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MALCOLM IAN NIXON, B.Sc.

THE EMERGENCE OF THE FACTORY SYSTEM
IN THE STAFFORDSHIRE POTTERY INDUSTRY

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THESIS

THESIS SUBMITTED TO THE SENATE OF THE UNIVERSITY OF
ASTON-IN-BIRMINGHAM, TO BE CONSIDERED FOR THE AWARD
OF THE DEGREE OF DOCTOR OF PHILOSOPHY, JUNE 1976

SUMMARY:

The thesis concerns the transfer of the Staffordshire pottery industry from a domestic craft serving local markets to a factory-based industry serving international markets. The Staffordshire case is set in the wider context of the transfer to the factory system in other provincial centres.

The organisation of the pottery industry is traced from the late seventeenth century, when potters adopted craft specialisation and the division of labour to satisfy market expansion. The dependence on hand craft processes enabled the potter to establish manufacturing units within domestic-scale premises in the eighteenth century and this is considered together with the simultaneous development of the purpose-built pottery factory.

The pottery industry relied on a limited range of raw materials and their rising cost in the manufacturing process prompted some entrepreneurs to make attempts at horizontal integration.

The expansion of the pottery industry during the eighteenth and nineteenth centuries was achieved with a relatively low fixed capital investment, and the opportunities for credit enabled potters to commence in business with only a limited supply of working cash - which accounted for the frequent instability of many of the enterprises.

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ABBREVIATIONS :

The following abbreviations have been used throughout the thesis.

Boulton and Watt Mss.	:	The business papers of Boulton and Watt deposited in the Reference Library, City of Birmingham Libraries.
Chamberlain Mss.	:	The business papers for the Chamberlain Pottery, Diglis, Worcester, deposited in the Dyson Perrins Museum, Worcester.
HL	:	Horace Barks Reference Library, Hanley, Stoke-on-Trent.
HRO	:	Herefordshire County Record Office.
LJRO	:	Lichfield Joint Record Office.
LPRO	:	Liverpool Public Record Office.
PRO	:	Public Record Office.
Spode Mss.	:	The business papers for the Spode and Copeland Pottery, Stoke-on-Trent, deposited at the factory and University of Keele.
SRO	:	Staffordshire County Record Office.
Wedgwood Mss.	:	The business papers for the Etruria Pottery deposited at Barlaston and University of Keele.
WRO	:	Worcestershire County Record Office.

INTRODUCTION :

Pottery manufacture developed in Staffordshire in a group of towns which by the late eighteenth century were collectively referred to as The Potteries - an indication of the area's pre-eminence in the pottery industry. This was achieved without concentration of labour and machinery in large, purpose-built factories. Instead of these characteristics there emerged other, equally distinctive features, notably a proliferation of small-scale workshops and a reliance on hand crafts and skills.

Not surprisingly this attracted antiquarian interest during the early nineteenth century (1) and a number of eulogistic studies of both entrepreneur and factory appeared. Writers romanticised social and industrial conditions, (2) a tendency maintained in later monographs published on individual potteries. (3)

In the twentieth century critical appraisals of working and industrial conditions emerged. A recent examination of probate inventories for Burslem potters between 1660 and 1760 has revealed the extent to which elements of factory organisation were emerging by the mid-eighteenth century. (4) The subsequent development of the

1. : S. Shaw, History of the Staffordshire Potteries. 1829
J. Ward, History of the Borough of Stoke-on-Trent. 1843
2. : J. Kohl, Travels in England and Wales. 1845. pp.37-8
3. : G. and F. Rhead, Staffordshire Pots and Potters. 1906
4. : L. Weatherill, The Pottery Trade and North Staffordshire. 1660-1760.

industry has largely been interpreted through detailed examination of the management of such firms as Spode and Wedgwood (1) and a profuse literature dealing with their finished wares. (2) This bias is not surprising, for there are few collections of business papers and the surviving records are mainly letters, recipe and pattern books and only occasionally include financial papers. (3)

In addition to these records there are extensive collections of property deeds, both amongst family papers as in the case of the Adams brothers, and in the possession of individual firms, as for example with the Gladstone Pottery. (4) The latter collection is particularly valuable in making possible the first detailed examination of typical pottery factory development.

1. : V. Bladen, The Potteries in the Industrial Revolution. Economic History. (Supplement to the Economic Journal) 1. 1926. J. Thomas, The Rise of the Staffordshire Potteries. N. McKendrick, Josiah Wedgwood and Factory Discipline. The Historical Journal. 4.1.1961.; Josiah Wedgwood: An Eighteenth Century Entrepreneur in Salesmanship and Marketing Techniques. Economic History Review. Second Series. 12.3. April, 1960.; Josiah Wedgwood and Cost Accounting in the Industrial Revolution. Economic History Review. Second Series. 23.1.1970.; Josiah Wedgwood: An Eighteenth Century Salesman. Proceedings of the Wedgwood Society. 4.1961.; Josiah Wedgwood and Thomas Bentley: An Inventor-Entrepreneur Partnership in the Industrial Revolution. Royal Historical Society. Fifth Series. 14. 1964.

L. Whiter, Spode

2. : See : Bibliography.
3. : Amongst these papers are the Chamberlain papers at Worcester, catalogued by M. Nixon in 1972. The Spode archives (Spode factory and University of Keele) were catalogued by M. Nixon in 1972. For a list of known manuscript sources see: M. Nixon, Sources Towards a History of the North Staffordshire Pottery Industry in the Eighteenth and Nineteenth Centuries. Business Archives. 38. June, 1973., Bibliography.
4. : The Gladstone Pottery archives (Gladstone Pottery) were indexed and transcribed by M. Nixon between 1970-2.

Further evidence for the period 1750 to 1850 is provided by newspaper reports and notices, particularly those in the Staffordshire Advertiser, and by the detailed records of such prominent landowners as the Marquis of Stafford, who rented farms and sold raw materials to potters. Eighteenth century probate inventories provide much valuable information regarding the evolution of individual utensils and pottery buildings, although after c.1770 their scope diminishes drastically. Legal papers have not survived in large numbers for Staffordshire estates and companies and prove a disappointing source.

From such material it is possible to attempt a balanced and detailed examination of the industry as a whole, rather than of a few selected manufacturers.

The investigation of these sources was only possible through the generosity and assistance of many people and the author has been particularly fortunate in receiving help and guidance during his thesis and wishes to express his thanks and indebtedness to those concerned, not the least to those whom it is not possible to refer by name but who have nevertheless given most helpful advice. Particular mention must be made to Mr. J. Thompson and Mr. R. Sherlock, whose initial enthusiasm and direction initiated the thesis. My thanks are due to Mr. N. Emery and his staff at the Horace Barks Reference Library, Hanley, and Mr. D. Exley, the Diocesan Registrar for Lichfield and Coventry for permission to use records in their custody. I am grateful to Mr. R. Copeland and Mr. H. Sandon for making available material contained in the Spode and Chamberlain archives respectively and to the Trustees of the Gladstone Pottery Museum for the loan of the Gladstone deeds. The Earl Fitzwilliam and his trustees are thanked for permission to refer to material contained in the Wentworth Woodhouse Muniments and the directors of Josiah Wedgwood and Sons Limited are thanked for allowing access to and copies of the Wedgwood papers. My thanks are due to Mr. Whitfield of the Boulevard, Sutton Coldfield, for generously allowing

access to his private papers, including the Grainger pottery site deeds. Not the least I would like to express my gratitude to Dr. Jennifer Tann who supervised my work at Aston University with patient and critical attention.

GLOSSARY :

Some technical terms may require additional explanation:

Bag wall	: An internal kiln wall, located so as to prevent the concentrated heat from the firemouths striking the wares directly.
Beating	: Wedging clay to remove impurities.
Biscuit	: Unglazed, fired ware.
Blunger	: A mill used to break down clay and water to form a smooth slip.
Body	: The potter's name for the clay from which pots are made.
Bottle oven	: A coal fired, intermittent oven.
Bung	: A single stack of saggars, set within the kiln.
Dipping	: The application of slip or glaze to a pot, by immersing the ware in a solution of the material.
Drawing	: The process of emptying a fired kiln.
Green	: Unfired Wares.
Hovel	: The outer shell to an intermittent oven, either built to form part of the kiln or outside it in the form of a shed.
Jigger	: The forming of flat wares by pressing clay over the outside of a revolving plaster mould, the underside of the ware formed by the use of a template pressed onto the mould.
Jolley	: Similar process to jiggering but for hollow wares - the shaping profile is lowered into the revolving mould which contains the clay.
Pug mill	: A mill used to compress and mix clays into a uniform consistency.
Saggar	: A fireclay vessel used to contain and protect wares during firing.

- Slip : Clay dissolved in water to form a thick liquid with the consistency of cream.
- Spurs : Clay supports used to separate glazed wares during firing.
- Sun kiln : A large, open-air tank used to naturally dry slip.
- Throwing : The process of forming pots on a wheel.
- Turning : The process of trimming the base or sides of a pot, usually in the green state, whilst revolving on a lathe, in order to achieve a particular section or finish.

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CHAPTER ONE:

THE TRANSFER TO THE FACTORY SYSTEM IN THE POTTERY INDUSTRY.

Successive generations of educated travellers, with wide ranging cultural and professional interests, visited and commented upon the embryonic industrial centres of eighteenth century Britain. (1) Their journals suggest a varied understanding of these experiences (2) but share a common admiration and wonder at the transformation of a domestic system of manufacture into one based on large concentrations of labour and machinery - the factory system:

"The buildings here are indeed like the ships themselves, surprisingly large, and in their several kinds beautiful: The ware-houses, or rather streets of ware-houses, and store-houses for laying up the naval treasure are the largest in dimension, and the most in number, that are any where to be seen in the world: all like the whole, monstrously great and extensive, and are not easily describ'd."(3)

Potteries were in general unequal to the spectacle of these concerns, but attracted by the finished product and the "...great rounded furnaces of which dozens are grouped together, like a vast chain of gigantic bomb mortars.",(4) the late seventeenth and eighteenth century travellers included potteries in their itinerary of industrial processes. Some were casual visits, as when Mr. and Miss Pate requested of Josiah Wedgwood: "we will esteem it a favour to have the permission of seeing his modelling room.. "(5), others were

1. : A.Young, Six months Tour Through the North of England. 1769. A. Aiken, Journal of a Tour Through North Wales. 1797. E.T. Svendenstierna, Svendenstierna's Tour of Great Britain 1802-3. The Travel Diary of an Industrial Spy.
2. : A.R. Williams, The Traveller in Gloucestershire. The Local Historian. 10.1.1972. pp.27-32.
3. : D. Defoe, A Tour Through England and Wales. 1724-7. (Everyman ed.) 1. pp. 106-8. - describing the royal arsenal, Chatham.
4. : J.G. Kohl, Travels in England and Wales. 1845. pp.37-8.
5. : Wedgwood Mss.: 11.10096. Letter Pate to Wedgwood, August 7th, 1784. Celia Fiennes visited the Elers' stone-ware pottery at Bradwell Wood as part of her 1698 tour. C. Morris, ed., The Journeys of Celia Fiennes. 1949. p.177.

organised, guided parties as at Warmstry House, Worcester, where visitors were expected to "...pay for seeing the manufacture by putting what they please in a box at the gate." (1)

Those aspects of the pottery industry which attracted attention were the physical manifestations of an economic development which had gathered momentum throughout the eighteenth century, particularly in North Staffordshire. Josiah Wedgwood towards the end of his manufacturing career summarised this development :

"I would request you to ask your parents for a description of the country we inhabit when they first knew it; and they will tell you that the inhabitants bore all the marks of poverty to a much greater degree than they do now. Their houses were miserable huts, the lands poorly cultivated and yielded little of value for the food of man or beast, and these disadvantages, with roads almost impassable, might be said to have cut off our part of the country from the rest of the world, besides rendering it not very comfortable to ourselves. Compare this picture, which I know to be a true one, with the present state of the same country, the workmen earning near double their former wages, their houses mostly new and comfortable, and the lands, roads, and every other circumstance bearing evident marks of the most pleasing and rapid improvements...Industry has been the parent of this happy change."(2)

1. : E.J. Chimenson, ed., Passages from the diaries of Mrs. Philip Lybbe Powys of Hardwick House, Oxon. AD. 1756-1808. 1899. pp.125-6.
2. : J. Wedgwood, An Address to the Young Inhabitants of the Pottery. March 27th, 1783. pp.21-1.

Subsequently Wedgwood summarised the commercial changes synonymous with this social improvement:

"..the annual value of the goods made here at that time, which was something under £10,000; but this certainly arises chiefly from the very low state and great simplicity of the manufacture, and the few hands then employed at each work. But if I am asked what is the annual value of the goods now got up, in order to form a comparison between that time and this, I can only say that I have heard them estimated at £200,000 - some have said £300,000; perhaps the truth may be somewhere near the medium, which compared with the above annual amount about 80 years ago makes the increase in that period 25 fold."(1)

This interpretation of the consequences of industrialisation in the Staffordshire Potteries was substantially correct. The fifty-one small manufacturers recorded for c.1715 had increased by 1787 to at least eighty 'principal manufacturers (2) and this expansion assisted investment in new civic buildings and housing. Lane End, for example, changed "..under the almost magical influence of a prosperous manufacture.." from a town notable for "..the great irregularity in the position of its buildings; of every size and sort, from the respectable residence of the manufacturer, to the mud and sagger-hovel of the pauper." to a "..respectable station in the scale of the Staffordshire Towns."(3)

1. : Wedgwood Mss.: E18988-26. Letter Wedgwood to Lord Auckland, January 28th, 1792.
2. : E. Meteyard, The Life of Josiah Wedgwood. 1. pp.191-2. W. Tunnicliffe. Survey of the Counties of Stafford, Chester and Lancaster, compiled and published at Namptwich in 1787 by Wm. Tunnicliffe, land surveyor, of Yarlet, near Stone; and a Directory of the principal merchants and manufacturers. 1787.
See: The Location of the Pottery.
3. : S. Shaw, History of the Staffordshire Potteries. 1829. pp.72-3.

With the expansion of the pottery industry - the main source of employment in North Staffordshire throughout the period 1750 to 1850 (1) - came a marked growth in the population of the individual pottery towns, exacerbating the already serious overcrowding problem. Between 1738 and 1841 the estimated number of established potteries increased from 51 to 127 (2) and the total population of The Potteries rose from 4,000 to 71,123. (3)

1. : For example, the number of potteries in Burslem declined from 42 in c.1715 to 24 in 1842, but percentage population employed in the industry was still 40.6% in 1851.
Wedgwood Mss.: E18988-26. Letter Wedgwood to Lord Auckland, January 28th, 1792.
Appendix to the Second Report of the Commissioners. Trades and Manufactories. Part 1. Report and Evidence from Sub-Commissioners. 1842. Session 1843. no. 431. Parliamentary Papers vol. 14.
D. Stuart, ed., Central Burslem in the 1851 Population Census. University of Keele. Department of Adult Education. 1971. p.26
2. : Wedgwood Mss.: E18988-26. op.cit.
Appendix to the second report of the Commissioners. op. cit.
3. : J. Ward. History of the Borough of Stoke-on-Trent. 1843. pp.43, 590

GRAPH OF THE ESTIMATED NUMBERS OF POTTERIES IN EACH
POTTERY TOWN, NORTH STAFFORDSHIRE, C.1715 - 1842. (1)



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1. : Wedgwood Mss.: E18988-26. op.cit.
Baily's Western Directory. 1784.
Survey of the Counties of Stafford, Chester and
Lancaster, compiled and published at Namptwich in
1787 by Wm. Tunnickliffe, land surveyor, of Yarlet
near Stone; and a Directory of the principal merchants
and manufacturers.
The Staffordshire Pottery Directory, 1796
Allbut, Staffordshire Pottery Directory, 1802.
Holden's Triennial Directory, 1805
W. Parson and T. Bradshaw, Directory. 1818
Appendix to the second report of the Commissioners.
op.cit.

GRAPH OF THE POPULATION FOR THE POTTERY TOWNS, 1738-1841: (1)



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1. : J. Ward, History of the Borough of Stoke-on-Trent.
1843. pp.43, 590.

Wedgwood was less secure in the his assessment of the domestic origins of the industry - the exaggerated emphasis of the achievements of the factory system naturally played down the extent and nature of the earlier trade. In part this reflected his reliance on oral tradition: "...the memories of some of the oldest men in the pottery here near thirty years ago, who knew personally the masters in the pottery, and very nearly the value of the goods they got up fifty years before that;..."(1), in part his desire to accentuate the part he had played in the commercial expansion of the district. Furthermore, the address to his workpeople was published only three weeks after the Etruria corn riot, a disturbance connived at by many of his employees. The attempt to dissuade further agitation therefore naturally stressed the advantages secured through the adoption of industrialisation. (2)

By inference, Wedgwood assumed that the development of the North Staffordshire pottery industry and the prominence of Burslem as a production centre was based on the need to diversify in an area incapable of agricultural self-sufficiency. Others, more recently, have assumed the same (3), but this is an oversimplification, both in respect to Burslem as an isolated potting community and to the significance and role of farming in the development of the pottery trade.

1. : Wedgwood Mss.: E18988-26. Letter Wedgwood to Lord Auckland, January, 28th. 1792.
2. : Wedgwood Mss.: Leith Hill Place. Letter Tom Wedgwood to Josiah Wedgwood, March 11th., 1783.
A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. pp.267-8.
J. Thomas, The Rise of the Staffordshire Potteries. pp.181-3.
3. : A.B. Hollowood, The Localisation of the pottery industry. Transactions of the North Staffordshire Field Club. 1939-40- 74. pp.22-8.
H.A. Moisley, The Potteries Coalfield, A Regional Analysis. 1950. unpublished M.Sc. thesis, Nottingham.

The pattern of localised potting communities serving limited markets was well established during the late medieval period and although many potential sites remain unexcavated, there is sufficient archaeological evidence to suggest that potters served an area of about fifteen to twenty mile radius. (1) The Burslem potters made, amongst other items, butter pots, which were sold within such a catchment area and served the local markets at Aston, Cheadle, Norton, Horton and Uttoxeter. (2) By the mid-seventeenth century technical improvements enabled them to produce high quality slipwares "...for sale, which is chiefly to the poor crate-men who carry them on their backs all over the countrey." (3) It was from this period that the Burslem potters successfully exploited their natural resources of raw materials (4) and through an extension of their marketing activities, forced the closure or decline of other centres.

The contraction of the national pottery industry was a slow process and whilst such flourishing medieval centres as Chilvers Coton, Warwickshire - which had, at its height of production, worked at least twenty-seven ovens - had closed by the early sixteenth century (5), other centres continued in a reduced capacity for many years. The London potteries, which served an expansive market for high quality wares, declined during the early eighteenth century after a brief but marked expansion of production during the late seventeenth century, stimulated by the introduction of stonewares. (6) The contraction of the industry, whilst more pronounced in those parishes which had benefited

1. : P. Brears, The English Country Pottery, Its History and Techniques. p.15. Excavations at Potovens, Wakefield, 1968. Post Medieval Archaeology. 5. 1971 pp.1-34. These works served Wakefield, Pontefract, Leeds and Dewesbury and Lee Gap fair.
2. : L. Weatherill, The Pottery Trade and North Staffordshire. 1660-1760. p.77.
3. : R. Plot, The Natural History of Staffordshire. 1686. p.124.
4. : See Chapters 2 and 4.
5. : P. Brears, op.cit. p.219. Excavated by P. Mayes and R. Thomson in 1967.
6. : R. Edwards, London Potters circa 1570-1710. Journal of Ceramic History. 6. 1974. pp. 127-31.

from the profitable stoneware trade - Southwark St. Olave and St. Saviour - was equally discernable in the more recently established tin-glaze potteries at Wapping :

TABLE 1 : NUMBERS OF POTTERS WORKING IN LONDON PARISHES,
1600 - c.1725 : (1)



A few centres survived and flourished into the nineteenth century, as for example Liverpool, and in the main this was through the exploitation of specialised markets. In Derbyshire, the Ticknall potters concentrated on the production of domestic earthenwares and despite the enclosure of many of their traditional sources of clay a few potters maintained the production of red ware until the late 1880's when the last of them - Thomas Charville - retired. (2) In neighbouring Church Gresley, the potting community survives to the present day, with T.G. Green and Company concentrating on the production of 'traditional' kitchen wares. (3)

The Burslem potters were able to exploit surface outcrops of coal and clay and ensure adequate supplies of essential, high quality raw materials. The failure of such supplies, either through the closure of pits, as

1. : R. Edwards, op.cit.
2. : P. Brears, op.cit. pp.47, 175.
3. : R.W. Gay and R.L. Smith, The British Pottery Industry pp.105-6.

at Ticknall, (1) or through impurities in the materials, as in Northamptonshire, frequently resulted in the cessation of potting :

"The depth of the bed is uncertain; tis scarce above the two feet at most. It is a yellowish clay, dense and firm, and free from mixture. Yet not withstanding its density, the ware made of it is of a brittler and less enduring nature than that of Ticknall in Derbyshire; tho' equal care and skil have been used in the managing it; an effect, which we may therefore reasonably suspect, proceeds from some salt embody'd in the clay.."(2)

Unlike glass manufacture where, due to the fragility of the finished product, (3) the industry was established near the largest markets rather than the raw materials, the importation of coal and clay by potters was rarely economical. An exception was Whitehaven where the strong coastal and colonial trade in earthenware supported the importation of raw materials after their local failure. (4)

The North Staffordshire potters initially worked the outcropping coalfield near Burslem for coal and clay, expanding their mining activity during the late seventeenth century to include other shallow seams near Hanley and Stoke.(5)

1. : P. Brears, op.cit. p.175. The enclosure of clay pits occurred in c.1800.
2. J. Morton, The Natural History of Northamptonshire. 1712
3. : T.C. Barker, Pilkington Brothers and the Glass Industry. pp.38-9. The Lancashire glass industry commenced in Stockport in c.1615 supplying the large domestic glass market, rather than in St. Helens, where there were excellent supplies of raw materials.
4. : L. Weatherill and R. Edwards, Pottery Making in London and Whitehaven in the Late Seventeenth Century. Post Medieval Archaeology. 5. 1971. pp.160-171.
5. : E. Meteyard. The Life of Josiah Wedgwood. 1. pp.191-2.

