land, technology and water management in the Tillingbourne valley. *Southern History*, **6**, 1984, 75-103

Buchanan, B J Comment on the manufacture of black powder. American *Journal of the Society for Industrial Archaeology*, **2**, 1976, 75-80

Buchanan, B J The use of documentary sources in the interpretation of physical evidence: the Woolley powder works near Bristol, a case study. 4 Conference internationale Lyon-Grenoble, 1981, *L'etude et la mise en valeur du patrimonie industriel (1985)*

Buchanan, B J & Tucker, M T The manufacture of gunpowder: a study of the documentary and physical evidence relating to the Woolley powder works near Bath. *Industrial Archaeology Review*, **5**[3], 1981, 185-202

Cleere, H & Crossley, D *The iron industry of the Weald.* Leicester University Press, 1985

Corbridge, J *A pictorial history of the Mersey and Irwell Navigation.* Manchester, E J Morten, 1979
Cork County Council Planning Dept. *Gunpowder mills Ballincollig.* 1985
Crocker, G *Chilworth gunpowder.* Surrey Industrial History Group, 1984
Crocker, G *A guide to the Chilworth gunpowder mills.* Surrey Industrial History Group, 1985
Earl, B *Cornish explosives.* Penzance, Trevithick Society, 1978
Fairclough, K Early gunpowder production at Waltham Abbey. *Essex Journal,* **20** [1], 1985, 11-16
Foreman, W *Oxfordshire mills.* Chichester, Phillimore, 1983
Goyt valley. Bakewell, Peak National Park, 1977
Greenwood, G *Elmbridge water mills.* 1980 (Deposited with the Surrey Archaeological Society Library, Guildford)
Hardie, D W F & Pratt, J D *A history of the modern British chemical industry.* Pergamon Press, 1966
Harris, H *The industrial archaeology of Dartmoor.* David & Charles, 1972
Harris, M C The mineral wealth of Llanfachreth parish. *Journal of the Merioneth History & Record Society,* **5**, 1965-8, 147-154
Hoole, G P *Sir Humphrey Davy, Tonbridge associations.* Tonbridge, Bridge Chemicals Limited, 1978
Joyce, W St J *The neighbourhood of Dublin.* 1912, 221-3
Kelleher, G Study, unpublished, of Ireland's war industries.
Lampson, M *A history of Maresfield 'Powder Mills'.* [1980s?]
Lister, S The gunpowder works job. *The Iron Horse: Journal of the Lakeside Railway Society,* Spring 1987, 7-9
McConnell, K J The story of Kames/Millhouse gunpowder works. (In *Kilfinan: walks, history, reminiscences,* compiled and edited by H F Torbet. Ardlamont Preservation Society, [1984])
McConnell, K J The people of the powder mill. *Glasgow & West of Scotland Family History Society Newsletter,* **24**, April 1987, 5-7; Research papers deposited with the Argyll Archives Office, Lochgilphead and District Library Headquarters, Dunoon
McLaren, M The Explosives Research and Development Establishment, its historical background. *Journal of Naval Science,* **1**[2], April 1975, 176-183
Manning, O & Bray, W *The history and antiquities of the County of Surrey.* 1804-14
Marshall, J D & Davies-Shiel, M *The industrial archaeology of the Lake Counties.* 2nd ed, Michael Moon, 1977
Melling, E *Kentish sources III.* Kent County Council, 1961
Midlothian District Council. *Roslin report.* [1970s]
Over, L *The gunpowder mills on Hounslow Heath.* Richmond upon Thames Friends of the Earth, 1984
Palmer, A *The Lowwood Gunpowder Company: its inception and early growth, 1798-1808.* (Unpublished thesis, Chorley College of Education, 1970; copy deposited with the Lancashire Record Office, Preston)
Patterson, E M The explosion at Furnace. *Scots Magazine,* October 1968, 13-17
Patterson, E M *Gunpowder terminology and incorporation. (Faversham Paper 27).* Faversham Society, 1986