Further to the west, potters at Red Street, Newcastle-under-Lyme had exploited similar shallow coal measures since at least 1577 (1) and by the early eighteenth century china was produced in Newcastle itself, based on the skills and experience of the much older clay pipe trade. (2) Both centres experienced competition from the nearby Burslem potters, but whilst the Newcastle potters declined during the mid-eighteenth century - Samuel Bell died in 1754 and Joseph Wilson survived him at the Pomona Pottery for only a few years, Bulkley and Bent were the last important manufacturers by 1797 - the Red Street works continued to thrive. Reduced to two potteries by 1802, the local coal measures continued to support earthenware manufacture until c.1845 when the last potters, the Moss family, abandoned it in favour of brick and tile production. (3)

1. : S. Shaw, History of the Staffordshire Potteries. 1829. p. 177.
2. : Charles Riggs worked a pipeworks in c.1686. R. Plot op.cit. p.121. In a letter dated July 14th, 1750, Dr. Pocock noted: "...there are some few potters here (Newcastle), and one I visited whom I saw at Limehouse who seemed to promise to make the next China ware..." B.M. Add. Mss.: 158000.P37429.
3. : P. Bemrose. The Pomona Potworks, Newcastle, Staffs. Transactions English Ceramic Circle. 9.1.1973. pp.9 and 18.
J. Allbut, The Staffordshire Pottery Directory. 1802. The firms were Moss and Henshall and Riles and Bathwell. The latter works was sold as a going concern in 1815. Staffordshire Advertiser. 21. February 18th, 1815.
W. Mankowitz and R. Hagger, The Concise Encyclopaedia of English Pottery and Porcelain. pp.163 and 188.

The availability of easily worked raw materials assisted the Burslem potters in their spectacular early eighteenth century development, but of equal significance was their ability to recruit capital from secondary occupations. The Bristol clay-pipe manufacturers, similarly, had dual-occupations in the early seventeenth century; Smauel Morris between 1628-9 worked as both saddler and pipemaker and Thomas Monkes between 1669-70 made pewter in addition to pipes. (1) In the absence of nearby large centres of population the Burslem potters turned to farming to provide additional income.

The North Staffordshire uplands were ideally suited for the practice of a dual-economy, possessing many of the essential attributes identified by Drs. Hey and Rowlands in their studies of Sheffield and the West Midlands. (2) The population of the pottery towns rose between 1738 and 1762 from an estimated 4,000 to 7,500 and was served by a basically pastoral agriculture, (3) increasingly based on the post-enclosure ley system of oat crops supporting livestock. (4).

1. : I.C. Walker, The Bristol Clay Tobacco-Pipe Industry pp.4 - 5.
2. : D. Hey, The Rural Metalworkers of the Sheffield Region, a Study of Rural Industry before the Industrial Revolution. Department of English Local History Occasional Papers. Second Series. 5. Leicester University. 1972.
M. Rowlands, Masters and Men in the West Midland metalware trades before the industrial revolution. pp.3 - 7.
3. : J. Ward, History of the Borough of Stoke upon Trent 1843. p. 43.
4. : The Victoria History of the County of Stafford. 8. p. 130
L. Weatherill, op.cit. p. 131.

In themselves these were negative determinants on the level of industrial development and of greater consequence was the potential for capital deversification within the community. A very poor farming community could not afford to divert capital into other interests, and if too promising, surplus profits would be invested in land improvement rather than new business ventures. The probate valuations prepared before c.1740 for Burlsem potters demonstrate this precise relationship and significantly, suggest that capital was freely available for both farming and potting interests. (1)

Between 1661 and 1740, twenty-nine potters' estates were valued for probate (2) and from this limited group it is possible to identify two levels of involvement in farming. (3) Six potters had agricultural interests comparable with those of non-manufacturing farmers in the area and were all active in the seventeenth century; seventeen potters managed small farms and businesses throughout the period and the remaining six had no direct involvement in farming, were large manufacturers and active in the eighteenth century.

Those potters who farmed benefited from controlling the supply of frequently used raw materials, particularly clay and straw. (4) Of greater consequence was the value

1. : Ibid. p. 130.
2. : The Diocese of Lichfield and Coventry. Calender of Wills Proved in the Bishop's Concistory Court. Lichfield Joint Record Office. (hereafter LJRO.) B/C/11.
3. : The analysis is based on L. Weatherill, op.cit. pp.70-3.
4. : A typical, early eighteenth century pottery required two cart loads of clay and seventy-two sheaves of straw per week. E. Meteyard, The Life of Josiah Wedgwood. 1. p.190.
The right to extract coal from North Staffordshire land was frequently sold separately to the freehold of the plot. Gladstone Pottery Mss.: GDL. Conveyance, 28th, June, 1783.

of the farm in the recruitment of capital, either as collateral for loans and mortgages or through the re-investment of surplus profits. In the absence of any known surviving farm records it is impossible to quantify the proportion of farm profits ploughed into the potting business, but from the valuations for agricultural interests it is reasonable to suppose that they were capable of providing a not insignificant assistance. The farms were, with the exception of Richard Daniel's dairy, (1) of the moorland type and although the poorest form of North Staffordshire farming, the estates were of a higher value than those of single-occupation potters. The six potters with large scale farming interests had estates valued at between £54 and £421, whereas the early eighteenth century potters had estates of between £15 and £107. (2)

With the marked absence of inventories from the mid-eighteenth century onwards, the probate evidence for the involvement of potters in farming declines sharply by c.1740. Whilst it is certain that by this period Burslem potters were less dependent on dual occupation with farming, their pre-occupation with manufacturing was not exclusive of either land ownership or tenure. Until the mid-nineteenth century agricultural holdings offered both capital diversification and social prestige, (3) and John Riley was typical in this respect, directing in his will of 1829 that his trustees should continue a large farm in addition to the successful Hill Works, Burslem. (4)

1. : LJRO.: B/C/11. Richard Daniel of Burslem, will proved April 21st. 1687.
2. : L. Weatherill, op.cit. pp.70-1.
3. : See Chapter 8.
4. : LJRO.:B/C/11. John Riley of Burslem, will proved April 30th, 1829. Similar investment in land occurred elsewhere in The Potteries, Elkin Knight and Bridgwood included in their Foley partnership estate, farmland rented from the Marquis of Stafford for £45 per year. SRO.: D593/G/2/5/4. 1833. 1833-48 Rentals.

Of greater significance in the expansion of the Burslem pottery industry was the development of new marketing techniques, allowing the wider sale of traditional wares and stimulating technical innovation. Encouraged by the greater market potential for certain traditional wares, notably the elaborately decorated slipwares (1) potters examined alternative methods of selling their products. The availability of capital from farming interests enabled the wider acceptance of credit transactions - a necessary condition of sales taking many months and over a wide area.

The Staffordshire-ware cratesmen were well established by 1686 (2) and represented the first major departure from the practice of each potter selling his own wares at the market:

"My father became by turns, a collector and vender of rags, a hard-ware man, a dealer in buckles, buttons and pewter spoons; in short a trafficker in whatever could bring gain. But there was one thing which fixed his attention longer than any other, and which therefore, I suppose he found the most lucrative; which was, to fetch pottery from the neighbourhood of Stone, in Staffordshire, and to hawk it through the North of England." (3)

1. : The richly decorated slipwares were extensively sold throughout the country, either as special orders - as undertaken by the Tofts, or for the discerning, public market.
W. Mankowitz and R. Haggard, The Concise Encyclopaedia of English Pottery and Porcelain. pp.222-3.
The St. Nicholas Almshouses excavation, Bristol, completed in 1969, uncovered a large, dated, cache of Staffordshire slipwares. P. Brears, op.cit. p.45.
2. : R. Plot, The Natural History of Staffordshire. 1686. p.124
3. : E. Colby, ed., The Life of Thomas Holcroft. 1925.
1. pp.29-30.

Benefitting, supposedly, from a lower cost of living than that in neighbouring areas and from their practice of begging food wherever they travelled, these itinerant cratesmen made serious inroads into the markets of other provincial potteries:

"Were our materials never so good, (it) is never likely to flourish very much with us because the way of living here is more expensive than in Derbyshire and Staffordshire, and the potters of those two counties who bring hither their wares upon little horses or asses, usually begging their victuals, do on that account afford their wares at such under-rates as our potters here cannot live so well upon the trade."(1)

Although potters had little or no control over where their wares were sold, the sale of pottery by itinerant hawkers continued into the late nineteenth century and crockery and glass hawkers were included by Mayhew in his 1851-62 study of London's working classes. (2)

As individual manufacturers became identified with particular wares, they received orders direct from customers and taking advantage of improved river transport - the River Weaver was canalised in 1732 - an increasing number of Staffordshire potters undertook commissions from clients. Some of the orders were channelled through Bristol and Liverpool merchants (3), others came direct, as with the order for six small fruit plates costing 4.6d., dispatched by the Wedgwoods of the Big House Pottery, Burslem, to William Berrow of Bristol, on February 16th, 1756. (4)

1. : J. Morton, Natural History of Northamptonshire. 1712
The works referred to were at Pottesbury.
2. : H. Mayhew, ed. P. Quennell, Mayhew's London. p. 156.
3. : L. Weatherill, op.cit. p. 80
4. : Thomas and John Wedgwood's Sales-Account Book.
c.1755-73. Quoted by A. Mountford, The Illustrated
Guide to Staffordshire Salt-Glazed Stoneware.
Appendix 1.

From the mid-eighteenth century onwards potters recruited such orders through travellers, either employed by the potter himself (1) or acting independently: "Person residing in London & undertaking 2 journeys a year - each 1,200 miles, wants to do business for manufacturer of earthenware.."(2)

Many of the early customers were large Norwich or London dealers, who purchased several crates of ware a year from such potters as the Wedgwoods and Baddeley. (3) William Hewson, of the Strand, London, took up to eleven crates of ware a year from the Big House Pottery and in return sold individual Bow pieces to the Wedgwoods in order that they might copy them in salt-glazed ware. (4) It was inevitable that potters should wish to control more closely their sales and maximise their profits and after the precedent set in 1750 by the Chelsea porcelain works (5) other manufacturers followed their example and established retail showrooms. The Bow porcelain works established a showroom in the West End "...for the convenience of the nobility and gentry."(6) and in 1758 the Longton Hall partnership opened a warehouse on the corner of St. Paul's Churchyard. (7) Not all of these early ventures survived

1. : Samples of printed and enamelled wares have survived for the Spode pottery, n.d. but considered to be c.1810. L. Whiter, Spode. Illustration 119.
2. : Staffordshire Advertiser. 17. November 16th., 1811
A similar pattern of diversified trading activity has been identified for the West Midlands metal-workers. M. Rowlands, Masters and Men in the West Midland metalware trades before the industrial revolution. pp.94-9.
3. : L. Weatherill, op.cit. p.83.
S. Smith, Norwich China Dealers of the Mid-Eighteenth Century. Transactions of the English Ceramic Circle. 9.2.1974.
4. : A. Mountford, op.cit. Appendix 1., p. 55.
5. : Closed in 1754. The Victoria County History of Middlesex. 2. p.152.
6. : Ibid. p. 148.
7. : B. Watney, Longton Hall Porcelain. p. 67.

long, either because the parent factory failed - as with the Longton Hall Pottery (1) - or because of the vagaries of the market. (2) But the benefits of these sales outlets had been demonstrated and towards the end of the eighteenth century such potters as Josiah Spode opened premises in London - and these venture survived into the following century. (3)

Inevitably, the exploitation of new markets, made possible by the commercial revolution outlined above, brought the Staffordshire potters into contact with other potting communities and different manufacturing techniques. The Staffordshire potters readily infringed John Dwight's 1671 Patent for stoneware by the 1690's and through Dwight's protracted litigation against such manufacturers as Aaron Wedgwood, Moses Middleton and Joshua Astbury (4) the process was well understood and effectively employed. Similarly, the Staffordshire potters were not responsible for the development of printing - this has been attributed to Sadler of Liverpool (5) - but they were certainly the most adept at using this process and achieved a supreme reputation for such decorated wares. (6)

1. : The Longton Hall partnership was dissolved in 1760.
L. Weatherill, op.cit. p. 85.
2. : Ibid.
3. : The Spode London showroom made a profit of £11,501
in 1831. L. Whiter, Spode. p. 75
4. : A. Mountford. op.cit. pp.5-6.
5. : A. Ray, Liverpool Printed Tiles. Transactions
English Ceramic Circle. 9.1.1973. p.37.
6. : Ibid. For example Mary Bagot recorded in her journal
in 1827: "...the invention which principally made
Mr. Spode's fortune was of the blue-white ware."
C. Bagot, Links with the Past. 1902. Diary entry:
August 27th., 1824. (sic) misprint for 1827.

The take-up of new raw materials and manufacturing techniques often necessitated investment in improved and enlarged pottery buildings. The adoption of ball clay and flint from c.1719 required more careful control over the preparation of raw materials and potters responded with the erection of purpose-built workshops - notably the slip-house. (1) Consequently the number of separate workshops in the typical pottery rose from an average of two to at least five by the 1730's and in the largest premises - for example John Baddeley's Shelton pottery in 1761 - fourteen workshops. (2) Many of these new raw materials established the need to modify drastically existing practices and these in turn effected the development of pottery buildings. The use of a liquid lead glaze for creamware after c.1740 forced the widespread take-up (3) of separate biscuit and gloss firings and most manufacturers increased the number of ovens rather than accept a lower production rate. (4) In all probability this accounted for the erection of an additional two ovens in c.1750 at Thomas and John Wedgwood's Big House Pottery, Burslem. (5).

1. : The first reference to a slip-house occurs in the following inventory: LJRO.: B/C/11. Isiah Marsh, Burslem, will proved May 25th, 1732.
2. : See Pottery Raw Materials.
LJRO.: B/C/11. Joseph Simpson, Burslem, will proved April 30th., 1686. The pottery had a workhouse and warehouse. SRO.: D1788.P14. (2) Valuation of Baddeley's assets, July 22nd. 1761.
3. : There is a strong possibility that double firings had been required before this - see The Adoption and Use of Coal in the North Staffordshire Pottery Industry.
4. : S. Shaw, History of the Staffordshire Potteries. 1829. p.176. L. Weatherill, op.cit. p.39.
5. : S. Shaw, op.cit. p.161.

The location of these additional workshops and kilns within the entrepreneur's own home and garden (1) gave the pottery factory its characteristic plan and form - the grouping of small domestic-scale buildings round open courtyards. With continued expansion this provision of manufacturing accommodation proved inadequate and potters turned to the erection of purpose-built factories. The Etruria Pottery, completed in 1769, although not the first of such new works, (2) provided a popular precedent for this expansion and over successive decades the public and entrepreneurs alike visited the factory and wrote to the Wedgwoods for advice on the establishment of new premises. (3) However, despite such acclaim and attention, the purpose-built pottery factory did not entirely replace its domestic counterpart, even for the large factories of the nineteenth century, (4) a phenomenon shared with the Birmingham toy and silver-ware industry.(5)

1. : For example, the Dr. Wall partnership of 1751 leased Warmstry House and converted many of the internal rooms for workshop accommodation, they also built ovens and workshops in the garden. H. Sandon. The Illustrated Guide to Worcester Porcelain. pp.2-3.
2. : Roger Wood of the Ash built the first known purpose-built pottery at Lane End, in 1756. The Victoria History of the County of Stafford. 8. p.241.
3. : Wedgwood Mss.: 8190-10. Letter P. Seckerson to Josiah Wedgwood, November 12th., 1810.
4. : Josiah Spode's Stoke Factory in 1833 covered fourteen acres yet had developed from the original domestic premises through a lengthy process of infill and extension. The Victoria History of the County of Stafford. 8. p. 203.
5. : Matthew Boulton's Soho Manufactory completed in 1766, remained a similar exception and today the Birmingham jewellery quarter is dominated by the domestic workshops and premises. E. Delieb and M. Roberts. The Great Silver Manufactory, Matthew Boulton & the Birmingham Silversmiths 1760-1790.

There were several reasons for this apparent reluctance on the part of pottery entrepreneurs to invest in purpose-built premises. In the first place the new factories were no larger than their domestic counterparts - the Wood pottery in Lane End was described as "...not large, but very convenient." (1) and Josiah Wedgwood considered his works, when built, to be "...little or no more than I occupy at present." (2) Both potteries were planned as a series of small workshops grouped round open courtyards and while little is known of the Wood premises - they were demolished in 1863 to make way for the new Longton Market - the Etruria Pottery was quickly swallowed up in a succession of later workshops and kilns, with the original premises added to and the courtyards infilled with kilns. (3) In effect, the new premises displayed the same functional obsolescence inherent in the domestic potteries.

1. : Wedgwood Mss.: E18181-25. Letter Wedgwood to Bentley, December 24th., 1767. At that time he was occupying the Bell works, Burslem, a traditional domestic pottery.
See the design and Planning of the Pottery.
2. : The Victoria History of the County of Stafford.
8. p.241.
3. : Plan of the Etruria Pottery, c.1850. The Victoria History of the County of Stafford. 2. p.14.

Of more critical importance to the entrepreneur, the purpose-built pottery factory achieved no greater overall manufacturing capacity than that achieved in the domestic premises. The capacity of a works, measured in the number of ovens fired per week, (1) had risen steadily throughout the early eighteenth century, from a single oven of ware, or 1,500 pieces, to an average of four ovens per week by the 1750's, or an equivalent capacity of 6,000 pieces. (2) Although larger concerns fired a greater number of ovens - in 1826 W. & J. Baker worked eighteen ovens and T. & J. Carey, also of Fenton, worked eight ovens (3) - the average pottery continued to work four ovens, even in the late nineteenth century. (4) By comparison the purpose-built potteries, particularly those built in the pottery building boom of the early 1800's, similarly averaged four ovens. (5) Furthermore, it was possible to increase the capacity of a pottery through the erection of slightly larger ovens and the shortening of the firing cycle and both practices were widely implemented in the purpose-built and the domestic-type factories. (6)

The take-up of new raw materials had a more marked and immediate effect on the deployment of labour, with

1. : See Chapter 5.
2. : Wedgwood Mss.: E18988-26. Letter, Wedgwood to Lord Auckland, January 28th, 1792.
A. Mountford, op.cit. p.37.
S. Shaw, History of the Staffordshire Potteries. 1829. p.161.
SR0.: D1788. V.94, John Baddeley Account Book, 1755-61.
3. : Wedgwood Mss.: E25219-33. Letter C.J. Mason to Wedgwood, June 9th, 1826.
4. : The Gladstone Pottery, Longton, worked four ovens from the 1840's until the closure of the works in the 1960's. Site notes, December 1975.
5. : For example, the Boundary Works, built in 1818 by Jacob Marsh had, in 1856, five ovens and the neighbouring works built by Robert Garner between 1790 and 1818 (now the Crown Clarence Pottery) had four ovens in 1856. SR0.: D593/B/1/11/15; Ibid. D593/B/1/11/16. Ibid. D593/H/8/92. 1856 1:500 Ordnance Survey.
6. : See Chapter 5.

craft specialisation often pre-dating the erection of purpose-built accommodation, particularly in the decorative processes. (1) The Elers working at Bradwell Wood between c.1693-8, demonstrated the advantages of throwing with a fine red clay and lathe-turning the finished piece; within a decade this practice was widespread. (2) The first probate reference to a lathe was that in Aaron Shaw's inventory of 1714 when it was valued at ten shillings (3), but turning houses only appear after 1732, the first recorded being in Isiah Marsh's inventory. (4) The skill and precision expected of a turner demanded a separate craft education to that of the thrower and by at least 1731 this requirement resulted in separate apprenticeships for the two crafts. Aaron Wood's indenture with Dr. Thomas Wedgwood in 1731 excluded throwing from: "...the art, trade, mystery, of ... turning in the lathe, handling, and trimming." (5)

In the absence of representative, surviving, business records for this transitional period, analysis of organisational change is largely dependent on nineteenth century antiquaries, and lacks statistical foundation. (6) However, from the more extensive surviving mid-eighteenth century pottery records it is apparent that by then entrepreneurs had recruited

1. : This was still true in the mid-nineteenth century when thirty-two separate trades were recorded in the 1851 Census returns for Longton, as opposed to twenty-one separate workshops noted on the 1856 1:500 Ordnance Survey for Longton.
1851 Census Returns. Parish of Stoke-on-Trent.
Rectory of Longton. SRO.: D593/H/8/92. 1:500 Ordnance Survey, Longton.
2. : S. Shaw, History of the Staffordshire Potteries. 1829. pp.118-9.
3. : LJRO.: B/C/11. Aaron Shaw, Burslem, will proved April, 23rd., 1714.
4. : Ibid. Isiah Marsh, Burslem, will proved May 25th, 1732.
5. : Indenture dated August 23rd, 1731, between Aaron Wood and Dr. Thomas Wedgwood of Burslem; Quoted by S. Shaw, History of the Staffordshire Potteries. 1829. p.151.
6. : The problems of using such sources have been well set out by: N. McKendrick, The Victorian View of Midland History: A Historiographical Study of the Potteries.

larger and more skilled workforces than had previously been necessary, in an attempt to meet these needs. Although in general the size of the average pottery labour force rose after this period, it is evident that even in the mid-nineteenth century there was a considerable diversification of workforce size with the small manufacturing unit by no means replaced by the large factory:

TABLE 2 : NUMBERS OF OPERATIVES EMPLOYED BY STAFFORDSHIRE POTTERS IN 1851 : (1)



Two distinct organisational groups are discernable from this analysis with approximately one third of all firms employing under twenty operatives and one quarter employing over fifty men. For the country as a whole there was a similar grouping, but there were proportionately more small firms, being two-thirds of the total:

TABLE 3 : NUMBERS OF OPERATIVES EMPLOYED BY BRITISH POTTERS IN 1815 (2)



1. : British Parlaimentary Papers. 88.1. (32.1.) November 4th, 1852 - August 20th, 1853. Population, Ages, Civil Condition, Staffordshire. pp.464, 467, 511.
2. : P. Mathias, The First Industrial Nation. p. 261.
The North Staffordshire equivalent figures are taken from Table 2.

The estimated average workforce for a Staffordshire pottery in 1851 was fifty-six, for a national concern, twenty-four, and this relationship is further highlighted when it is considered that at this time the Staffordshire industry consisted of 37% of the total number of firms, but employed 69% of the total labour force. (1)

Despite the greater emphasis during the eighteenth century on the skilled nature of much of the manufacturing cycle, most potteries continued to employ both highly trained and general labourers. Thomas Whieldon's workforce fluctuated according to the state of trade, but of those taken on, the majority were engaged to perform a specific and skilled task. Thomas Dutton, for example, was hired on the 14th of February, 1749, for 'vineing' and six days later William Cope was hired for 'handleing & vineing & cast ware'.(2) Of the seventeen men and sundry lads engaged by John Baddeley on the 11th of November, 1758, in order to establish his Shelton China Works, two - Simpson for throwing and Simpson for handling - were engaged well in advance of their being required, presumably to secure their valued services. (3) In the early years of Chamberlain's pottery at Worcester, he differentiated between the skilled craftsmen - the painters and potters - and the unskilled labourers - the daymen. (4)

1. : Ibid. British Parliamentary Papers. op.cit.
2. : Thomas Whieldon's Account Book, c.1749-60. City Museum and Art Gallery, Stoke-on-Trent.
3. : SRO.: D1788. V.94. John Baddeley's Account Book.
4. : Chamberlain Mss.: 1801-9 Wages Book.

Craft apprenticeships in themselves were inadequate in the provision of a sufficiently large, trained workforce and entrepreneurs advertised widely for suitable operatives. (1) Shaw identified this need with the introduction of "White Stone Ware" - salt-glaze - (2) but ignored the need of subsequent manufacturers who faced similar problems in recruiting decorators and finishers of the right calibre. Chamberlain sought skilled floral and heraldic painters in Staffordshire and Thomas Longmore of Whitechapel, London, similarly advertised for suitable engravers. (3)

It is surprising therefore, to find that with skilled labour at a premium, few potters turned to outworking to provide specialised services other than for raw material preparation and decoration. (4) This ability to concentrate the means of production within a single pottery site was maintained until the mid-nineteenth century, when major organisational changes occurred in the decorative and ancilliary crafts. Thomas Minton and Sons were self-sufficient until at least the 1830's, when for example, they even made their own kiln furniture - employing nine cockspur makers; it is doubtful whether they were still employed after 1840 when Charles Ford successfully established his kiln furniture factory in Hanley. (5)

1. : Housing was one form of inducement offered to recruit pottery workers from other centres. See Chapter 7.
2. : S. Shaw, History of the Staffordshire Potteries. 1829. p.166.
3. : Both Chamberlain and Longmore advertised in the Staffordshire Advertiser, Chamberlain in : Staffordshire Advertiser. 19. June 26th, 1813.; Longmore in : Ibid. 18. September 12th, 1812. Longmore used as an incentive: "This is a good opportunity for young men that wish to see London."
4. : See : Pottery Raw Materials.
5. : Thomas Minton and Sons 1831-42 Wages Book. W. Mankowitz and R. Haggard, The Concise Encyclopaedia of English Pottery and Porcelain. p.209.

The effectiveness of Ford's marketing may be gauged by the early take-up of his patented spurs in Worcester, where in particular Grainger used them in his Semi-Porcelain body trials. (1)

Although North Staffordshire Potters were reluctant to follow the example of Roger Wood and Josiah Wedgwood in the erection of purpose-built pottery factories, they were more disposed towards the implementation of the organisational structure of these works : "...a regular plan for the arrangement of the separate places for the distinct processes." (2) The ability to rationalise their production cycle and achieve a greater manufacturing efficiency (3) was not dependent upon the provision of large, purpose-built workshops (4) and it was this flexibility which made possible the widespread adoption of rational production planning and division of labour. To an extent, it was this adaptability which enabled such potters as Josiah Spode to continue with their old and ramshackle premises and achieve an international reputation for the manufacture of superb wares at competitive prices. (5).

This sub-division of labour within self-contained manufacturing premises was a characteristic of the factory

1. : Semi-Porcelain wasters found at Claines, Worcester, included examples of Ford's spurs - pre 1840 wasters were found in association with locally made kiln furniture. Excavation by M. and S. Nixon, September 1975.
2. : S. Shaw, History of the Staffordshire Potteries. 1829. p.75. The Victoria History of the County of Stafford. 8. p.241.
3. : Wedgwood Mss.: E.8549-25. Letter Wedgwood to Bentley. July 25th, 1774.
4. : S. Shaw, op.cit. p.75.
5. : The Victoria History of the County of Stafford. 8. p.203.

system, but was in itself only one aspect of factory development. Numerous late eighteenth century industries achieved a measure of labour specialisation without being classified as factory based. In particular, Birmingham toy manufacturers practised intensive job specialisation and were able to concentrate manufacturing in self-contained sites, but were considered to be workshop rather than factory based. (1) A similar distinction occurred until recently in the Redditch needle trade. A broader definition of a factory was provided by the nineteenth century academic and chemist, Andrew Ure, writing in 1835:

"The term Factory in technology, designates the combined operation of many orders of work-people, adult and young, in tending with assiduous skill a system of productive machines continuously impelled by a central power. This definition includes such organizations as cotton-mills, flax-mills, silk-mills, woollen-mills, and certain engineering works; but it excludes those in which the mechanisms do not form a connected series, nor are dependent on one prime mover . Of this latter class, examples occur in iron-works, dye-works, soap-works, brass-foundries, &c. Some authors, indeed, have comprehended under the title factory, all extensive establishments wherein a number of people co-operate towards a common purpose of art; and would therefore rank breweries, distilleries, as well as workshops of carpenters, turners, coopers, &c., under the factory system. But I conceive that this title, in its strictest sense, involves the idea of a vast automaton, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of a common object, all of them being subordinated to a self-regulated moving force." (2)

1. : E. Delieb and M. Roberts, The Great Silver Manufactory. Matthew Boulton & the Birmingham Silversmiths 1760 - 1790. pp.17, 29.
2. : A. Ure, The Philosophy of Manufactures or an Exposition of the Scientific, Moral and Commercial Economy of the Factory System of Great Britain. 1835. pp.13-14.

It is evident that Ure expected certain essential pre-requisites for a factory-based industry, and in particular, power-driven machinery. The availability of capital enabled the potter to purchase the simple mechanical aids developed in the early to mid-eighteenth century, particularly the lathe, but these remained few in number. The slow development of fully mechanised production reflected the basic need of the industry - the satisfaction of rapidly changing fashions in a consumer market. During the first half of the nineteenth century public demand favoured endless variation in decorative effect rather than in the basic shape of the ware; this enabled the pieces to be mass-produced by simple hand operated jollies and jiggers (1) leaving the surface finish to be completed at a later stage. Josiah Spode ii introduced only four new teaware shapes between 1815 and 1830 and by 1820 had only 344 shapes for the entire china production. (2) Comparatively little variety in shape was compensated for by the proliferation of decorative finishes, with 5,201 new patterns introduced between 1804 and 1833. (3) In part this encouraged mass production, particularly in the manufacture of the basic wares, since it was also possible to mechanise the decoration of wares, using transfer prints, but in the main this was reserved for the cheaper earthenwares, china and porcelain being hand finished. (4) Thomas Minton and Sons in 1831 employed

1. : F. Celoria, Ceramic machinery of the 19th century in the Potteries and other parts of Britain. Staffordshire Archaeology. 2. 1973. pp.38-41. See Chapter 3.
2. : L. Whiter, Spode. pp.65, 94-116.
3. : Ibid. p.85.
4. : It was considerably cheaper to print than to hand decorate and this was particularly true in the firing of the pieces - it took minutes rather than hours to decorate and fifty-five minutes to muffle fire rather than two days for ordinary wares. A. Ray, Liverpool Printed Tiles. Transaction English Ceramic Circle. 9.1. 1973. p.38.

fifty-five printers and only fourteen paintresses in their earthenware department, whilst in the manufacture of porcelain they employed only fourteen printers and at least 158 painters and gilders. (1)

For certain branches of the pottery trade therefore, full factory production was possible, with entrepreneurs able to "...substitute mechanical science for hand skill."(2), but for the industry as a whole there was little stimulus or need for investment in fully mechanised production. As late as the 1850's the manufacture of pottery was both labour intensive and dependent on traditional hand skills (3) and with the spirit of Ure's definition formalised in the 1844 Factory Act : "The word factory.. shall be taken to mean a;; buildings and premises... wherein or within the close or curtilage of which steam or any other mechanical power shall be used to move or work any machinery employed in preparing, manufacturing, or finishing, or in any process incident to the manufacture of cotton, wool, hair, silk, flax, hemp, jute or tow.."(4) a large number of processes, including potting, were excluded from either control or supervision. The pottery industry remained outside the Factory Legislation until 1864 when it was included in the Factory Acts Extension Act. (5)

1. : Thomas Minton and Sons 1831-42 Wages Book, quoted in : G. Godden, Minton Pottery and Porcelain of the First Period 1793-1850. pp.151-3.
2. : A. Ure, op,cit. p.20
3. : In 1851 the British pottery industry employed 25,000 men and 11,000 women, of which total Staffordshire employed 25,022. P. Mathias, The First Industrial Nation. p.261.
British Parliamentary Papers, op.cit. pp.464, 467, 511.
Parish of Stoke-on-Trent : Rectory of Longton. Longton Census Returns, 1851. Districts 1-15.
4. : An Act to amend the Laws relating to Labour in Factories. 8. Victoria c.15. June 6th, 1844.
5. : Factory Acts Extension Act. Cap. xlviii. July 25th, 1864.

The recruitment of larger labour forces and the concentration of production within single, frequently small and constricted sites, (1) created appalling overcrowding. The government inquiries of the 1830's and 1840's reveal an ever worsening working environment, with overcrowding often exacerbating other factors. Stevenson in 1833 employed 600 operatives in a pottery covering some 8,200 square yards (2) overcrowding that was typical of the Burslem district. By 1842 this condition was prevalent over the entire Potteries area, with almost 80% of all potteries examined considered to be cramped and insanitary. (3) Scriven, reporting to the Factory Commissioners in 1842 described one such typical works, that of Messrs. Daniel and Sons, Stoke:

"...not very extensive, but there is a good business carried on, and 240 hands employed. The rooms and buildings are old and dilapidated, small, close, dirty, mostly damp and uncomfortable, never or rarely whitewashed."(4)

The pottery had, in 1832, a ground floor area of only 1,450 square yards. (5)

A more profound and lasting consequence of the take-up of the factory-system was the enforcement of strict discipline in the pottery, particularly in relation to attendance and hours of work. This was not a new problem, but the decline

1. : See Chapter 2.
2. : Reports from the Commissioners 1834. Volume 12, Factories Enquiry. Supplementary Report Pt. 11-1. Session 1833. no.450. Parliamentary Papers vol. 20. p.B2. 20. Site measurements by M. Nixon, August 1968.
3. : Appendix to the second report of the Commissioners. 1842. op.cit.
4. : Ibid. Interviews 57-64.
5. : SRO.: D593/H/447a. Hargreaves 1832 Map of the Potteries. The works had been repaired at the time of purchase by Herbert Minton & Co. in 1847. Staffordshire Advertiser. 53. August 7th, 1847.

of the family unit of manufacture with its' own natural discipline, required the imposition of alternative solutions. (1) Many of the new disciplinary techniques were introduced by Wedgwood - the bell to summons workers rather than the horn and a system of tally cards, the forerunner of the clocking-in system - and then modified for use by other potters. (2) The excesses of St. Monday and poor workmanship were checked by rules and regulations (3) which covered every aspect of the manufacturing process and compliance was enforced by means of fines, corporal punishment and even "kindness and proper conduct". (4)

1. : Similar needs were experienced in the textile industry. S. Pollard. Factory Discipline in the Industrial Revolution. Economic History. Second Series. 16.2. 1963. pp.257-9.
2. : Wedgwood introduced the bell whilst a tenant at the Brick House Pottery, Burslem between 1762-70. Other potters followed this example but the only examples to survive until recently were at the Elder Pottery and Furnival's Pottery, both at Cobridge and demolished in the late 1960's. The Victoria History of the County of Stafford. 8. p.133. and site observations. Details of the clocking-in system used by Wedgwood are in: E19114-26. Josiah Wedgwood's Experiments, Potters Instructions. 1780. pp.27 and 180. Kerr and Binns instructed the lodgeman at their Worcester pottery to record all latecomers, with deductions made in their wages as a punishment. Chamberlain Mss.: 73. Apprentices' Time Book. 1858-9.
3. : St. Monday was traditionally the first day of the working week and was spent drinking - the rest of the week was spent furiously making good the piece-work quota. C. Shaw, When I was a Child. pp.47-9. Wedgwood Mss.: E19114-26. op.cit. N. McKendrick, Josiah Wedgwood and Factory Discipline. Historical Journal. 4.1.1961. pp.30-55. Chamberlain Mss.: Rules and Regulations. March 1st. 1851
4. : Reports from the Commissioners. 1834. op.cit. 50. Ralph Stevenson, Cobridge; 62. F. Wedgwood, Etruria; W. Ridgway, Hanley.

The use of children in potting was well established by the time of the transfer to the factory-system and their continued employment was expedient. (1) They were hired as assistants by individual operatives, rather than by the entrepreneur himself, and used to perform the tedious and arduous ancilliary work associated with the throwing and moulding of wares:

"Such part of our workmen as employ children under them are used for the purpose of handing moulds to and from the men, to prevent the necessity of the man moving from his seat; this is very light work.. These children are called runners."
(2)

Few potter's hiring or conditions of employment books have survived and it is therefore difficult to substantiate the claims made before the Commissioners. Clearly the evidence had a natural bias and potters admitted to no undue hardship for their juvenile employees: "I think potters' children are tolerably healthy; they look white, but that is from the clay, which is not pernicious." (3) Not all entrepreneurs

1. : Wedgwood considered that the typical, early eighteenth century pottery employed four boys and six men. Wedgwood Mss.: E18988-26. op.cit.
2. : Reports from the Commissioners. 1834. op.cit. p.62. Enoch Wood and Sons, Burslem.
3. : Appendix to the Second Report of the Commissioners. 1842. op.cit. 93. Thomas Furnival on behalf of Ridgway, Morley, Wear & Co.

shared such opinions:

"..but there are many hundreds employed by men in the stoves as runners of moulds and jiggers, as well as in other departments, of the ages of from six to eight; the work is very laborious from morning till night, with perspirations running down their faces in abundant streams; they run like race-horses." (1)

and a minority advocated the strict curtailment of the employment of children: "...Is it to be wondered at that they are diminutive and sickly?...I wish you success in this mission of mercy : the measure is a great one." (2) Where records survive they refer to large companies and it would be inaccurate to suggest that their labour structures were typical for the industry as a whole, although such sources offer further insight into the employment of children.

There were, among the large firms, varying degrees of dependence on the employment of children but with generally fewer juveniles hired by those potteries concentrating on the more elaborately decorated wares, such as the firms of Chamberlain and Minton.

1. : Ibid. 212. Elijah Hughes on behalf of Messrs. Stephen Hughes & Co., Cobridge.
This statement is corroborated by C. Shaw, When I was a Child. pp.12-13.
2. : Appendix to the Second Report of the Commissioners. 1842. op.cit. 212. Elijah Hughes, op.cit. Also evidence of Joseph Clementson. 98.

The following table offers a chronological comparative hiring for the large firms :

TABLE 4 : NUMBERS OF CHILDREN HIRED BY POTTERS : 1715-1851:(1)



A more detailed hiring structure for the Staffordshire potters is provided in the abstract reports produced from the 1851 Census, where not only are the numbers of children engaged given, but also a breakdown of numbers in each age range. (2) Interestingly, the 1851 analysis offers a

1. : Wedgwood Mss.: E18988-26. Letter, Wedgwood to Lord Auckland, January 28th, 1792.
 Thomas Whieldon's Notebook, c.1749-60. City Museum and Art Gallery, Hanley, Stoke-on-Trent.
 V.W. Bladen, The Potteries in the Industrial Revolution. Economic History. First Series. 1. January 1926. p.129.
 Chamberlain Mss.: 1796-1806 Cash Book. January 8th, 1803.
 Thomas Minton and Sons 1831-42 Wages Book. op.cit.
 Parish of Stoke-on-Trent: Rectory of Longton.
 Longton Census Returns. 1851. Districts 4,5.
2. : British Parliamentary Papers. op.cit.

lower average percentage ratio of adults to children, 58-42% and may be considered as a more accurate relationship for the industry as a whole, including the small manufacturers. The tables below give the breakdown for the Staffordshire pottery industry in 1851:

TABLE 5 : NUMBERS AND AGES OF CHILDREN EMPLOYED BY STAFFORDSHIRE POTTERS IN 1851 - EXPRESSED AS A PERCENTAGE OF THE TOTAL NUMBERS OF OPERATIVES EMPLOYED : (1)



These figures enable important comparisons to be made with other industries, particularly the cotton trade which traditionally has been considered as a major employer of children. In the Staffordshire textile industry the respective percentage ratios between adults and children was 61 - 39%, (2) a low figure the more surprising when considered in the light of William Henshall's evidence before the 1834 Inquiry:

"Does the nature of your work require the employment of children under twelve years of age, and why". "Yes; we could not afford to pay the wages required by older hands." (3)

1. : British Parliamentary Papers. op.cit.
2. : Ibid.
Other comparative percentages include 85-15% adult to juvenile for coal mining and 92-8% for brewing.
3. : Reports from the Commissioners. 2. Factories Inquiry.
167. Supplementary Report. 11-1. 1834. p.66.
W. Henshall, Newcastle-under-Lyme, textile entrepreneur.

In pottery manufacture the engagement of children as assistants to older operatives of necessity enforced similar hours and working conditions for all operatives, as the evidence given by Messrs. E. & G. Phillips of Longport before the 1834 Inquiry indicated:

"We make no difference as to age; that is left to themselves. Those whom we pay by the day we compel to work eleven hours and a half each day, including meal-times; but those who work by the piece may work longer if they choose."(1)

Further to this it was often customary for children to work longer hours than the older employees:

"...children who work with piece-work men work the same time, and about half an hour more, as they are expected to have the fire lit and the place ready before their masters come."(2)

The hours worked by pottery operatives varied from works to works, both according to the customary practice of the individual entrepreneur and as of necessity "in times of brisk trade". Josiah Wedgwood in 1816 indicated that seasonal variations excepted, potters worked a ten hour day or a sixty hour week (3); in 1834 there was a slightly wider range of hours worked, from between nine and ten and a half per day - a working week of between fifty-four and sixty-three hours. (4) These hours compared favourably with those

1. : Reports from the Commissioners. 1834. op.cit. p.60.
E. & G. Phillips, Longport.
2. : Ibid. p.76. F. Wedgwood, Etruria.
3. : Minutes of Evidence taken before the Select Committee on the State of the Children Employed in the Manufactories of the United Kingdom, 25th April to June, 18th, 1816. p.61.
4. : Reports from the Commissioners. 1834. op.cit. p.64.
W. Ridgway & Co., Hanley, worked a nine hour day; p.62. E. Wood & Sons, Burslem, worked a ten hour day and as such was typical for the Potteries; p.63. Robert Godwin of Cobridge worked a ten and a half hour day.

enforced by the 1833 Factory Act in the Staffordshire textile industry, where children worked a ten hour day and adults an additional two and a half hours. (1)

The pottery industry, although sharing many of the characteristics of other factory based manufacturing trades, remained free from government control until 1864, a measure of their successful lobbying against such intervention. (2) The first factory legislation - the 1802 Factory Act - alarmed the Staffordshire potters, even though they rarely employed pauper apprentices (3) and through Josiah Wedgwood ii they expressed total opposition to any extension of legislation to cover their works. His evidence before the 1816 Inquiry (4) maintained the independent nature of the industry and reflected the concern and alarm experienced by most of his fellow masters :

"Did not the Bill which was introduced last session into Parliament, for regulating the hours of children employed in manufactories, carry a very considerable alarm amongst all classes in the potteries?" - "I cannot speak to the fact of any alarm having been excited among the workpeople, for I do not know they were aware of the Bill; the masters conceived that the provisions would be very injurious, and in fact, I may say, derogatory to their characters as British manufacturers." (5)

1. : Reports from the Commissioners. 1834. op.cit.p.66.
W. Henshall, Newcastle-under-Lyme.
2. : The Factory Acts Extension Act. CAP. XLVIII. 25th
July, 1864.
3. : The 1802 Act referred principally to pauper apprentices,
few of whom were employed in the industry - then
mainly by Chamberlain at Worcester - and certainly
none by 1834. Reports from the Commissioners. 1834.
op.cit.
4. : Minutes of Evidence. 1816. op.cit. pp.60-6, 67-73.
5. : Ibid. p. 63.