Percival, A *The Faversham gunpowder industry and its development. (Faversham Paper 4).* Faversham Society, 1967, 3rd ed 1986
Philo, P & Mills, J The Bedfont gunpowder mills. *London Archaeologist,* **5**[4], 1985, 95-102
Philp, B *The Dartford gunpowder mills.* Kent Archaeological Rescue Unit, 1984
Pritchard, T, Evans, J & Johnson, S *The old gunpowder factory at Glynneath.* Merthyr Tydfil & District Naturalists' Society, 1985
Reader, W J *Imperial Chemical Industries: a history. Volume I: The forerunners, 1870-1926.* Oxford University Press, 1970
Rise and progress of the British explosives industry. Edited by E A B Hodgetts. Whittaker, 1909
Royal Commission on the Ancient and Historic Monuments of Scotland. *Argyll volume 2: Lorn.* RCAHMS, 1975
Shaw, J *Water power in Scotland, 1550-1870.* Edinburgh, 1984
Shedden, H *The story of Lorn, its isles and Oban.* Oban, 1938
Simmons, W H *A short history of the Royal Gunpowder Factory at Waltham Abbey.* London, Royal Ordnance Factories, 1963
Smith, J H, ed. *Whaley Bridge in the mid-nineteenth century.* Whaley Bridge Amenity Society, [1979]
Smith, J R *The Kennall Gunpowder Company: an archaeological and historical study.* Cornwall Trust for Nature Conservation, 1986
Spain, R J The Loose watermills II. *Archaeologia Cantiana,* **88**, 1973, 159-186
Straker, E *Wealden iron.* 1931, David & Charles Reprints 1969
Titford, C F The Great Park of Nonsuch. *Surrey Archaeological Collections,* **64**, 1967, 71-90
Tomlinson, H C *Guns and government.* Royal Historical Society, 1979
Victoria History of the County of Middlesex, **3**. OUP, 1962
Victoria History of the County of Surrey, **2**. Constable, 1905
Warner, D W The early history of gunpowder manufacture at Chilworth. *Surrey History,* **1** [3], 1975, 95-105; The great explosion and the later history of the Chilworth gunpowder mills. *Ibid.* **1** [4], 1976, 131-157
Webster, C, ed. *Health, medicine and mortality in the sixteenth century.* Cambridge University Press, 1979
West, J *The supply of gunpowder to the Ordnance Office in the mid-eighteenth century, with specific reference to supply, distribution and legislation during the Seven Years War.* (Unpublished PhD Thesis, London University, 1986)
Wilkinson, J *Worsborough: its historical associations & rural attractions.* 1872
Wilkinson, N B An American powder maker in Great Britain: Lammot du Pont's Journal, 1858. *Transactions of the Newcomen Society,* **47**, 1975, 85-96
Williamson, F George Sorocold of Derby, a pioneer of water supply. *Journal Derbyshire Archaeological & Historical Society,* **57**, 1936, 43-93
Wilson, P N The gunpowder mills of Westmorland and Furness. *Transactions of the Newcomen Society,* **36**, 1964, *47-65*
Wilson, [P N] *A short history of the New Sedgwick gunpowder mills,* by Lord Wilson of High Wray. National Trust, [n.d.]
Wood, A *Life.* pre 1695, Oxford Historical Society reprint 1891-1900

THE WIND AND WATERMILL SECTION
of
THE SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS

Despite the increased awareness of our industrial heritage, Wind and Watermills are under a greater threat than ever before. Ours is the last generation that will have the opportunity of saving some of the best examples and the pressures are enormous. The Section is the national co-ordinating body for our mills and it strives to protect both the buildings and their contents in a number of ways.

It is the consultative body when a mill is under threat and it is the means of exerting pressure to safeguard others.

- provides information and advice, maintains lists of mills and a register of practising millwrights.
- carries a wide range of publications for sale about mills and milling.
- holds regular meetings and organises mill visits.
- is associated with a number of local Mill Groups which make its work more effective and widen its appeal.

Don't wait to regret the passing of *your* local mill - join us now.

Please write for further information to The Secretary, The Wind and Watermill Section, S.P.A.B., 37 Spital Square, London E1 6DY.

THE GUNPOWDER MILLS STUDY GROUP

The Group was formed in 1985 to bring together individuals who are studying the history and archaeology of the gunpowder and explosives industries. It works closely with the Wind and Watermill Section of S.P.A.B. and those interested in taking part in its activities are invited to contact the Secretary care of the above address.