This apprehension remained for several decades and further representations were made, through inquiries and lobbying, against the inclusion of potteries in the list of workplaces covered by the Factory Acts - an opposition considerably enhanced by the inability of potteries to match the contemporary definition of a factory. (1) In 1834 Thomas Mayes forcefully reminded the Commissioners that "...the less government interference between the master and his workmen the better for all parties," (2) and this view was further reiterated by successive witnesses. Even after the partial control effected by the 1864 Factory Act, potters continued to lobby against further intervention and were successful in preventing any form of control over the use of lead in glazing until 1899. (3)

The reluctance of potters to accept change in the organisation and running of their works reflected a much wider conservative attitude than that pertinent to the hiring of children. Fostered by an ability to expand their business without the need for intensive capital recruitment or investment in fully mechanised production, potters continued to practice business methods introduced in the pre-factory period. The dangers of such attitudes and their cumulative effect on the prosperity of the industry are examined elsewhere in the Thesis; they were aspects of entrepreneurial policy only occasionally understood and

1. : Staffordshire Advertiser. 24. April 4th, 1818.
2. : Reports from the Commissioners. 1834. op.cit. p.72.
Thomas Mayes, Stoke-upon-Trent.; Thomas Minton,
Stoke-upon-Trent, p.74.
3. : H. Owen, The Staffordshire Potter. pp.271-303.

then only by the visionary. Sir Henry Doulton's remarks on his own manufacturing career were equally relevant to the industry as a whole:

"There are three steps in the law of Nature which it is well to remember. If there is stagnation, decay soon follows, and finally dissolution. Such a calamity can only be avoided by introducing new methods and manufactures as the old become obsolete... There is still the urgent call for new departures and adjustments... and unless we are ever on the alert to keep pace with public requirements, stagnation and decay must inevitably overtake us." (1)

1. : E. Gosse, ed. D. Eyles, Sir Henry Doulton. The Man of Business as a Man of Imagination. pp.206-7.

CHAPTER TWO:
THE LOCATION OF THE POTTERY.

Throughout the middle ages and later into the seventeenth century, there were minor centres of pottery production serving geographically limited markets with simple, domestic earthenwares. (1) The essential pre-requisite for the location of such centres as Potovens and Chilvers Coton, was an easily worked supply of essential raw materials - notably coal or wood as fuels and clay for the body and decoration of wares - and where the mineral resources were favourable, metallic oxides to stain the clays and produce a glazed finish. (2) The North Staffordshire potters had access to a number of good 'plastic' clays (3) and chemical analysis of the in-situ clay and coal beds at the Hanley, Albion kiln sites, supports the contention that potters worked surface outcrops of a low calorific value coal. (4) With improved transport facilities towards the late eighteenth century, other centres were established using similarly easily worked raw materials, to serve limited product markets, notably the Church Gresley and Denby potteries, manufacturing buff and stonewares. (5)

1. : L. Weatherill, op.cit. p.77.
P. Brears, Excavations at Potovens, near Wakefield, 1968. Post Medieval Archaeology. 5.1971. pp.1-34.
For a fuller discussion of the small provincial potteries see: L. Jewitt, The Ceramic Art of Great Britain. 1883.
2. : P. Brears, Ibid.
P. Brears, The English Country Pottery. op.cit. p.219.
3. : R. Plot, The Natural History of Staffordshire. 1686.
pp.122-4.
4. : F. Celoria and J. Kelly, A post-medieval pottery site with a kiln base found off Albion Square, Hanley, Stoke-on-Trent, Staffordshire, England SJ 885 474. City of Stoke-on-Trent Museum Archaeological Society Report. No. 4. 1973. pp.10, 55. The coal was found inter-spersed in shallow clay beds at a depth of 5'0". The coal had a calorific value of 12,200 BTU/lb. (Ash free dry.) whereas local, deep seam coals have a higher value - 13,800 - 14,900 BTU/lb.
The earliest wares found in this excavation were unglazed coarse wares of the late seventeenth century.
5. : L. Jewitt, op.cit. pp.357, 377.

During the mid-eighteenth century a small group of English pottery entrepreneurs turned their attention to satisfying the expanding and lucrative market for porcelain, then imported in vast quantities from either China or the Continental factories at Meissen and Dresden. (1) Again, the availability of raw materials was an important factor in the location and establishment of these potteries. The Longton Hall partnership established a porcelain works in c.1749 using in part local clays previously worked for earthenware manufacture (2) and Hewling Lewson founded the Lowestoft Porcelain Works in c. 1757, using clays dug on his estate by another potter - Philip Walker - and flints which were already gathered for shipment round the coast to other pottery manufacturers. (3) Not all of these ventures continued to base their production on the indigenous raw materials after the commencement of business. John Coke and William Billingsley established the Pinxton China Works in c.1796 on the assumption that the local clays would support the manufacture of high quality wares - they were mistaken and within months of starting business they were required to import their clay supplies. (4)

Whilst the failure of many of these provincial potteries was due to the complex interaction of such factors as the marketing of wares, the availability of transport and the recruitment of capital, it is certain that the failure of

1. : G. Godden, The Illustrated Guide to Lowestoft Porcelain. p.2.
2. : The Victoria History of the County of Stafford.8. p.239.
3. : G. Godden, op.cit. pp.2-3.
4. : D. Exley, The Pinxton China Factory. pp.2-5, 38.
L. Jewitt, op.cit. p.361.
The first trial pieces were fired on April 23rd, 1796 and on the 2nd. of July 1796 the factory ledger recorded the payment of 9.3d. haulage charge for 9½ tons of clay from Buckland Hollow. D. Exley, op.cit. p.39.

raw material supplies posed critical problems for the entrepreneur. The commercial decline of the Ticknall potteries in the early nineteenth century is attributable to the enclosure of the common lands and the cessation of clay working (1) and the Whitehaven potters in the eighteenth century maintained production after the failure of their indigenous raw materials through the use of coastal shipping to import supplies.' (2)

The availability of raw materials was also an important factor to be considered in the choice of individual pottery sites within the manufacturing district. (3) In particular, the supply of coal figures prominently in the location of the pottery and was a critical element in the financial success of the business. (4) With every ton of clay requiring between five and six tons of coal to process it, the dependence on these supplies governed, more than any other criterion, the entrepreneur's choice of site.

The potter in searching for a site for his new works had therefore, to consider the distance that site would be from coal supplies and to be more than a few hundred yards away from a pit without direct access to one, was a serious disadvantage. Josiah Wedgwood estimated that in c.1715 a slipware pottery required coal costing 6.0d. for a weeks firing, but which cost an extra 8.0d to carry it from the pits. (5) Few potters were allowed to dig for coal on their

1. : P. Brears, op.cit. pp.84, 175.
2. : L. Weatherill and R. Edwards, Pottery Making in London and Whitehaven in the Late Seventeenth Century. Post Medieval Archaeology. 5.1971. pp.160-81.
3. : See Chapter 4.
4. : See Chapter 8.
5. : Wedgwood Mss.: E18988-26. Letter Wedgwood to Lord Auckland, January 28th, 1792.

pottery site (1) and such firms as William Adams and Sons at Greenfields remained the exception in having a colliery working under their control and within the factory confines. (2) The more enterprising potter overcame this difficulty by the use of a tramway to serve his works from the nearest colliery and by 1832 sixteen potteries were so served, the most notable being the Newfield Pottery which was connected by a long line to the Clanway Collieries, Tunstall. (3) An astute choice of site could effect considerable financial savings and the measure of such an advantage made clear in the sale notice for Turner and Co's. Lane End porcelain and earthenware works: "...a railway within 40 yds. of a pit mouth, from the works, - no horse needed. At 40 tons of coal per week it is equal to a saving of £150 per year."(4) The rapid expansion in the exploitation of the North Staffordshire coalfield during the late eighteenth and early nineteenth centuries, provided more opportunities for potters to find suitable sites:

"The extensive Collieries now at work, and upon the point of being opened in their neighbourhood, with the great advantages that will result from the Branch of the Canal executive from the Grand Trunk near to Dale Hall, must render Burslem one of the best situations in the Potteries for Manufactories;" (5)

1. : Land was frequently sold with a restrictive covenant forbidding the extraction of coal - all of the Longton Manorial lands were sold in the 1780's in this manner, the mineral rights having been already sold to Jeremiah Smith, Gladston Pottery Mss.: 1. Conveyance, June 28th, 1783.
2. : J. Thomas, The Rise of the Staffordshire Potteries. p.69.
3. : SR0.: D593/H/447a. Hargreaves 1832 Map of the Potteries.
4. : Staffordshire Advertiser. 12. April 19th, 1806.
See Chapter 5.
5. : Staffordshire Advertiser. 5. November 30th, 1799.

The significance of coal supplies was only matched by that of water and in a region of poor surface water supplies, it was crucial in the location of a pottery, leaving aside the question of water power. Water was an important raw material used in the preparation of glazes and the manufacture of slip, which until the introduction of sodium carbonate and silicate as defloculants, in the 1850's required equal parts of clay and water. (1) Most manufacturers relied on springs and wells until the introduction of piped water from private company reservoirs in the early nineteenth century; (2) Richard Myatt's Lane End pottery was unusual in being supplied directly by a stream of soft water, conveyed to his sliphouse (3) and the Gladstone and Park Works, Longton, shared a pond until at least 1840, when the pressure on suitable building land needed for expansion forced the tenants to accept piped water. (4) This dependence on water supplies is stressed by an application from Stevenson and Bucknall, earthenware manufacturers at Cobridge, to Josiah Wedgwood, in 1814:

"We shall be extremely oblig'd by your permitting us to carry Water from the Pool adjoining your Garden. Ms. Hales have as we heard the Misfortune to be entirely out, and the whole of our Premises must be oblig'd to stand still unless we obtain an immediate Supply. We will Cheerfully pay any Charge you may make for this Accommodation."(5)

1. : P. Rado, An Introduction to the Technology of Pottery. pp.68-9.
2. : The provision of piped water was still considered inadequate in the 1840's. J. Wards, The History of the Borough of Stoke-upon-Trent. p.268.
3. : Staffordshire Advertiser. 10. April 21, 1804.
4. : Gladstone Mss.: 8. Deed of Partition, 25th August, 1815. Ibid. 14. 1840, plan.
5. : Wedgwood Mss.: E25195-33. Letter Stevenson and Bucknall to Wedgwood. September 13th, 1814.

With the introduction of the steam engine into the pottery industry in c.1775, there arose a further need for a reliable water supply. An 8 h.p. engine required thirty gallons of cold water per minute and by the early nineteenth century potters were ordering far larger capacity engines, with a proportionate increase in demand for injection water. (1) It is not known how many pottery manufacturers purchased engines for their works, and it is a matter for speculation to what extent the inadequacy of local water supplies forced them to reconsider the adoption of steam power in the same way it had forced them initially to use water mills in the Moddershall and Churnet valleys.

Although North Staffordshire potters had easily worked coal measure clays which were freely dug in Burslem during the eighteenth century, (2) their significance declined after the introduction of Devon and Dorset ball clays in c.1710. Evidence from probate inventories would suggest that their use did not completely die out (3) and that local clays were still worked in the late eighteenth century, mainly for the production of stoneware and saggars. (4) Their use continued into the nineteenth century, the occasional rentals for clay pits referring to pits well outside the manufacturing district. Clay was clearly no

1. : Boulton and Watt Mss.: Outgoing Letters. Letter from the Company to J. James, September, 1787. Wedgwood had a 30 h.p. engine installed in 1801 and Hamilton a 32 h.p. engine by 1807. Boulton and Watt Mss.: Catalogue of Old Engines. P. 56. Section A./P.106. Section B.
2. : Shaw noted that Burslem freeholders assumed the right to dig for clay in unenfranchised land. S. Shaw, History of the Staffordshire Potteries. 1829. p.124.
3. : L. Weatherill, The Pottery Trade and North Staffordshire. 1660-1760. p.12.
4. : J. Turner in c.1780 used local Greendock clays for stonewares. The Victoria History of the County of Stafford. 8. p.239.

longer a factor in the location of new potteries. (1) Sagger clay requirements could be readily met through the working of shallow pits within the pottery confines or on adjacent land (2) and the normal exclusion of mineral rights to a tenant generally only applied to : "...coal, channel, sleek, ironstone and limestone.."(3) and did not prohibit the working of clay pits.

The availability of power resources was not an important location factor. The need for mechanical assistance throughout the eighteenth and early part of the nineteenth centuries was confined to the preparation of raw materials. A few potters employed a horse to work mills (4) or converted windmills (5), the majority stamped raw materials by hand (6) the transition to power-driven mills being made in the Moddershall and Churnet valleys. With the cutting of the Grand Trunk and Caldon Canals in the late 1770's, the use of these mills became economical and they remained in business long after the widespread take-up of steam power in The Potteries in the late nineteenth century.

The awareness of potters to such factors as coal and water supplies is indicated by the frequent use of the proximity to pits or the availability of water as a selling

1. : Minton & Co. rented clay pits from the Trentham estate between 1857-60, for £100 per annum. SRO.: D593/G/1/22/6
2. : Boon advertised his Shelton pottery in 1811 as having land adjacent contained sagger clays. Staffordshire Advertiser. 17. July 20th, 1811.
3. : Gladstone Pottery Mss.: 1. Conveyance, June 28th, 1780.
4. : Thomas Wedgwood used a horse-driven pug mill at the Churchyard works, Burslem, in c.1679. The Victoria History of the County of Stafford. 8. p.133.
5. : See Chapter 3.
6. : Baddeley had a "Small Grinding Mill" at his Shelton Pottery in 1761. SRO.: D1788 p.14. (2). Valuation July 22nd, 1761.

point. Many sale notices simply refer to the nearby supplies of raw materials : "...works have a constant supply of water, are very near to Coals..."(1) whilst a few indicate the advantages of such supplies, as with Jonathon Leak and Co's pottery at Twenty Row, Burslem : "...near to coals and canal and on a railway to Sneyd Colliery from the new wharf, with a fifty percent saving on carriage..."(2)

It is interesting to consider contemporary opinion on the location of potteries. Although technical treatises were produced throughout the nineteenth century, they tended to concentrate on the design and decoration of wares and Ure (3) was exceptional in commenting upon the actual layout and organisation of the pottery itself. Ure suggested that the ideal location for a pottery should be : "...by the side of a canal or navigable river, because the articles manufactured do not well bear land-carriage..."(4) Whilst this ideal relationship between pottery and transport was achieved outside North Staffordshire - as at the Wigan Pottery and Chamberlain's porcelain works at Worcester - few North Staffordshire entrepreneurs made use of the newly cut Grand Trunk Canal in locating their new premises. The Etruria and Davenport works (at Newport, Burslem) were the only large potteries to be built adjacent to these canals, although a few smaller potteries were so sited, (5) and for the majority of entrepreneurs the penalty of having a site away from the canal

1. : Staffordshire Advertiser. 10. September 15th, 1804.
2. : Ibid. 16. October 6th, 1810.
3. : A. Ure, The Dictionary of Arts, Manufactures and Mines 1867.
4. : Ibid. 3. p.567.
5. : SR0.: D593/H/447a. Hargreaves 1832 Map of the Potteries.

was : "...the necessity of carting all raw materials from the canal wharf to the various manufactories, averaging a mile of uphill draughts." (1) A few manufacturers without direct access to the canal system, found that an agreement could be made with the canal proprietors. Josiah Spode was allowed the free use of the Newcastle Canal up to its junction with the Grand Trunk, in consideration for the demolition of part of his pottery. From 1795, both Spode and his neighbour Wolfe, had direct access to the main navigation system, a considerable commercial advantage. (2)

At the turn of the eighteenth century, there was very little land in the Potteries outside the direct control of a few powerful landowning families and in consequence these families controlled the territorial expansion of the pottery industry. The Marquis of Stafford, unlike such Staffordshire landowners as Lord Dartmouth, (3) had few reservations about allowing the industrial development of his Trentham estate and besides sinking several coal pits, leased sites for the erection of potteries in Lane End, (4) but this development was carefully screened from his country seat by the maintenance of a wide area of farming around Trentham. The Sneyd family did not enjoy the advantage of having agricultural land between their homes and the collieries they owned and were consequently less inclined towards

1. : Aris's Gazette, April 11th, 1825. The letter, signed by potters, complained of the transportation system in the Potteries and of the inadequacies of the canals and supported the projected Birmingham and Liverpool railway.
2. : Newcastle Canal Act. Geo. iii. 1795. Cap.87.
3. : Lord Dartmouth's agent, in 1806, bid successfully, if expensively, against prospective developers, for land near Snadwell Hall, West Bromwich. The action was justified by the agent: "...a Sacrifice I should have advised your Lordship to have made rather than to have submitted to the Nuisance in giving the opportunity of having Buildings there." J.T. Ward, Land and Industry. pp.174-5.
4. : The Marquis leased three-quarters of an acre of land at Lane End to Jacob Marsh in 1818, at an annual rent of £3 in order that he could build a pottery. Similarly, John Forrester rented a site from the estate in 1777. SRO.: D593/B/1/11/16. and D593/H/14/3/3., 5.

allowing the commercial and mineral exploitation of their Madeley estate. The initial development by Colonel Walter Sneyd in the 1790's was reluctantly persued by his son, Ralph, who inherited the estate in 1829 and it is conjectural whether, given a more positive attitude towards industrial exploitation, the nucleus of potters working at Red Street could have survived into the nineteenth century. (1)

Towards the end of the eighteenth century several of the larger landed estates in the Potteries were sold for development. Sometimes the estate was transferred intact, as in the case of Wedgwood's 350 acre Ridgehouse estate, purchased in 1767, (2) but more frequently the estate was broken into smaller lots. When the Furlong estate was subdivided and sold in 1787, part was purchased and developed by Theophilus Smith to provide a landscaped estate and a site for his earthenware works. (3) Both the Ridgehouse and Furlong estates represented considerable capital outlay and were beyond the means of most eighteenth century potters. For the smaller manufacturer the sale of a large estate provided few opportunities to acquire a site for a new pottery, unless, as in the case of the Longton Manorial holdings, the venders adopted a policy of selling the land in small plots. In the 1780's the trustees of the manor lands released much of the present day Longton for industrial development and allowed the Lane End potters to modernise their premises and expand their operations. (4)

The entrepreneur who lacked the capital resources of the larger manufacturing concerns, could, as an alternative to purchasing a site, lease land for industrial development. The Marquis of Stafford leased sites at Lane End specifically

1. : J. Ward, op.cit. p.175.
2. : For details of the purchase see Appendix 1.
3. : The Victoria History of the County of Stafford. 8.pp.90-1.
4. : Gladstone Pottery Mss.: 1. Conveyance, June 28th, 1783.

for the erection of potteries (1) and the Lord of the Manor of Hanley, John Bagnall, leased land to potters for extensions to existing works. John Simpson took out one such lease in 1740 and the tenancy agreement specified the type of permitted development :

"...the waste ground lying before the said upper wrkhouse for drying his potts and Earthen ware thereon And also to erect upon it a kiln and a piece of Building for the use of his Trade not exceeding Six Yards square within the walls And also Six Yards in length and ten Yards in breadth of the said waste Land behind and contiguous to the said Lower workhouse.."(2)

Throughout the period 1795-1850, (3) three distinct types of site were offered for sale and development; the general site offered for any kind of development, which formed the greatest single group of available sites; the site offered exclusively for the erection of a pottery; and lastly, the site offered for the expansion of existing premises. The sales for each type recorded in the Staffordshire Advertiser for the period, together with the numbers of established potteries offered for disposal during the same period are tabulated on the following graph. The availability of land and potteries closely follows the trade

1. : Jacob Marsh leased three-quarters of an acre of land in 1818 in order to build a pottery. The lease was for a term of 99 years and for an annual rental of £3. A covenant dictated that the works be brick built and to cost a minimum of £1,500. This pottery is identified as the Boundary Works, King Street, Longton. SRO.: D593/B/1/11/16.
2. : HBL.: EMT. 15/740a.
3. : The Staffordshire Advertiser appeared weekly throughout this period, being first published in 1795. This was by far the most comprehensive newspaper for the period in its coverage of local news and the advertising of properties and land.

PAGINATION AS IN ORIGINAL

cycles prevalent in North Staffordshire and the very considerable rise in the number of units for disposal between c.1806-15 reflects the sharp economic decline in the pottery industry brought about by the blockade of Britain, the annexation of Holland and finally the war with the United States. (1) Similarly the sharp rise at the end of the period marked the final impact of the American recession which removed many of the traditional and lucrative markets for Staffordshire earthenwares. (2).

1. : J.R. Harris, ed., Liverpool and Merseyside.
The Liverpool Campaign Against the Order in
Council and the War of 1812.
B.H. Tolley, pp.98-132.
Between 1810-12 the trade recession forced the
closure of thirty firms in the potteries.
Staffordshire Advertiser. 18. January 7th, 1812.
2. : Appendix to the second report of the Commissioners.
1842. op.cit.

GRAPH OF NUMBERS OF POTTERIES FOR DISPOSAL AND SITES
AVAILABLE FOR INDUSTRIAL AND GENERAL DEVELOPMENT, IN
THE POTTERIES, 1795-1850 : (1)



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1. : The graph is based on the public notices which appeared in the Staffordshire Advertiser between 1795 and 1850. Comparative analysis of figures has not been attempted : J. Walton, Newspaper Advertisements - some further considerations. The Local Historian. 10.6. 1973. p.271.

The restriction of choice for sites for new potteries, evident even after the south eastern extension of the North Staffordshire coalfield in the late eighteenth century, resulted in a tightly developed urban community with industry, commerce and housing competing for available building land. Pottery sites were often, therefore, cleared of old, unwanted buildings in order to provide land for redevelopment and whilst it is evident that in most potteries this was a gradual and continuing process of renewal, in a few instances it represented an almost complete rebuilding of the premises. Samuel Alcock acquired the neighbouring works to his own in Burslem, those of John Riley and William Taylor, and in 1839 turned the entire complex into a single pottery after largely clearing the site. (1) Even in the later industrial settlements, notably Lane End and Lane Delph, the estate management practised by the Marquis of Stafford's agents restricted development to a narrow strip of land on either side of the turnpike road to Uttoxeter, with the result that the new towns became tightly developed linear communities:

1. : The Victoria History of the County of Stafford. 8.
pp.134-5.
A. Mountford, Samuel Alcock's Hill Pottery, Burslem.
SJ 867500. City of Stoke-on-Trent Museum Archaeological
Society. Reports No. 2. for 1966. 1967. pp.30-1.

PLAN OF LANE END IN 1832 : (1)



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Predictably, the population of each pottery town rose steadily from the mid-eighteenth century onwards, (1) growth matching the expansion of the staple industry but not, interestingly, the rise in the number of potteries at work. Once established, each pottery town, with the exception of Burslem, maintained a fairly constant number of works in operation, minor fluctuations reflecting trade cycles in this country and in North America. (2) The differential between the expansion of the manufacturing capacity of each town and the resident population was partly the result of a marked increase in the number of ancilliary trades and processes established during the early nineteenth century and partly through the development of the Potteries as a regional commercial centre rivalling that of Newcastle-under-Lyme. The closest correlation between the development of the local pottery industry and the growth of the resident population, occurred at Tunstall, where industrial expansion remained at a relatively low level until the availability of deep mining techniques at the end of the eighteenth century. Once established, the local potters recruited their labour from neighbouring centres (3) until the resident population increased sharply a generation later.

The consequences of constricted development - overcrowding, pollution and insanitary working and living conditions - were exacerbated by an apparent lack of concern for the quality of the environment created by this expansion, not an uncommon reaction among contemporary entrepreneurs and society as a whole. When in 1801 part of the Goats Head estate at Cliff Bank, Stoke, was offered for sale in freehold plots, no distinction was made between the attraction

1. : See Chapter 1.
2. : Caution must be exercised in using the entries contained in trade directories, they were not necessarily comprehensive in their coverage of the potteries at work.
3. : See Chapter 7.

of the land for either high class residential or industrial development :

"..one of the most flourishing parts of the Staffordshire Potteries, and presenting a building situation, either for Houses for the residence of genteel families, the erection of Potworks, or other buildings, not to be met with in any part of that populous and still increasing neighbourhood." (1)

The various North Staffordshire boards of Public Health Commssioners accepted that potteries were a "nuisance or injurious to the health of the inhabitants." but declined to exercise their powers and control pollution, for fear that interference would lead to unemployment. (2) Not surprisingly the few recorded instances of civil authorities curbing pollution by potters, occur outside North Staffordshire. In 1707 Nathaniel Oade was fined 40/- for "Annoyance by smoak" at his Gravel Lane Pottery, Southwark - a fine repeated each successive year for twenty years (3) - and more drastically, in 1783 the Corporation of Bristol ordered the demolition of John Townsend's kiln at his Tucker Street mug works, after complaints concerning pollution from it. (4)

Atmospheric pollution, whilst the most dramatic effect of a failure to control the development of industry, was by no means the only problem attributable to potting. The

1. : Staffordshire Advertiser. 7. November 14th, 1801.
2. : The Victoria History of the County of Stafford.
8. p.96. Tunstall Improvement Act. 1847, 10 & 11
Vic. c.252.
3. : R. Edwards, London Potters circa 1570-1710. Journal of Ceramic History. 6. 1974. p.21.
4. : G. Hughes, English and Scottish Earthenware. p.42.

location of cratemaker's pools, full of "vegetable matter.. constantly undergoing a process of putrefaction."(1) next to housing, and the free use of open streams and rivers as sewers : "The works are well drained by sewers throughout the bank, which empty themselves in the Trent 400 yards off." (2) remained a constant reminder to those who worked in the Potteries that their prosperity was achieved at a very high price.

1. : Appendix to the second report of the Commissioners.
op.cit. Appendix no. 1.
2. : Ibid. Statement no. 35, William Griffiths, overlooker
at Messrs. Minton and Boyle's china works, Trentham
Road, Stoke.

CHAPTER THREE :
THE CRAFT TRADITION : THE DEVELOPMENT OF THE MANUFACTURING
PROCESS.

Throughout the late and post-medieval period, North Staffordshire potters manufactures for local sale a wide range of plain, utilitarian earthenwares, using indigenous raw materials and relying on simple, hand processes. (1) Their production was largely superceded during the early seventeenth century by the manufacture of elaborately finished slip-trailed and combed wares, (2) capable of sale throughout the country and sustaining the sophistication of detailing necessary for individual commissions. (3) The transfer to the more profitable slip-ware trade was possible within the existing organisation of the pottery - no new supplies of raw materials were required and the basic hand processes were readily adapted to accommodate the new decorative finishes :

"Before it be brought to the wheel they prepare the clay by steeping it in water in a square pit, till it be of a due consistence; then they bring it to their beating board, where with a long Spatula they beat it till it be well mix'tThis being done, they wage it, i.e. kneed or mould it like bread, and make it into round balls proportionable to their work and then 'tis brought to the wheel,... When the

1. : See Chapter 4.

A rescue excavation on the site of the Swan Bank Methodist Church, Burslem, Stoke-on-Trent, Staffordshire, England SJ870 499. City of Stoke-on-Trent Museum Archaeological Society Report. 5. 1973.

2. : Ibid. In this particular excavation there were few 'utilitarian' sherds in layer 3, which had a base date of c.1670. Similar findings were noted in other local excavations, for example: Post Medieval Pottery from Newcastle St. Burslem, Stoke-on-Trent SJ867 498. City of Stoke-on-Trent Museum Archaeological Society Report. 8. 1975.

3. : L. Weatherill, The Pottery Trade and North Staffordshire. 1660-1760. pp.79-80.
The Toft and Simpson families in particular specialised in the production of elaborately decorated 'special pieces', dated examples being recorded between 1671-89. W. Mankowitz and R. Haggart, The Concise Encyclopaedia of English Pottery and Porcelain. pp.202-3,222-3.

Potter has wrought the clay either into hollow or flat ware, they are set abroad to dry in fair weather, but by the fire in foule, turning them as they see occasion, which they call whaving, when they are dry they stouk them, i.e. put Ears and Handles to such Vessels as require them ; These also being dry, they then Slip or paint them with their severall sorts of Slip, according as they design their work,... After the vessels are painted, they lead them, with that sort of Lead Ore, they call Smithum, which is the smallest Ore of all, beaten into dust, finely sifted and strewed upon them; which gives them the gloss than ordinary.... After this is done, they are carryed to the Oven, which is ordinarily above 8 foot high, and about 6 foot wide, of a round copped forme, where they are placed one upon another from the bottom to the top : if they be ordinary wares such as cylindricall Butter pots &c. that are not leaded, they are exposed to the naked fire, and so is all their flat ware, though it be leaded, having only parting shards, i.e. thin bits of old pots put between them, to keep them from sticking together : But if they be leaded hollow-wares, they do not expose them to the naked fire, but put them in shragers, that is, course metall'd pots, made of marle... In 24 hours an Oven of Pots will be burnt, then they let the fire goe out by degrees which in 10 hours more will be perfectly done, and then they draw them for Sale, which is chiefly to the poor Cratemmen, who carry them at their backs all over the Countrey." (1)

The national sale of slip-ware, initially through itinerant cratesmen and subsequently along the canalised rivers Severn and Weaver to merchants in Bristol, Chester and Liverpool, (2) exposed the Staffordshire potters to new markets and brought them into contact with other pottery production centres. Increasingly, during the mid to late seventeenth century, they found their wares competing with the tin-glazed wares of Bristol and London (3) and with the development of salt-glazed stonewares in c.1664 (4) the

1. : R. Plot, The Natural History of Staffordshire. pp.123-4.
2. : Plot's account of the marketing of Staffordshire slip-ware is substantiated, in greater detail in :
 E. Colby, The Life of Thomas Holcroft. 1925.
 i. pp.29-30.
 L. Weatherill, The Pottery Trade and North Staffordshire. 1660-1760. pp.14. 80.
3. : W. Mankowitz and R. Haggart, The Concise Encyclopaedia of English Pottery and Porcelain. p.68.
 R. Edwards, London Potters circa 1570-1710. Journal of Ceramic History. 6. 1974. pp.7-14.
4. : Symon Woolters the elder and younger are credited with developing stoneware in c.1664-9. A. Mountford, The Illustrated Guide to Staffordshire Salt-Glazed Stone-Ware. p.3.

markets for slip-ware declined sharply. In response to this competition, the Burslem potters infringed John Dwight of Fulham's 1671 stoneware patent (1) and taking advantage of a recession among the London salt-glazed stoneware manufacturers, (2) a succession of Staffordshire potters turned to the salt-glaze trade, (3) which remained the pre-dominant manufacture until superceded in the 1760's by lead-glazed creamware. (4)

The rapidity and extensive of the take-up of the stone-ware trade, reflected the ability of potters to adapt their business organisation and modify the manufacturing process to accommodate the new ware. Although the production of stoneware required, for the first time, the use of a non-indigenous material - salt - its importation present few entrepreneurial problems, particularly after the discovery of rock salt deposits at Marbury near Northwich, in 1670. (5) Of greater consequence was the need to develop a new kiln technology, the stonewares requiring a different firing

1. : At least six Burslem potters infringed the 1671 patent - Aaron, Thomas and Richard Wedgwood, Hammersley, Middleton and Astbury. PRO.: C6/534/37.
2. : In 1698 Dwight dismissed half of his Fulham pottery workforce due to the recession. House of Commons Journal. 12. 281. et. seq.
3. : Meteyard maintained that in c.1690 most of the twenty-two ovens in use in Burslem had been adapted to fire stoneware, although Wedgwood's 1715 list records only ten. E. Meteyard, The Life of Josiah Wedgwood. 1. p.128. Wedgwood Mss.: E18988-26. op.cit.
4. : Thomas and John Wedgwood of Burslem continued to supply stoneware until at least 1773. Thomas and John Wedgwood Sales-Account Book. City Museum and Art Gallery, Stoke-on-Trent.
As late as 1787, John Wood of Brownhills, Burslem, manufactured stoneware. John Wood Sales-Ledger. City Museum and Art Gallery, Stoke-on-Trent.
Despite the variety of product manufactured by Whieldon and Wedgwood during the partnership years (1754-9), the white salt-glaze trade was the most important :
"White stoneware was the principal artical of our manufacture." A. Mountford, The Illustrated Guide to Staffordshire Salt-Glazed Stoneware. p.47.
5. : R. Sherlock, Rock Salt and Brine. Special Report on the Mineral Resources of Great Britain. 8. p.2.

operation and temperature range :

"We may also mention, that Salt glazed Pottery of that time, was comparatively cheap; and the oven being fired only once each week, required to be large, to hold a quantity sufficient to cover the contingent expenses. Hence we find the ovens were large, and high, and had holes in the dome, to receive the salt cast in to effect the glazing." (1)

The new ovens were adapted from the basic lead-glazed kilns, with scaffolding built round the crown and firemouths to facilitate the insertion of salt when the kiln temperature reached 1,200 degrees Centigrade. (2) Temperature control during the firing cycle, whilst undeveloped as a science, (3) was well understood in practice, as the discovery of over-fired and distorted 'Astbury' ware wasters indicates. (4) The adoption of fretted saggars further assisted in the volition of the salt : "The Saggars were therefore adapted to the purpose, by being formed with holes in their sides to admit the vapours, and the ware was so placed in them, that every part might be affected." (5), a technique employed by the Nuneaton 'Midland Purple' potters during the fifteenth and sixteenth century, and certainly one appreciated by the Burslem potters. (6)

1. : S. Shaw, History of the Staffordshire Potteries. 1829. p.121.
2. : R. Copeland, A short history of pottery raw materials and the Cheddleton Flint Mill. p.5.
S. Shaw, History of the Staffordshire Potteries. 1829. p.121.
3. : Josiah Wedgwood was probably the first potter to scientifically examine the problem of measuring kiln temperatures. J. Wedgwood. Description and use of a thermometer for measuring the higher degrees of heat from a red heat up to the strongest that vessels made of clay can support. 1784.
4. : A. Mountford, A Group of Astbury-Type Pottery Found in Shelton, Stoke-on-Trent, Staffs. SJ 879 469. City of Stoke-on-Trent Museum Archaeological Society Reports. 7. 1975. p.28. The wasters were dated c.1725-40.
5. : S. Shaw, History of the Staffordshire Potteries. 1829 p.112.
6. : R. Thompson, Midland Purple. (lecture). Post Medieval Archaeology Conference at Leicester University. March 30th. 1974.

For the Staffordshire stonewares to be competitive in the large urban markets, they had not only to be of similar quality to other contemporary ceramic wares, but also acceptable in the place of pewter and silver. For generations, potters had imitated metalware forms as a basis for their own wares (1) and this tradition was maintained through the production of stonewares. (2) The new ceramic bodies sustained a more refined finish and with improved kiln technology, warping of even the thinnest sectioned pieces could be avoided. Many of these metalware shapes, especially those with relief moulding, were impossible to produce satisfactorily on the wheel alone and potters turned to the use of block-moulds (3) and other hand tools, (4) for the production of these wares. Initially made of locally mined alabaster, and after c.1745 from plaster-of-Paris, (5) these moulds were capable of mass producing even the most intricate pieces and the master block-cutter was a highly respected and paid operative. Thomas and John Wedgwood of the Big House Pottery, Burslem, engaged the elder Ralph Wood between c.1748-70 and during this period he acted as manager in the absence of John Wedgwood, as well as making most of the blocks for the pottery. (6)

1. : For example, late fifteenth century 'Cistercian' wares frequently copied contemporary metalware shapes.
P. Brears, The English Country Pottery. p.22.
2. : J. Kelly, A rescue excavation of the site of Swan Bank Methodist Church, Burslem, Stoke-on-Trent, Staffordshire, England SJ870 499. City of Stoke-on-Trent Museum Archaeological Society Report. 5. 1973.
3. : J. Kelly and S. Greaves, The Excavation of a Kiln Base in Old Hall Street, Hanley, Stoke-on-Trent, Staffs. SJ885475. City of Stoke-on-Trent Museum Archaeological Society Report. 6. 1974.
4. : For example, earthenware profiles were frequently used to provide a standard section to thrown wares.
A. Mountford, The Illustrated Guide to Staffordshire Salt-Glazed Stoneware. p.34.
5. : Ibid. pp.29-34. Alabaster was mined at Tutbury, twenty-five miles from the Potteries.
6. : Ibid. p.33.

In the absence of comprehensive potters' records surviving, evidence for the use of tools in the manufacture of pottery during the late seventeenth and early eighteenth centuries, is largely confined to the interpretation of archaeological excavation. However, after this period, business records indicate that many of the techniques and tools developed by salt-glaze manufacturers were retained and modified after the transfer to creamware and porcelain production in the 1760's. (1)

John Baddeley, in partnership with William Reid and Daniel McNeale, both of whom were based at a Liverpool pottery, and William Yates who was a maltster from Newcastle-under-Lyme, established an earthenware and porcelain works at Shelton in 1755. (2) Through a series of accounts of his transactions kept by Baddeley on behalf of the Liverpool partners, it is possible to trace the development of the works and identify the equipment used in manufacture.

From the commencement of the partnership accounts in 1755, to the engagement of the first operative on the 11th of November 1758, Baddeley purchased numerous items in preparation for the manufacture of porcelain at Shelton. Most of the purchases of raw materials were recorded, but, significantly, there were few purchases of tools or equipment. In all probability, the tools used at the works were those previously employed by Baddeley in his partnership with John Mare and the recorded items were replacements or additional items. On September 26th, 1755, Baddeley purchased two lawns for sieving clay for 5s. and on March 25th, 1758 paid Harrop 9s. for 'modells'. (3) Shortly after a five day visit

1. : Creamware was a cream coloured earthenware with a transparent lead glaze, developed in c.1760; porcelain, as initially developed, was a fine ceramic body prepared in the same way as ordinary earthenwares with the exception of the substitution of kaolin and feldspathic rock for certain clays.
See Chapter 4.
2. : SRO.: D1788. p.14. b.2. 'Case'. 1758.
3. : SRO.: D.1788.V.94. Account book for transactions undertaken by Baddeley on behalf of Messrs. Reid & Co., February 5th, 1755 to May 9th, 1761. Baddeley also purchased lathes costing £1.14.9 and a hand mill for £7.10.7.

to Worcester, made in August 1758, the first operatives were hired - seventeen men and sundry lads, including a handler and thrower. (1) It is possible that several of these men brought their own utensils, a practice known in the textile industry. From March 3rd, 1759 painters were hired and from that point onwards Baddeley's pottery was fully operational. (2)

In 1761 the Liverpool partners were declared bankrupt and although Baddeley and Yates were only minor shareholders in the firm (3) they were also forced into bankruptcy. The contents of the Shelton works were meticulously inventoried and from this it is possible to itemise the utensils used by the works. Material preparation was largely undertaken with hand tools. Slip was prepared in blunging tubs which were located in a separate slip-house. There was also an iron blunging furnace. Raw materials were ground at Botteslow Mill, away from the works, with the exception of saggar marl and colours which were prepared in small hand mills at the pottery. Lathes and wheels were employed to shape the wares, but curiously there is no mention of moulds, although they were certainly in common use by 1761, and the only reference to such an item was for a single 'Screw Box to make Handles.' It is possible that the moulds had been previously disposed of, or alternatively belonged to the other partners. On the whole there was a wide range of tools in use, all hand powered, the heavier material preparation being undertaken away from the works

1. : Ibid. Based on their total weekly wage of 10s. the number of lads would have been two and four.
2. : Ibid.
3. : PRO.: Docket Book of Commissions in Bankruptcy, 1759-63. B.4/16, Ind.22649. pp.138,141,143,149. Baddeley and Yates both possessed three-sixteenths shares, Reid and McNeale had five-sixteenths shares each. SRO.; D.1788.p.14.b.2.

at a water mill. (1)

With the intensification of competition amongst North Staffordshire potters, there emerged in the late eighteenth century a discernable change in entrepreneurial policy. Potters became concerned with : "...not so much the advancement of the art, as the discovery of cheaper processes and cheaper materials, by which the present quality of manufacture can be wrought." (2) Potters were forced to adopt trade specialisation and mechanisation in order to remain competitive.

In those potteries which had established specialised workforces, the entrepreneur had a means of reducing manufacturing costs through the production of standardised and improved quality wares. Skilled workers could be trained to produce a single, carefully chosen product, rather than a series of articles made to a lower standard. Josiah Wedgwood

1. : SRO.: D.1788.p.14.(2) Valuation of Baddeley's assets. July 22nd, 1761. See Appendix 2 for a full list of all utensils used at Shelton.

A similar range of utensils was recorded in the probate inventory for Joseph Warburton of Cobridge, an important potter who had assisted in the development of creamware and whose total estate was valued at £234. The utensils were :

"In the workhouse stock of clay.	£18.12.-
four lathes	£8.7.-
Three wheels	£2.14.-
One Seive three paddles and old thinks	£-.13.-
A Squeezing Box.	£-.4.-
An Iron Crow	£-.3.-
A Beating board, Slip tubs, Lawns, etc.	£1.8.6.
Iron bands, pokers, etc.	£6.-.-
Boards.	£2.10.-

LJRO.: B/C/11. Joseph Warburton, November 9th, 1752.

2. : W. Evans, Art and History of the Potting Business. 1846, p.vi.

at Etruria trained artists to develop a particular style and engaged : "...hands to work at red and black.. constantly & then we shall make them good, there is no such thing as making now & then a few of any article to have them tolerable."

(1) Once a skilled and trained workforce had been established at Etruria it was possible for Wedgwood to reduce his manufacturing overheads in response to the 20% price reduction agreed by a Potter's General Assembly in 1773. (2) The piece rates for wares were reduced and in order to maintain wage levels, Wedgwood provided constant employment for workers in a specific branch of trade and in one single manufacturing process, removing the need for operatives to take as much trouble : "...tuneing their fiddle as playing the tune.." (3) Wedgwood recognised that factory overheads were independent of the amount of ware produced and realised that to remain competitive he had to make the best possible use of his fixed capital assets : "...the making the greatest quantity possible in a given time." (4) Accordingly, the Ornamental Works at Etruria were equipped with a large

1. : Wedgwood Mss.: E18271-25. Letter Wedgwood to Bentley, December 1st., 1769.
Other potteries adopted similar policies, for example, Warmstry House, Worcester. H. Sandon, The Illustrated Guide to Worcester Porcelain. p.36.
2. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. p.128.
The Assembly had been convened on the 30th May, 1771 in order to stabilise prices during a trade recession. Letter Wedgwood to Bentley, May 30th, 1771. Uncatalogued - Leith Hill Place. There were several trade organisations working in the Potteries, including the Burslem District of Manufacturers of Earthenware - 1814, and the Chamber of Commerce - 1825. Whilst they were active in the control of prices and overall commercial policy, they did not apparently have any direct control over the organisation of individual potteries. Staffordshire Advertiser. 20. February 19th, 1814.
Ibid. 31. December 17th, 1825. et.seq.
In addition the Staffordshire potters were represented by Wedgwood at the General Chamber of Commerce of British Manufacturers, a body established in 1785 in order to promote and protect the national interests, particularly foreign trade, of entrepreneurs.
J. Thomas, The Rise of the Staffordshire Potteries. p.152.
3. : Wedgwood Mss.: E18392-25, Letter Wedgwood to Bentley, August, 23rd. 1772.
4. : Ibid.

stock of standard moulds : "We have now upwards of 100 Good forms of Vases, for all of which we have the moulds, handles, and ornaments, and we could make them almost as currently as useful ware, and at one half the expense we have hitherto done, provided I durst set the Men to make from about 6 to 12 doz of a sort;.."(1)

Many of the tools and utensils employed by Wedgwood in the Ornamental Works were already in common use in other Staffordshire works, although most were modified to provide particular refinements to the wares. (2) Some of the tools used were purpose-made for Etruria : "Mr. Wedgwood's delicate manipulations in the line or ornamental variation also required tools of exquisite construction and fineness; as punches, spatula-like instruments and gravers." (3) The majority of these punches were manufactures by Wyke of Liverpool and Stamford of Derby, following designs submitted by Wedgwood :

1. : Ibid.
2. : The development of hand tools in eighteenth century potteries has recently been examined in : F. Celoria, Ceramic Machinery of the 19th Century in the Potteries and in other parts of Britain. Staffordshire Archaeology. 2. 1973.
3. : E.Meteyard, The Life of Josiah Wedgwood.2. p.17.

ILLUSTRATION OF FRIEZE AND FRIEZE CUTTER : (1)



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1. : E. Meteyard, The Life of Josiah Wedgwood. 2. pp.18,21.

The commercial success and expansion of The Potteries and the survival of such isolated potting centres as Worcester and Leeds, was a reflection of the widespread take-up achieved by the late eighteenth century, of mass production techniques based on hand crafts and auxilliary mechanical assistances in a few branches of the trade.

Chamberlain's porcelain works, established at Diglis, Worcester in 1786 as a decorating workshop for Caughley (Shropshire) and Warmstry House (Worcester) wares, had, by 1802 (1) established a supreme reputation for the production of high quality and richly decorated wares. The expansion of the firm was in part the result of the recruitment of a highly skilled workforce and partly due to the early take-up of many of the tools and manufacturing techniques used elsewhere in the industry, notably in Staffordshire. An inventory made at Christmas 1795, (2) lists a comprehensive range of utensils, including a brass mortar and pestle for colour grinding, sieves, and lawns for filtering clay and lathes to finish moulded ware. From the high valuation of moulds and models, £210, and the model for a screw box, it would appear that much of the ware was made by casting, being finished on the wheel and lathe. Seventeen separate rooms and buildings were itemised including a slip-house, mill-house, saggar workshop, warehouses for each type of ware, and potting and painting rooms. (3)

1. : In 1802 Lord Nelson visited the works and ordered breakfast, dinner and dessert services. Chamberlain Mss.: 7. 1804-6 Journal Wholesale and Retail Invoices.
2. : Ibid. 32. Stock Book. 1795. See Appendix 3.
3. : For a full list of rooms see Appendix 3.

The pottery employed approximately forty operatives in 1795 (but in the absence of detailed records this number and any job specialisation can only be surmised.) (1) The presence of painting rooms and the frequent occurrence in accounts of purchases of gold and other expensive decorating materials (2) is further evidence for the need for trained operatives, in the decorating departments at least. The proportion of imported to Diglis-manufactured ware was small, a valuation of £231.17.7d. out of a total stock valued at £3,442.19.0d. (3)

The reliance on manual power and hand crafts was emphasised by Valentine Green in his description of the manufacturing cycle at Warmstry House, Worcester, in 1764 :

"..from thence into the throwing-room, where the ware is first formed from the clay. From this you are taken to a narrow passage, to the stove, which, a fire being placed on its centre, equally diffuses its heat to the whole; the ware is placed here to dry gradually, thereby preparing it for the succeeding operation. ...the ware is turned upon the lathe, another method is carried on, called, pressing the ware on the wheel. ...also turning on the lathe, with that part of the business called, handling and spouting, ie. putting the hands to cups etc. and the spouts to teapots etc. From hence..into another pressing room,..in this the clay is pressed by the hands only in the mould. From hence.. where are the first sett of kilns called buisquet-kilns, in which the ware is first burnt. After passing another stove, you entre the dipping or glazing room, in which the ware receives its glaze. From thence to another sett of kilns, where the glazed ware is burnt."(4)

1. : The nearest surviving wage list is dated January 1st, 1796, and was for £40.18.1. but without any breakdown. By 1801 an average of 85 operatives were employed and the average weekly wage bill was £83.15.5. The presence of painters and burnishers, along with children indicates a high degree of operative specialisation, the children hired presumably to run moulds and turn wheels and lathes. Chamberlain Mss.: 1796-1806 Wage Book and 1801-9 Wage Book.
2. : Chamberlain Mss.: 66. 1792-8 Cash and Order Book.
3. : Ibid. 32. Stock Book.
4. : V. Green, Survey of the City of Worcester. 1764. quoted by H. Sandon, op.cit. pp.9-10.

This position had not materially changed by 1810 when a guide book prepared for visitors to the works was published (1) and children were still employed to turn potter's wheels at the factory in 1843. (2) Neither was this continued reliance on hand crafts in the early nineteenth century unique to the Worcester potteries. In a series of woodcuts published in 1827 on behalf of Enoch Wood and Sons, the Burslem potters, (3) the reliance on hand crafts in what was generally considered by contemporaries to be a progressive firm, is well demonstrated (4) :

1. : The Process of Making China. 1810
2. : Penny Magazine. 12. 700. Supplement. 1843. p.73.
3. : F. Falkner, The Wood Family of Burslem. p.83.
4. : The Victoria History of the County of Stafford.
8. p.135.

WOODCUT ILLUSTRATIONS OF THE MANUFACTURING PROCESS AT
ENOCH WOOD AND SONS BURSLEM POTTERY IN 1827 : (1)



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1. : A Representation of the Manufacturing of Earthenware.
1827.

The woodcuts are given, complete with their text and whilst stylised they are accurate as far as details of utensils used are concerned.

Page removed for copyright restrictions.

Initially, potters prepared their materials by hand, crushing the hard clays and ores in hand mortars and small stamp mills, (1) an adequate if dangerous process, with the inhalation of dust causing silicosis after only two to three years exposure. (2) The expansion of the industry during the early eighteenth century, necessitated the individual preparation of greater quantities of materials and technical innovation extended the range of materials requiring preliminary grinding - from c.1720 both ball clay and flint required crushing before use. (3) In response to this need for increased capacity, potters examined alternative sources of power, and although the use of hand mills did not decline completely - they were still extensively used up to the early nineteenth century for the preparation of expensive colours and for the preliminary crushing of flint (4) - the horse driven mill became the commonest method of preparing materials. Thomas Wedgwood had a horse pug mill as early as 1657 (5) and interestingly, the Warmstry House Pottery, Worcester, relied on a horse powered mill until as late as 1763:

"In a room adjoining to the slip-house, you are shown a large iron rowl, upwards of two tons weight, by the assistance of horses, revolving in a grove, not much unlike a cyder mill. This rowl reduces all the hard bodies made use of in the composition to a fine powder, fit for levigation." (6)

Although the horse mill shown below was used for the preparation of flint for glass making, the machinery was identical to that used by potters :

1. : F. Celoria, Ceramic machinery of the 19th century in the Potteries and in other parts of Britain. Staffordshire Archaeology. 2. 1973. p.16.
2. : R. Copeland, A short history of pottery raw materials and the Cheddleton Flint Mill. p.6.
3. : See Chapter 4.
4. : R. Copeland, op.cit. p.16.
5. : The Victoria History of the County of Stafford. 8. p.133.
6. : V. Green, Survey of the City of Worcester. 1764.

ILLUSTRATION OF A HORSE MILL FOR GRINDING FLINT : (1)



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1. : W. Pyne, Microcosm. 1806

In addition, a few potters adapted windmills to grind materials and although ideally suited to the exposed nature of the Potteries, their application appeared to be limited and short lived. (1) Thomas and John Wedgwood in c.1750 commissioned Brindley to erect a windmill on the Jenkins, Burslem, (2) and in 1779 Watt and Edgworth completed a wind powered flint mill for Wedgwood at the Etruria Pottery, using a design prepared by Darwin. (3) The Jenkins mill remained in use until at least 1832, but it is doubtful whether the Etruria mill remained in use long after the third steam engine was installed in 1793. (4)

The continued expansion of the pottery industry, together with the health risks attendant with the dry crushing of materials, required the development of alternative milling techniques and the most significant was Thomas Benson's 1726 patent for a wet milling process. (5) The new mills required a constant water supply, both to power the machinery and supply the grinding arks and with few potential sites on the watercourses within the manufacturing district, sites were selected on the nearby rivers Trent and Churnet and in the Moddershall valley, where existing mills were available for use or conversion. (6)

1. : See Appendix 4 for a complete inventory of known potters' mills.
2. : The Victoria History of the County of Stafford. 8. p.134.
3. : E. Meteyard, The Life of Josiah Wedgwood. 2. pp.29-30.
4. : SRO.: D593/H/447a. Hargreaves 1832 Map of the Potteries. Boulton and Watt Mss.: Catalogue of Old Engines, Section A. p.56. Portfolio 97.
5. : Thomas Benson. Patent no. 487. 1726. Preparing Flints for Making White Pots. A second, similar patent was granted in 1732, no, 536.
6. : R. Copeland, op.cit.p.22.
A similar situation arose in Worcester and in 1763 the proprietors of the Warmstry House Pottery were required to lease a mill several miles from their works, on the Glasshampton Brook, Astley Parish.
H. Sandon, The Illustrated Guide to Worcester Porcelain. p.10.

The Mostylee corn mill in the Moddershall valley, built in c.1716, was converted for potters' use in 1756 (1) and a similar conversion occurred at the South Mill, Cheddleton, in c.1785, an important site which exploited the Lichfield to Manchester turnpike road and the subsequent Caldon Canal. (2) Occasionally conversion of other water powered sites was possible, as for example when Thomas Adams, Stephen Stringer and Thomas Wedgwood agreed in 1744 to : "take, farm and rent ye old ffurnace at Lawton and convert it into a fflint mill." (3)

Intensive exploitation of the available watercourses occurred from the mid-eighteenth century. Two potters, Gallimore and Astbury, in partnership with Thomas Benson, the engineer, built the Ivy Mill in the Moddershall valley in c.1740. (4) and the milling capacity at Cheddleton was doubled through the erection of a second mill in c.1780. (5) In all, thirty-five flint and colour mills were established on these watercourses and it is reasonable to assume that most were purpose-built for the pottery trade. (6) Once established, many flint mills were tenanted and sub-let; Moses Keeling of Lane Delph shared a lease with John Baddeley of Shelton of a Moddershall mill and in 1796 Adams, Yates and Godwin auctioned their eighty years unexpired lease of the Upper Mill, Stanley. (7)

1. : R. Wailes, Water Driven Mills for Grinding Stone. Paper read to the Newcomen Society, April 5th, 1967.
2. : R. Copeland, op.cit. p.21.
3. : Rental agreement, April 24th, 1744. Uncatalogued mss.: City Museum and Art Gallery, Hanley, Stoke-on-Trent.
4. : L. Helsby, A. Rushton and D. Legge, Watermills of the Moddershall Valley - An Historical Engineering and Economic Survey of the Water Mills of Staffordshire. 1961. Stafford College of Technology.
5. : R. Copeland, op.cit. p.35.
6. : See Appendix 4.
7. : Letter Baddeley to Fletcher, May 31st, 1762. SRO.: D.1788.p.1.(1) Baddeley supplied many potters with ground materials and his milling business was as significant as his potting. Staffordshire Advertiser. 2. March 12th, 1796. In 1835 the mill used a twenty foot diameter, five foot width wheel. Staffordshire Advertiser. 41. December 12th, 1835.

Whilst the majority of eighteenth century potters' mills were established away from the Potteries, the nineteenth century was marked by an exploitation of sites within the manufacturing district. Many of these new mills were steam powered, as for example the Nelson Place, Hanley, mill, occupied by John Booth in 1838, but a few water powered mills were built. (1) Joseph Myatt held the Foley Mill, Fenton, up to 1820, which exploited a fall to the Cockster Brook of twenty-six feet (2) and the New Hall Pottery, Shelton, possessed a water flint mill near to their works, on Booden Brook, in 1806. (3) Not all of the nineteenth century mills were used exclusively for flint milling and several were purpose-built to grind both corn and flint, as for example a mill built in c.1830 in Tunstall and several in nearby Stone. (4) This possibly indicates the continued ability of the mills outside the Potteries to meet most of the market demand for ground materials, although more plausible would be the effect of increased competition from the steam powered mills developed during the early nineteenth century.

The investment in steam powered mills reflected in part the shortcomings of water milling. The intensive exploitation of available sites resulted in the inevitable water supply difficulties and few potters were as fortunate as Hollins Warburton and Company of the New Hall Pottery, who were awarded £30 compensation by the Trent and Mersey Navigation Co., for loss of water at their Abbey Hulton Mill in 1792. (5) This constant failure of their mill forced them to develop an alternative site on the Booden Brook.

1. : See Appendix 4. Staffordshire Advertiser. 44. March 17th, 1838.
2. : Staffordshire Advertiser. 26. August 26th, 1820.
3. : The Victoria History of the County of Stafford. 8. p.167.
4. : Staffordshire Advertiser. 37. March 12th, 1831.
Ibid. 38. November 17th, 1832.
5. : SRO.: D593/B/1/11/40. March 25th, 1792, compensation award.

The limited capacity of many of these mills was a further disadvantage. The Sprat Slade mill, Trentham, was only capable of grinding 500 pecks of flint per week, in 1811, (1) an average capacity, (2) and there were several smaller mills - the Lower Mill, Trentham having a capacity of 240 pecks per week in 1815. (3) Whilst water mills were developed to exceed this capacity, the Stone flint mill in 1822, deploying a twenty-six foot diameter wheel ground 1,000 pecks of flint per week, (4) it was generally the steam mill which achieved such production rates. (5) In addition, the siting of most mills away from their parent works, removed the potential for the application of water power to other manufacturing processes and the following map, giving the location of water powered flint mills in the vicinity of the Potteries, illustrates this problem :

1. : Staffordshire Advertiser. 17. November 9th, 1811.
2. : See Appendix 4.
3. : Staffordshire Advertiser. 21. June 17th, 1815.
4. : Staffordshire Advertiser. 28. March 2nd, 1822.
5. : For example, the Stoke flint and corn mill, on the banks of the Newcastle Canal, employed a twenty-six h.p. engine to grind 1,000 pecks of flint per week, in addition to corn. Staffordshire Advertiser. 31. October 29th, 1825.

Unless working a very large pottery, manufacturers required far less than 500 pecks of flint per week, Jonah Malkin in 1749 purchased an estimated 260 pecks per year. The supplies to additional partners or sub-tenancies would account for part of the considerable surplus capacity, the rest would be sold as part of a subsidiary business interest, as conducted by Baddeley between 1758-63.

A. Mountford, The Illustrated Guide to Staffordshire Salt-Glazed Stoneware. p.37.

SRO.: D1788. V. 95.

Although several mill capacities are known, these are insufficient to prepare any form of reliable estimate as to the total theoretical milling capacity of the industry.

MAP OF THE POTTERIES, SHOWING THE MANUFACTURING TOWNS AND
WATER POWERED FLINT MILLS, IN 1775. : (1)



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In order to overcome these difficulties, potters sought additional sources of motive power, and found that the use of an auxilliary steam engine to pump water over an existing water wheel, regulated the working of the mill. Towards the end of the eighteenth century there were close trading links between Cornwall and the Potteries and after a visit to the peninsula in 1775, John Turner followed the example of the tin miners and installed an atmospheric engine at his Lane End pottery. (1) Interestingly, Josiah Wedgwood, who accompanied Turner on the visit, decided against the use of an atmospheric engine and it was his commercial rival Josiah Spode who realised the benefits of such an installation and applied an engine to pump water over his twelve foot diameter wheel in Stoke. (2)

The atmospheric engines were inexpensive to install (3) and effective in regulating the work of the mill, but the efficiency of this application of steam power was limited by the efficiency of the original mill. The Spode mill for example, had a capacity of only 300 pecks of flint per week, together with 150 pecks of enamel and marl. (4) With the patenting of Watt's Sun and Planet motion in 1782, (5) many of these problems were eliminated and Boulton and Watt recommended clients to install : "...engines which are applied

1. : S. Shaw, History of the Staffordshire Potteries. 1829 p.173. Other entrepreneurs had employed atmospheric engines to pump water over existing wheels, the Coalbrookdale Ironworks for example, installed an engine in c.1742. R. Hills. Power in the Industrial Revolution. pp. 134-5.
2. : Boulton and Watt Mss.: Incoming Letters, Box 36. Letter Josiah Wedgwood to the company, c.1782. The letter, and subsequent correspondence, indicates that Wedgwood favoured a more sophisticated engine, hence the reluctance to install one similar to Turner's.
3. : R. Hills, op.cit. p.144.
4. : Boulton and Watt Mss.: Incoming Letters. Box 36. op.cit.
5. : R. Hills, op.cit. p.142.

directly to the moving of mills without waterwheels which do the same work cost less in construction than the others and require less fuel." (1) With the advantages of steam power demonstrated, potters, where capital was available, converted their water mills to steam power. Jesse Breeze converted his mill at Greenfields in 1806, (2) and Enoch Wood replaced obsolete machinery at his Fountain Place mill, in the early 1840's. (3)

Entrepreneurs who wished to centralise their operations within one industrial complex, or who did not have access to a suitable water powered site, were able after 1782 to install steam driven mills at their potteries. Adams has been attributed the distinction of bring the first potter to install such machinery (4) and it was inevitable that with the opportunity of increasing significantly the efficiency and capacity of their mills, other potters would follow. When Wedgwood wrote to Boulton and Watt in c.1792 with a detailed list of what he wanted a ten horse power engine to do, the operations included the grinding of flint, enamel colours, saggars and tempering clay. (5) This engine was intended to supplement the original engine installed at Etruria in 1784. (6) Spode replaced the atmospheric engine in 1802 with a ten horse power rotative beam engine and

1. : Letter Boulton and Watt to A. Burden, August 11th, 1785.
2. : The Victoria History of the County of Stafford. 8. p.100.
3. : The original mill was used for : "...raising water and preparing the clay, ready for the hands of the potters, and for grinding glaze and colours." J. Ward. History of the Borough of Stoke-upon-Trent. p.260.
As late as 1843 the Fenton Mill was advertised as having a thirty-eight horse power engine to assist a water wheel. Staffordshire Advertiser. 49. January 14th, 1843.
4. : S. Shaw, History of the Staffordshire Potteries. 1829. pp.62-3.
5. : Boulton and Watt Mss.: Incoming Letters. Box 36. See Appendix 5.
6. : Ibid. Outgoing Letters. Office Book, April 1728-July 1784. p.454. Letter Boulton and Watt to Wedgwood, June 10th, 1784.

further increased the capacity of his mill in 1810 by the installation of a replacement, thirty-six horse power engine. (1) The example of the larger manufacturers was followed, during the first half of the nineteenth century, by a succession of potters, and by the 1850's steam power was common in the industry. (2)

Unlike material preparation, there were persistent technical problems in the application of steam power to the production of wares and it was not until the development of a means of exercising individual control over the speed of steam driven machinery, particularly lathes and wheels, that a widespread take-up of steam powered production was possible. A means whereby the operative could control the speed of machinery he was using was developed by the late eighteenth century and perfected in the 1830's. :

"..where steam power is available, cones inverted are placed on parallel shafts, and a belt is adopted to them, which is adjusted because of their similar but opposed dimensions. One of these shafts has a pulley on its lower end, from which passes a belt to the thrower's wheel; and the other is connected by proper gearing, with the moving power. The needed velocity for the thrower is obtained by a moveable belt being higher or lower on the driving cone, from a directing lever." (3)

The following illustration shows the use of cones at the Spode works .

John Turner of Lane End was one of the first to extend the use of steam power at his pottery to include the turning of lathes and wheels, (4) and Cope, an ironfounder from Milton, Tunstall, converted lathes for Hales and Adams at Cobridge and printing presses for Ralph Baddeley at Shelton, by 1792. (5)

1. : R. Copeland, op.cit. p.17.
2. : See Appendix 6 for a list of all known steam engines installed by North Staffordshire potters.
The list is provided in the appendices by nature of its limited content, which is misleadingly sparse and not a true reflection fo the take-up of steam power by potters.
3. : W. Evans, Art and History of the Potting Business. 1846 P.26. The Potters' Examiner and Workman's Advocate, December 9th, 1834.
4. : S. Shaw, History of the Staffordshire Potteries. 1829.p.173.

ILLUSTRATION OF CONES AND VARIABLE BELTS FOR CONTROLLING
THE SPEED OF STEAM DRIVEN MACHINERY : (1)



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1. : The Penny Magazine. 1843., March. Supplement, p.206.
The illustration was based on machinery used at
the Spode-Copeland pottery, Stoke.

The technical problems associated with the application of steam power to the manufacturing process were paralleled by more recalcitrant obstacles in the development of the process itself. During the 1804's a number of machines were developed to standardise and increase the production of flat and hollow wares - plates and cups. (1) The jigger and jolley, as the respective machines were termed, were adaptations of the plaster mould and profile, the two used together and powered either by hand or by mechanical assistance :

- 1: : The development of these, and other potters' machines, is examined in detail in the comprehensive :
F. Celoria, Ceramic machinery of the 19th century
in the Potteries and in other parts of Britain.
Staffordshire Archaeology. 2. 1973. pp.11-48

An earlier reference than that given by Dr. Celoria for the use of the jigger is provided by Pratt, of Messrs. F. and R. Pratt, Fenton, in his evidence before the 1841 Inquiry, who evidently used jiggers at that time - as did other potters. Appendix to the second report of the Commissioners. op.cit. Statement no. 157.

ILLUSTRATIONS OF THE JIGGER AND THE JOLLEY : (1)



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1. : E. Ronalds and T. Richardson, eds. Chemical Technology; or, Chemistry applied to the Arts and to Manufactures. 2. 1848. p.242. fig. 121.
- G. Lambert, Art Ceramique. Description de la fabrication actuelle des faïences fines et autres poteries en Angleterre avec indication des ressources que presente le Belgique pour ce genre d'industrie. Brussels. 1865. pp.352-3. fig. 29.

The latter illustration is by far the most explicit of those available for the jolley, but is a late example.

The initial response of both manufacturer and operative to the new machines was one of caution; the operatives feared that the machines would lower piece rates by leaving only the tedious and complicated shapes for hand working; (1) the masters faced opposition from the operatives and potters' unions. In addition, the machines were not without their defects : "Independent of the want of polishing, hair-cracks almost invariably made their appearance in the backs of the ware, after firing." (2) C.J. Mason introduced the jolley at his Fenton pottery in 1844 (3) and spirited opposition, similar to that experienced by other potters, notably Copeland, forced the abandonment of the scheme. (4) "...it scared not only the workpeople but the masters themselves, "Futility" breathed upon them as well as on their operatives, and after a while even some of the largest employers fled from the introduction of machinery as from a ghost." (5) The overcoming of this joint reluctance to the take-up of the new machines was a slow process, lasting several decades. (6)

Further evidence for the slow take-up of mechanised production in the pottery industry is indicated by the slow establishment of specialist firms supplying potters' machinery. Much of the early machinery came either from local millwrights or textile machinery manufacturers in Macclesfield. (7) A number of small ironfoundries were

1. : W. Warburton, The History of Trade Union Organisation in the North Staffordshire Potteries. 1931. p.156
2. : W. Evans, Art and History of the Potting Business. 1846. pp.vii-viii.
3. : Dr. Wall of Manchester patented the jolley in 1843. Patent no. 9901. The Potters' Examiner and Workman's Advocate. November 30th, 1844.
4. : H. Owen, The Staffordshire Potter. p.95.
5. : C. Shaw, When I was a Child. pp.186-7.
6. : With the exception of Warburton, the above authors were strongly biased towards the unions and their reactions to machinery were appropriately coloured. For a more impartial assessment see J. Thomas, The Rise of the Staffordshire Potteries.
7. : Wedgwood in 1801 engaged the services of Mr. Thornicroft, millwright, in connection with fitting out the Etruria mill. He also employed Kirk. Boulton and Watt Mss.: F.1800-4.p.73. Letter Boulton and Watt to Wedgwood, March 14th 1801.

established during the late eighteenth century, the most notable being Cope's, who supplied a wide range of engines and machinery from 1782 (1) including an engine to Thomas Wolfe, in 1793; but by the 1840's most of these foundries had declined in business. (2) In the 1850's and 60's, with increased mechanised production, a number of new specialist foundries and firms of engineers appeared, including William Boulton of Stoke and Burslem (still in business) Hancock's Foundry, Fenton and F. and J. Silvester & Hopkins at the Castle Hill Foundry, Newcastle-under-Lyme. (3)

The advent of increased mechanisation in the potteries inevitably affected the working conditions of operatives, if for no other reason than it significantly increased the amount of ware to be handled by the operatives in the dipping and scouring departments. (4) Accidents directly attributable to potters' machinery were uncommon, the first being in 1803 when Josiah Spode iii lost an arm in the gearing of the then recently installed engine. (5) Despite the dramatic and personal nature of the accident, precautions were not taken to guard against further mishap : "...all the lathes are turned by steam machinery; we have the means of stopping all

1. : S. Shaw, History of the Staffordshire Potteries. 1829. p.62.
2. : William Heath advertised his engine business in 1809 but was bankrupt by 1812. Staffordshire Advertiser. 15. April 22nd, 1809. Ibid. 18. February 22nd, 1812. S. Shaw, History of the Staffordshire Potteries. 1829 pp.62-3.
The Victoria History of the County of Stafford. 8.p.203.
J. Ward, History of the Borough of Stoke-upon-Trent. pp. 378-9.
3. : J. Thomas, Rise of the Staffordshire Potteries. p.57.
Keates and Ford's Annual Directory of the Potteries and Newcastle with Almanack. 1867.
4. : Appendix to the Second Report to the Commissioners. 1842. op.cit. Statement 22, Minton and Boyle, Stoke, statement 45, Copeland and Garrett, Stoke.
5. : Staffordshire Advertiser. 35. December 19th, 1829.

the lathes and throwing tables at a moment's notice, but we must run into the cellar to do it; sometimes accidents do occur, but they are rare."(1), although the engine itself was railed off by 1834. (2) The minimal precautions taken by the Spode works (3) were though frequently more than those taken by most manufacturers, who considered their machinery to be perfectly safe. (4) Despite such protestations, accidents did occur and it is a matter for conjecture as to how many never came to the public notice : "...was hurt once by the machinery; had my hand nigh clean off; could not go to work again for 8 months; was in the Infirmary; never knew any other accident here;... I clean the machinery, all about the little wheels, when it is going sometimes."(5)

Whilst it is clear that many entrepreneurs ignored the risks of machinery, it is also certain that the problems were exacerbated through the ineptitude of the operative. The poorly educated labour force available to potters was ill-prepared for the transition to operating the new, complex machinery, a problem little alleviated by the growth

1. : Appendix to the Second Report to the Commissioners. 1842. op.cit. Interview 48. Copeland and Garrett, Stoke.
2. : Reports from the Commissioners, 1834. op,cit. Reply 57, William Outrim for Copeland and Garrett.
3. : Ibid. Reply 49, Enoch Wood and Sons, Burslem. This statement indicates that they too had implemented minimal precautions.
4. : Of the eighteen potters giving evidence before the 1834 Inquiry, five did not consider their machinery to be dangerous, three took precautions to guard against accidents and the remainder either claimed they had no machinery or did not reply to the question asking for details or precautions. Report from the Commissioners. 1834. op.cit.
5. : Second Report to the Commissioners. 1842. op.cit. statement 47, Charles Sanders, Copeland and Garrett. Stoke. (aged 13.)

in adult education and mechanics institutes. (1) The difficulty experienced in the use of the jolley - hair-cracking after firing - was reputedly due to mechanical defect, but the evidence was far from conclusive and a serious doubt remained as to whether ineptitude or sabotage caused the problems. As late as 1864, Baker, a factory inspector reported that the greatest single problem which faced potters on the introduction of machinery was the need for : "...a more educated class of workmen, a finer touch to regulate the speed, and to a juster idea of the economy of power, than as yet overspreads the minds of potters generally." (2)

The potters who eschewed, or were unable to take-up fully mechanised production, could still maintain economic production rates in all branches with sophisticated hand tools as the 1834 auction notice for William Godwin's pottery in the Market Place, Hanley, shows :

"..throwing wheels, lathes, benches, head poles, peg posts, work house stools, printing presses, saggars, shoards, saggar bench, stillages, stone and plaster flags, frames, beating flags, blungers and drums, mortar and pestle, glaze mill, glaze tubs, dipping and washing out tubs, patent printers stove and brickwork, bake plates, iron boxes and oven tools ... block and working moulds." (3)

Examples of hand production rates are infrequent, but detailed accounts are provided in the 1842 Inquiry evidence. Cast figures were produced quickly and cheaply by small children; William Cotton worked for Deakin and Sons, Longton and was paid 2.Od. per week for the production of forty-two figures per hour, approximately 3,000 figures per week, and Richard Morton, aged nine, worked for Hilditch and Hopwood, Longton, and produced forty dozen small figures per day at

1. : The only recorded lecture on mechanisation, given to a Potteries mechanics institution, was given by Hollinshead at the half-yearly meeting of the Mechanics Institute, on January 23rd, 1837. Staffordshire Advertiser. 43. February 4th, 1837.
2. : Report by R. Baker, factory inspector, 1865.
3. : Staffordshire Advertiser. 40. August 23rd, 1834.
As late as 1844, hand tools continued to be the only form of manufacturing aids used in certain potteries. Josiah Hackwood of Upper Hanley, made figures without any mechanical assistance. Staffordshire Advertiser. 50. February 24th. 1844.

1d. per ten dozen figures. (1) Conversely, the hand presser, working a ten and a half hour day and producing : "...eight score dozen saucers in a week, every dozen counted 36 pieces;..." (2) was uneconomic, the Wall flat press or jolley produced 600 dozen plates a day, the work of seven hand pressers. (3)

During the 1840's the pottery trade unions accepted that the new machines then being developed were capable of dramatically changing the occupational structure of the pottery industry and opposed their take-up. Their belief that this was the threshold of a new age proved as unfounded as that held by later writers who saw the birth of the modern pottery industry in those decades. (4) The new machines were part of a gradual transition and a significant stage in the evolution of complete factory production, but as with other innovations in the industry, was neither conclusive nor universal in application. Today, in 1976, there are still pottery firms who manufacture domestic earthenware and china, with the minimum of mechanical assistance. (5)

1. : Second Report of the Commissioners. 1842. op.cit. Statement 316, Richard Morton, of Hilditch and Hopwood, Longton; statement 317, William Cotton, of Deakin and Sons, Longton.
2. : Ibid. Statement 248, John Johnson, of T. & J. Mayer, Longport.
3. : H. Owen, The Staffordshire Potter. p.65.
See Appendix 7 for a list of potter's jobs identified from the 1851 Census - most of which were still hand crafts.
4. : J. Thomas, The Rise of the Staffordshire Potteries. E. Gosse. D. Eyles, ed. Sir Henry Doulton, the Man of Business as a Man of Imagination.
5. : P. Gay and R. Smyth, The British Pottery Industry. p.89.

CHAPTER FOUR : POTTERY RAW MATERIALS

Shortly before his death in 1897, Sir Henry Doulton of Lambeth recalled in a series of lectures, the essence of his almost unique business success as a potter in an industry dominated by North Staffordshire entrepreneurs. Fundamentally, he considered the response to fashionable demand essential in a thriving commercial enterprise :

"Of course, public taste cannot altogether be disregarded; and if a master is to provide for the dependent army of workers the demand must to some extent regulate the supply - although the intelligent and enterprising manufacturer will always endeavour to lead the public taste."

He added : "It is needful that beauty of design should go hand in hand with economy of technique." (1)

Staffordshire potters had long been aware of these principles and whilst few employed the aggressive sales techniques adopted by Josiah Wedgwood i, (2) a developed commercial policy had been fundamental in their success in both domestic and foreign markets and all classes of

1. : E. Gosse, ed. D. Eyles, Sir Henry Doulton the Man of Business as a Man of Imagination. p. 205.
2. : "Fashion is infinitely superior to merit in many respects, and it is plain from a thousand instances that if you have a favourite child you wish the public to fondle and take notice of, you have only to make the choice of proper sponcers." Wedgwood Mss.: E18898-26. Letter Wedgwood to Bentley, June 19th, 1799. Wedgwood's sales policy is discussed in detail in : N. McKendrick, Josiah Wedgwood : An Eighteenth-Century Entrepreneur in Salesmanship and Marketing Techniques. Economic History Review. 12. 3. 1960.

manufacturer had responded to consumer demand. (1) The adoption of mass-production techniques during the early eighteenth century, together with the subsequent, gradual take-up of a rationalised sequence of manufacture, achieved an 'economy of technique'. (2) However, as with other eighteenth century industries serving a consumer market, one of the areas of most effective stimulation for new fashions and implementation of cost control, was that of the selection and exploitation of raw materials. (3)

Supplies of raw materials influenced the location of seventeenth and early eighteenth century works (4) and potters exploited these supplies to provide a wide variety of decorative wares, capable of sale throughout the country:

"..where for making their severall sorts of Pots, they have as many different sorts of Clay,...and are distinguish't by their colours and uses as followeth.

1. Bottle clay, of a white brightish streaked yellow colour.
 2. Hard-fire clay of a duller whitish colour, and fuller intersperst with a dark yellow, which they use for their black wares, being mixt with the
 3. Red blending Clay, which is of a dirty red colour.
 4. White-clay, so called it seems though of a blewish colour, and used for making yellow-coloured ware, because yellow is the lightest colour they make any Ware of
- all which they call throwing clays, because they are of a closer texture, & will work on the wheel;
26. Which none of the three other clays, they call Slips, will any of them doe, being of looser and more friable nature;

1. : See Chapter 1.

Spode ii by 1820 used 344 different shapes in thrown china ware alone. L. Whiter, Spode. pp.94-116.
James and Charles Whitehead manufacturers Hanley Staffordshire. 1798. The Whitehead trade catalogue recorded 175 earthenware shapes. The catalogue was printed in four languages.

2. : See Chapters 1 and 6.

3. : Matthew Boulton, in response to the sharp growth in demand for silverware, manufactured Old Sheffield Plate from c.1765 onwards, producing elaborate wares of comparable quality to the contemporary solid silver pieces, but at a much lower cost.
E. Delieb and M. Roberts, The Great Silver Manufactory, Matthew Boulton and the Birmingham Silversmiths 1760-1790. pp.14, 39-40.

4. : See Chapter 2.

these mixed with water they make into a concistence thinner than a Syrup, so that being put into a bucket it will run out through a Quill, this they call Slip and is the substance where with they paint their wares;.."(1)

Further refinement in decorative finish, in particular to the red clays, resulted in high quality stonewares equal in sophistication to contemporary silver ware. The Elers at Bradwell Wood introduced in the last decade of the seventeenth centiry, the use of metal dies to apply relief decoration to lathe turned wares, exploiting their earlier employment as silversmiths to provide refined and elegant forms capable of sale to the aspiring middle class in London and the provinces. (2) By the 1720's a growing number of Staffordshire potters had adopted these techniques and the following illustrations represent specimens of early eighteenth century redware based on silver prototypes - the pieces have been attributed to the Astbury family : (3)

1. : R. Plot, The Natural History of Staffordshire. 1686 pp.122-4.
2. : A. Mountford, The Illustrated Guide to Staffordshire Salt-Glazed Stoneware. p.27.
W. Mankowitz and R. Haggart, The Concise Encyclopaedia of English Pottery and Porcelain. pp.81-2.
3. : A Group of Astbury-Type Pottery found in Shelton, Stoke-on-Trent, Staffs. op.cit. pp.28-38.
The use of silver prototypes was not confined to the early part of the century, the New Hall Pottery, for example, consistently based their designs on contemporary silverware. D. Holgate, Further Thoughts on New Hall. Northern Ceramic Society Journal. 1. 1972-3. p.61.

ILLUSTRATIONS OF 'ASTBURY' REDWARES BASED ON SILVER
PROTOTYPES : (1)



Aston University

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1. : A Group of Astbury-Type Pottery Found in Shelton,
Stoke-on-Trent, Staffs. op.cit. pp.31, 36.
The wares are coffee or chocolate pots and follow
silver prototypes made no later than c.1700-25.

The use of indigenous raw materials by Staffordshire potters, in the production of fashionable wares, declined in the late seventeenth century, with the widespread take-up of salt-glazed stoneware manufacture. (1) The successful imitation of the extensively imported Germanic and Low-Country stonewares was the result of independent trials conducted by Symon Woolters in Southampton and Johnson, Talbot and Garner in Southwark, between 1664 and 1670, although John Dwight of Fulham claimed the credit for the discovery in his patent of 1671. (2) The rapid take-up of stoneware manufacture - Dwight's patent was openly infringed in Nottingham and Staffordshire by 1693 (3) - reflected the flexibility of the manufacturing technique and the ease of obtaining supplied of the salt used in glazing. (4) Burslem was supplied with salt from the brine-pans at nearby Nantwich, Northwich and Middlewich and with rock salt from Marbury, also in Cheshire. (5)

1. : For an excellent study of the salt-glaze trade see :
A. Mountford, The Illustrated Guide to Staffordshire Salt-Glazed Stoneware.
2. : British Museum : Lansdowne Mss.: 108, folio 60.
Arnold Mountford, op.cit. p.3.
R. Edwards, London Potters circa 1570-1710. Journal of Ceramic History. 6. 1974. p.16.
J. Dwight, Patent no. 164, 1671.
3. : P.R.O.: C6/524/37 and C6/404/24. These Bills of Complaint cited Hammersley, Middleton and Astbury of North Staffordshire as having infringed the 1671 patent, an earlier injunction cited Morley of Nottingham, the Elers of Fulham (subsequently Bradwell Wood) and Aaron, Thomas and Richard Wedgwood.
4. : See Chapter 3.
5. : A. Mountford, op.cit. p.11. R. Sherlock, Rock Salt and Brine.Special Report on the Mineral Resources of Great Britain. vol.xviii. p.2.

The Staffordshire potters, despite the need to import salt for glazing, were still able to produce their stone-ware cheaply, using local clays and marls finished with a ferruginous wash and sold under the name of Crouch ware :

"..the common Brick Clay, and fine Sane from Mole Cop were first used; but afterwards the Can Marl and Sand, and some persons used the dark grey clay from the coal pits and sand, for the body...in the time of William and Mary, as well as Anne, very excellent Crouch Ware was made in Burslem."(1)

The characteristic features of these wares were the dark brown glazed finish and low manufacturing cost, and it is apparent that vast quantities of these pieces were manufactured, wasters and sherds occurring in all excavations within The Potteries. (2) The comparative cheapness of the crouch wares is evident in the sales account book kept by Thomas and John Wedgwood at the Big House, Burslem, for the period 1748-80 :

"Sold to John Godwin, near Newgate, Bristol

1763	Sepr. 26	To Crate white	£5.13.4.
		To Do Crouch	£1.15.0.

	Novr. 7	To Crate white	£5.9.10.
		To Do Crouch	£1.15.0. " (3)

The reference in the Wedgwood accounts to a more expensive "white" ware alludes to the manufacture of salt-glazed wares which required both imported glazing and body materials. The first reference to the use of non-indigenous materials in the preparation of the body occurs in John Dwight's notebook, in an entry of 1698 : "Calcin'd beaten & sifted flints will doe instead of white sand & rather whiter but ye charge & trouble is more", but the subsequent

1. : S. Shaw, History of the Staffordshire Potteries. 1829. p,110.
2. : For example: A rescue excavation on the site of Swan Bank Methodist Church, Burslem, Stoke-on-Trent, Staffs, England SJ870 499. op.cit. p.3.
The Excavation of a Kiln Base in Old Hall Street, Hanley, Stoke-on-Trent, Staffs. Sj 885475. City of Stoke-on-Trent Museum Archaeological Society Report. No. 6. 1974. pp. 8-9.
3. : A. Mountford, op.cit. p.22.

take-up in Staffordshire is obscure. (1) Simeon Shaw attributes the first use of flint in Staffordshire to John Astbury of Shelton and whilst other writers endorse this attribution, Joshua Heath of Shelton has also been credited with the innovation; the first documentary reference to a flintware pottery is that of Fenton and Hill, whose works in Shelton lasted from 1719 to 1721.(2) Although the practice of mixing flint with clays was known, analysis (3) reveals that all of the early flintwares were slip coated with flint rather than comprising a clay and flint body. It was only after the large scale importation of the Devon ball clays in the 1720's (4) that the Staffordshire potters were encouraged to experiment with the use of both flint and ball clay to form wares. The determination of the best ratio of flint to ball clay by Daniel Bird of Stoke, in the 1730's, (5) and its subsequent application for most stoneware and earthenware production, did not preclude further experimentation with the two materials. As late as 1772, Josiah Wedgwood attempted to use them in glazing : "White clay has been used in our Glazes, but it is not so good, either for the color or the polish of the Glaze, as flint."(6)

1. : Ibid. p.36.
2. : S. Shaw, History of the Staffordshire Potteries. 1829. p.69.
A. Mountford, op.cit. p.35.
L. Weatherill, The Pottery Trade and North Staffordshire, 1660-1760. p.17.
3. : A. Mountford, op.cit. p.36. Tests carried out by the British Ceramic Research Association, Stoke-on-Trent.
4. : Traditionally, these clays were introduced into the Potteries by Astbury of Shelton. S. Shaw, History of the Staffordshire Potteries. 1829. p.69.
5. : Ibid. pp.63-4. Flint comprised 32% of the total composition. R. Copeland, op.cit. p.5.
6. : Wedgwood Mss.: E18430-25. Letter Wedgwood to Bentley, December 26th, 1772.

Despite competition from salt-glazed stonewares, the manufacture of lead-glazed slipwares continued into the eighteenth century, (1) and it was inevitable that experimentation should occur in the use of lead glazes with the stonewares. When prepared with flint and water, (2) the use of a liquid lead glaze over a ball clay and flint body resulted in a characteristic cream colour to the ware. (3) This modified process benefitted the potter, allowing the continued manufacture of already established shapes and patterns (4) and the development of new decorative features, most notably transfer printing, which was largely unsuccessful on salt-glazed wares. (5) Of more immediate financial consequence, the new process removed the need to pay the Salt Tax, which had been levied from 1694 and extended to include all stonewares in 1696. (6) With the grant of royal patronage for Wedgwood's creamware in 1765 - Queen Charlotte purchased a service in it and allowed the ware to be called Queens Ware - the commercial success of its manufacture was assured and by the 1780's salt-glazed production had almost completely ceased. (7)

1. : The Sadler Teapot Manufactory Site Burslem, Stoke-on-Trent, Staffs. SJ868498. City of Stoke-on-Trent Museum Archaeological Society Reports No. 7. 1975.
2. : Water based lead glazes introduced c.1745. L. Weatherill, op.cit. p.30.
3. : The cream colour resulted from impurities in the raw materials. S. Shaw, History of the Staffordshire Potteries. 1829. p.165.
4. : A. Mountford, op.cit. p.47.
The same continuation was recorded in Leeds. D. Towner, The Leeds Pottery. pp.23-4.
5. : A. Mountford, op.cit. p.62.
6. : F. Cites Knapp, Chemistry Applied to the Arts and Manufactures. 1848. vol. ii. pp.475, 477-8.
The Tax, in 1762, brought in £5,000 from 1,400 tons of salt used in the Potteries annually; it was repealed in 1825. All ovens were required to be registered and inspected after drawing. A. Mountford, op.cit. pp.12-13.
7. : L. Jewitt, The Ceramic Art of Great Britain. 1883. 2nd. ed. p.511.

The development of pottery raw materials and manufacturing processes up to the early eighteenth century had been largely one of empirical trial and error, the lack of precision and scientific method fostered by the latitude in use of the raw materials. The first potter known to have carried out controlled scientific experiment in the production of new wares, was Thomas Whieldon, who had in the fourteen years preceeding his partnership with Josiah Wedgwood in 1754, established a considerable reputation for the introduction and manufacture of a wide range of bodies and glazes. (1) Whieldon understood the properties and application of both local and imported raw materials, experimenting with both :

"for Black
2 pounds Magnass
6 pound ocre
2 scals
3 Red clay
2 Tough tom
4½ white clay
½ pound flint " (2)

Wedgwood's partnership with Whieldon lasted until 1759, during which time he has been credited with being :
"..responsible for many of the improvements and developments

1. : Thomas Whieldon's Account and Memorandum Book. c.1745-60. City Museum and Art Gallery, Hanley, Stoke-on-Trent. A. Mountford, Thomas Whieldon's Manufactory at Fenton Vivian. Transactions of the English Ceramic Circle. 8.2. 1972. pp.166, 170.
Whieldon is credited with the development of agate, marbled and tortoiseshell wares.
Despite the innovation, "White stoneware was the principal artical of our manufacture." quoted from Wedgwood, by A. Mountford, op.cit. p.47.
2. : Thomas Whieldon's Account and Memorandum Book. c.1745-60. op.cit.

which gave Whieldon his leading place amongst potters of his time." (1) Certainly one of the articles in their partnership deed was to the effect that Wedgwood should :
 "...practise for their joint benefit such secret processes as genius and experimental industry had made his;..."(2) and Wedgwood did leave Whieldon through his partner's lack of ambition : "I saw the field was spacious, and the soil so good as to promise ample recompense to anyone who should labour in its cultivation."(3) It is, however, possible that whilst Wedgwood undertook experiments for the partnership, he was assiduously improving many of the existing recipes rather than introducing new ones himself. Wedgwood recorded in his Experiment Book that he had : "...already made an imitation of Agate, which was esteemed beautiful and a considerable improvement." (4)

Wedgwood undoubtedly benefitted from his partnership with Whieldon, broadening his scientific experience and establishing a logical basis for many of the technological improvements which he was to make in later years at Etruria :

"I am going on with my experiments upon various Earths Clays &c for different bodys, and shall next go upon Glazes. Many of my experiments turn out to my wishes, and convince me more and more, of the extensive capability of our Manufacture for further improvements." (5)

1. : W. Mankowitz and R. Haggard, The Concise Encyclopaedia of English Pottery and Porcelain. p. 239.
2. : E. Meteyard, The Life of Josiah Wedgwood. 1. p.238.
3. : Introduction to Wedgwood's Experiment Book. c.1759-60.
4. : Ibid. Entry made on March 23rd, 1759.
5. : Wedgwood Mss.: E18161-25. Letter Wedgwood to Bentley, August 5th, 1767.

In his later years at Etruria, Wedgwood broadened his application of scientific research and as a result of his work on the pyrometer (1) was elected a Fellow of the Royal Society in 1783. It has been debated whether Wedgwood was a scientist or merely : "...aware of the technics of scientific experimentation and prepared to use them." (2), but what is certain is that he recognised the need for potters to experiment further in the search for new, and better uses for materials. He hired Alexander Chisholme in 1781 to assist and later direct experiments at Etruria (3) and in an attempt to enlighten his fellow potters, sought the establishment in 1775-6 of a co-operative research organisation, a project which only reached fruition in 1937. (4)

During the mid-eighteenth century the cultural horizons of fashionable English society were broadened by the influence of a classical revival and as a consequence potters were required to extend their selection of raw materials and manufacturing techniques in order to supply these demands. La Rochefoucauld during a visit to England in 1784, wrote with only slight exaggeration that the teacups and pots used by the gentry were : "...always of most elegant design based upon Etruscan and other models of antiquity."(5) The inspiration for these ware came from both contemporary

1. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. p.18.
The papers relating to experiments with pyrometers were published in the Transactions of the Society in 1782, 1784, and 1786.
2. : R. Schofield, Josiah Wedgwood, Industrial Chemist. Chymia. 5. 1959. p. 184.
3. : A. Musson and E. Robinson, Science and Technology in the Industrial Revolution. p. 78.
4. : J. Leighton, Pots and Potters. Transaction of the North Staffordshire Field Club. 41. pp.34-7.
5. : B. Hiller, Pottery and Porcelain. 1700-1914.p.130.

literary sources - the library of William Turner of Lane End, contained in 1813, amongst books on technical matters : "Hamilton's Antiquities, 4 vols. Herculaneum and Etruscan Antiquities, 7 vols. Montfaucon's Antiquities, 5 vols. Plaw's Architecture : Italian Views." (1) - and from patronage. Wedgwood in 1788 sponsored John Flaxman's visit to Italy, using many of his sketches for subsequent designs for vases. (2)

Wedgwood, in his search for a 'fine white composition' which he could use to display the finely sculptured reliefs of classical figures demanded by his customers in the early 1770's, experimented with several new materials, including china-stone and 'spalth fusible'. (3) The initial composition and method of manufacturing his intaglios was radically changed as a result of technical and commercial considerations. Vagaries in the supply and quality of spalth fusible were overcome by the adoption of an alternative material - barium sulphate. Although the intaglios were initially made in one piece, the white figures stained during firing, the metallic oxide grounds running at high temperature and this forced a change with the grounds and figures manufactured separately. (4) This was his solid jasper ware, first marketed in 1775 and highly successful, but soon replaced by dipped jasper in order to economise on the use of the expensive ingredient, cobalt. (5) Despite the secrecy with which Wedgwood prepared

1. : Staffordshire Advertiser. 19. May 22nd, 1813.
2. : B. Hiller, op.cit. pp.127-8.
3. : 'Spalth Fusible' was in all probability a protoxide of barium.
4. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. p.166.
Wedgwood Mss.: E18573-25. Letter Wedgwood to Bentley, December 18th, 1774.
5. : A. Finer and G. Savage, op.cit. pp.171, 181.
The composition of the jasper body was : flint, 10%; barium sulphate, 59%; clay, 29%; barium carbonate, 2%.

his materials (1) his jasper ware soon found imitators, including Humphrey Palmer, James Neale and John Turner. The composition of these imitations were frequently dissimilar to that employed by Wedgwood, but their quality was in every respect equal to his and they certainly competed for the fashionable markets. (2)

The development of new wares inevitably lead to the search for new raw materials and no one innovation in either composition or design of wares had such a profound effect upon the selection and supply of these new materials as porcelain. The importation of oriental porcelain during the seventeenth and early eighteenth centuries was subject to high import taxes and it became a luxury, with European courts considering it more prestigious for banquets than either gold or silver. (3) Demand for porcelain, particularly teawares, was such that supply rarely matched demand and most of the state or nobility controlled potteries of Europe experimented to find the secret of its manufacture. Credit for the first successful imitation of oriental porcelain has gone to the Meissen factory, whcch produced a frit based body in the first decade of the eighteenth century. (4)

Seventeenth century potters drew an interesting parallel between oriental porcelain and glass, comparing the natural translucency of both and concluding that the secret of porcelain manufacture lay in the ability to prepare a mixture of clay and glass - or frit. This substance was a replacement for the Chinese ingredient petuntse, a feldspathic rock known as moorstone in this country. Although there were advantages in using a frit based formula, Dr. Wall at Warmstry House, Worcester found that his steatite based

1. : Wedgwood Mss.: E18581-25. Letter Wedgwood to Bentley, January 5th, 1775. The letter concerned the problems of obtaining supplies of London crown glass, without revealing the processes to his "Antagonists".
2. : W. Burton, History and Description of English Earthenware and Stoneware. p.157.
3. : B. Hiller, Pottery and Porcelain 1700-1914. pp.84-5.
4. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. p.1.

frit porcelain resisted cracking when subjected to very hot liquids, (1) in general the technical problems of firing the ware were sufficient to prevent its widespread manufacture. (2) Alternative methods of producing porcelain were made possible by the discovery in this country of china clay and Cornish stone, in 1747, by William Cookworthy. (3) Supplies of both materials were available to potters by 1759, although their use was not restricted until Cookworthy's patent was taken out in 1768. (4)

When the original patent expired in 1775, the North Staffordshire potters, led by Wedgwood and John Turner, lobbied against its renewal by Richard Champion and were successful in limiting the patent specification to cover only the manufacture of translucent porcelain. (5) The failure totally to lift the prohibition on porcelain manufacture was a distinct advantage to Wedgwood and Turner, whose research into jasper bodies was by then well advanced and based on the use of the contested materials. The 1775 Act allowed the production of jasper, but effectively prevented rivals from marketing a competitive porcelain, (6) and by the expiration of the patent in 1796, most Staffordshire potters had turned to exploiting this concession in the Act, experimenting with different preparations, especially in the use of bone additives.

1. : H. Sandon, The Illustrated Guide to Worcester Porcelain. p.7.
This was due to the low thermal expansion of steatite.
2. : A. Finer and G. Savage, op.cit. p.192.
3. : R. Barton, A History of the Cornish China Clay Industry. pp.18-9.
4. : F. Cites Knapp, Chemistry Applied to the Arts and Manufactures. vol. ii. pp.475, 477-8.
5. : A. Finer and G. Savage, op.cit. p.178. Champion had purchased the patent from Cookworthy, in 1774.
6. : Wedgwood's correspondence reveals that he fully understood the application of the new materials and the means of exploiting the patent. See Appendix 8.

Bones had been used from 1749 onwards at the Bow Pottery to temper frit porcelain, but it was not until 1800 that a true porcelain body was successfully developed using them - Spode's bone china. (1) Problems were experienced in the supply of good quality animal bones : "Let great care be taken in picking them over before grinding so as to get rid of all iron and other impurities in which they frequently abound, from a large proportion being collected by bone collectors who sell them by weight and to make them heavy frequently thrust spikes of iron up the hollow parts." (2) However, there were two significant factors which aided the widespread adoption of bone china manufacture. There was considerable latitude in its composition and it was possible to vary the formula to suit different firing temperatures and casting needs. The following recipes, taken from Abner Wedgwood's recipe book, illustrates the variations in composition necessary to manufacture pressed jugs and large pieces, respectively :

"December 18, 1827.

40lb Bones.
30 lb Flint.
45 lb Cornwall Clay.
25 lb Stone.
1/4 pint of Stain.

"1811

60 lb Cornwall Clay
20 lb Thresher's do.
60 lb Cornwall Stone.
65 lb Flint
55 lb Bones.
6/8 pint of Stain."(3)

1. : Shaw voiced the traditional view that Josiah Spode produced the first bone china body in 1800, but until the discovery in 1972 of the following recipe in the Spode archives, there was no corroborative evidence. S. Shaw, History of the Staffordshire Potteries. 1829. p.217. Spode Mss.: 893. Collection of recipes, c.1760-1803. "The first trial of China I ever made was of the following articles and put in the biscuitoven on the 11th Decr. 1800, viz. 8oz. of Cornwall Stone, 5 oz. of Burnt Bone, 3 oz. of Blue Clay, 30 oz. of Soap Rock Clay & 2 oz. of flint and 2 pinches of Blue clax. I had these made into a horn & a cup & saucer."
2. : L. Whiter, Spode. p.30.
3. : "Abner Wedgwood No. 11." - the recipe book was prepared by Wedgwood whilst manager of the blue department at Etruria and entries relate to the period 1805-35. The recipe book eventually passed into the Allied English Potteries Ltd. archives. Abner Wedgwood's Recipe Book. Northern Ceramic Society. Journal. 1. 1972-3. pp.24-5.

Further to this the bone china bodies could be fired in the existing kilns and the manufacture of the new wares was therefore possible without increasing the fixed capital investment in pottery buildings.

Despite royal patronage for Spode's bone china (1) the ease with which his competitors could manufacture comparable quality china forced him to experiment further in the use of additives. In 1820, he purchased felspar from the Middletown Hill Mine, spurred on by the success of Mr. Rose at Coalport who first adopted the material. With this new composition Spode re-established his lead over other manufacturers and founded : "...a new and important era, and excellence and superiority over any other, rapidly approximating to perfection." (2)

The development of feldspathic china had been the result of intense commercial rivalry between Staffordshire entrepreneurs and for similar reasons there occurred a remarkable extension in the range of decorative treatments developed by potters. Enamelling had been practised since the mid-eighteenth century but it was only the market demand for richly decorated wares in the early nineteenth century that had established the craft as an integral part of the manufacturing cycle. With the adoption of enamelled decoration it became possible for even a small manufacturer to market a range of individual and expensive wares, (3) it also radically changed the planning and organisation of the pottery. Each separate colour used was fired to a

1. : Spode received royal patronage from the Prince of Wales, later to become George IV., in 1806.
2. : S. Shaw, The Chemistry of the Several Natural and Artificial Heterogenous Compounds used in manufacturing Porcelain, Glass and Pottery, 1837. p.438.
3. : Robert Chamberlain in 1786 established his own pottery at Diglis, Worcester, producing richly decorated wares. Until the early 1790's the decorators used biscuit ware purchased from Caughley or Warmstry House.

separate temperature range and for the first time manufacturers faced multiple firings after the biscuit stage, increasing significantly the amount and type of coal required and the capital investment in kilns. Added to this, the enamelled wares required a faster but lower temperature firing than either biscuit or gloss and necessitated the construction of new ovens specifically to take the decorative firing. (1)

With fashion demanding elaborate and richly decorated wares, potters refined and extended the basic range of enamelling techniques - Wedgwood for example, from 1790 onwards, experimented with lustred decoration, a process perfected and extended by John Hancock whilst working with Daniel at the Spode factory. (2) Unlike many of his contemporaries, Hancock freely made available his formulae for lustres and by 1829 the four commonest types, gold, silver, steel and copper, were in constant use throughout the Potteries and in other potting centres, notably Tyneside. (3) As with the subsequent development of gilding, the formulae for the preparation of the decorator's materials were well known, but the skill came in their application and despite serious technical problems gilding formed the

1. : K. Shaw, Science for Craft Potters and Enamellers. p.67. For example, antimony yellow colours were fired to 1050 C. whilst copper based colours fired to 950 C.
The enamel kilns were significantly smaller than the biscuit or gloss kilns - the biscuit ovens at the Gladstone Pottery, Longton are 56'0" high with a 30'0" base (hovel dimensions), whereas the adjacent enamel kiln is 30'0" high by 9'6" base. Measurements from personal survey, completed 1973.
2. : W. Mankowitz and R. Haggart, The Concise Encyclopaedia of English Pottery and Porcelain. p.137.
L. Whiter, Spode. p.43.
3. : S. Shaw, History of the Staffordshire Potteries. 1829. pp.227-8.

basis of the Spode factory reputation for decorated wares, in the nineteenth century. (1)

Significant in the take-up of any new raw material was the ability to obtain supplies at an economic price. The failure to do so could have far reaching economic and social effects, as seen in the problems associated with the supply of salt and boracic acid, which eventually led to their rejection by potters. For the seventeenth and eighteenth century Burslem potter, the chief problem in obtaining raw materials was that of fines levied against indiscriminate digging of coal and clay from the roadside : "It is ordained by the said Jury that if any person without permission who digs clay in a certain lane called Wall Lane and does not fill up the same well and sufficiently shall forfeit to the Lord of this manor for each default 6/8d." (2) Despite the increasing adoption of imported raw materials throughout the eighteenth century, local materials, especially clays, continued to figure in both probate inventories (3) and at a later date, in land sales, although in latter instance the clays were for sagger making rather than for fine wares.(4)

1. : S. Shaw, History of the Staffordshire Potteries. 1829. p.228. A. Church, English Earthenware. p.107. Problems were experienced in both the application of the gold and in the firing of the burnished wares.
2. : The order came from the 1604 Tunstall Manor Court Roll. Fines were levied, for example : "1681. Pains are also laid on Tho. Malkin of Sneyd hamlet, potter that he fill up the pit that he hath made in the lane near to the Dale Hall before 14 Octo." A. Mountford, op.cit. p.10.
3. : L. Weatherill, op.cit. p.12. For example, Thomas Stevenson of Burslem had in 1758 fifty loads of local clay valued at £2.10.0.
4. : Evidence based on the Staffordshire Advertiser, 1795-1850.

Other local materials continued to be significant throughout the late eighteenth and early nineteenth century, notably hay and straw for packing wares. (1)

It is evident though, that with the exception of supplies of sagger marls, by the end of the eighteenth century local materials had diminished in significance. The Shelley family extensively quarried the Tough Tom clays on their Longton estate - later incorporated into the Gladstone Pottery - but from the evidence of subsequent building activity it is clear that this mineral working had ceased by the first decades of the nineteenth century, when the excavations were backfilled with shale to prepare the land for industrial development. (2) With this decline there emerged a totally new entrepreneurial policy, with potters purchasing a wide range of raw materials, from an increasing number of agents. Evidence for this transition to a broader based purchasing policy consists in the main of records for the larger pottery manufacturers with few secondary sources available to redress this imbalance. The records, therefore, offer only a general timescale for the transfer and whilst it is probable that many of the smaller companies would follow the example of the large firms, it is also possible that there was a considerable time-lag in a number of instances. (3)

1. : The estate of Theophilus Smith of Tunstall was sold in 1801 and reference was made to the extensive supplies of straw and hay available from the farmland. Staffordshire Advertiser. 7. February 14th, 1801.
2. : Gladstone Pottery Mss.: 8. Deed of partition, August 25th, 1815. Ibid. 14. Plan, October 15th, 1840. Gladstone Pottery Excavation Area 1. August 2 - 16, 1975. Tough Tom was a friable yellow clay used for coarse wares.
3. : The principle source of information concerning the contents of all types of potteries - the Staffordshire Advertiser for 1795-1850 - provides no more than a covering reference 'materials' when itemising the contents of a works. Similar omissions occur in the Baddeley 1761 inventory, which in all other respects is very thorough.

John Baddeley of Shelton, through a series of partnerships with other potters and businessmen, established a considerable reputation during the mid-eighteenth century running potteries in both Liverpool and Shelton between 1755 and 1761. (1) Two of the partners, Baker and Sutton, were enamellers in Liverpool, and through these associations Baddeley was able to market a wide range of richly decorated wares. The surviving company records relate to the expenses incurred by Baddeley on behalf of the Liverpool works and as such constitute only part of the total company purchasing account. Notwithstanding this, they do reveal a dramatic change in the manufactured product, with the associated changes in the type of raw materials purchased. (2) Up to 1758 the company concentrated on the manufacture of blue and white decorated china, but records indicate that this changed markedly and by the end of the year extensive supplies of enamelling colours were purchased for the decoration of richer wares. The absence of references to soaprock and the single reference in the 1761 inventory of two tons of the material, indicates that porcelain was only manufactured at the Liverpool works.

Wedgwood in c.1759 noted in his experiment book that Messrs. Reid and Baddeley's china was composed of Isle of Wight sand, bone ash, chalk, Purbeck clay and pearl ashes, (3) and with the exception of the latter - which Wedgwood himself queries - all of the materials are referred to in the purchasing account. The glazing materials were bought from several merchants and included cullet and broken china - materials similar to those used by the Derby pottery. (4) Decorating materials were supplied principally by four local

1. : SRO.: D1788. p.14.b.2.
The partners were William Reid, Daniel McNeale, John Sutton, Henry Baker, William Yates and Lawrence Harrison.
2. : SRO.: D1788. V.94. 1755-61 Account Book.
The purchases of raw materials for the period 1755-9 are given in full in Appendix 9.
3. : B. Watney, English Blue and White Porcelain. p.79.
4. : Ibid. p.91.

firms - Tush, Newdick and Nicholas, Sanders and Smallwood, and included smalts, the glassy form of cobalt blue. Enamels were purchased from Michael Grazebrook, proprietor of the Audnam Glasshouse near Stourbridge - a prominent enamel and flint glass maker. (1)

Similar extensive accounts survive for the Chamberlain works, Diglis, Worcester. The period 1789-99 covers the transition from a purely decorating business into a complete manufacturing concern, (2) with the purchase of Cornish stone from Goodwin on January 6th, 1792, marking commencement of biscuit ware production. (3) The transition to a complete manufacturing cycle was intended to increase not only Chamberlain's self-reliance but also the total output of the pottery, and in the November preceeding the commencement of biscuit ware production, two extra enamelling stoves were purchased from Dale & Co. for £12.9.0. in order to satisfy increased manufacturing capacity. (4) Many of the items referred to in the purchasing ledgers refer to decorating materials, with frequent purchases of smalts and light and leaf gold - an indication of the richness of the decoration.(5)

Chamberlain experienced difficulties in the supply of many of his materials and in particular with the supply of china stone, which he was forced to purchase from the potter Valentine Close of Hanley : "Our want of sufficient mill room

1. : H.J. Haden, Notes on the Stourbridge Glass Trade.
pp.26-7. and The Stourbridge Glass Industry in the
19c. p.17.
2. : For abstracts on purchases by Chamberlain for the
period 1789-92 and 1799, see Appendix 10.
3. : Chamberlain Mss.: 26. 1789-92. Cash and Order Book.
4. : Ibid.
5. : Ibid. August 5th, 1795

has compell'd us to buy several tons of ground stone from Mr. Valentine Close of Hanley.." (1) Five years after this letter, in 1799, Close was still supplying clay, an indication of the persistent nature of Chamberlain's problem. (2) Not all of the problems relating to the purchase of materials were caused by insufficient mill capacity and it is clear from the factory letter book for 1791-5 that a policy of testing clay supplies from a large number of merchants was open to abuse. In 1794 the company wrote forcefully to Jonathon Skey at the Bewdley brickworks complaining : "...we have given several gentlemens clays tryal at different times but upon my word never before had the honour with a charge for our civility." (3) The demand for a £10.11.0d. fee was refused and the company lost a supplier of sagger clay.

It is difficult to date with any precision when the pottery idnstury moved from self-sufficiency in the supply and preparation of raw materials, a factory system based on vertical organisation, to one of dependence on specialist suppliers, horizontal structuring. The Baddeley and Chamberlain records indicate that for these larger manufacturers, most of the raw materials were supplied by a wide range of contractors and that by the end of the eighteenth century these suppliers, even for non-Staffordshire firms, were more often than not North Staffordshire based. The Herculaneum Pottery (Liverpool) records show that this transition was complete by the 1830's, when all of the

1. : Ibid. 5. 1791-5. General Letter Index and 1795-7 Order Book. Letter Chamberlain to J. Warwick at St. Austell, June 12th, 1794.
2. : Ibid. 1796-1806 Cash Book. Entries made on the 15th and 17th of May, 1799.
3. : Ibid. 5. op.cit. Letter Chamberlain to Jonathon Skey, July 25th, 1794,

suppliers, except those dealing in lead, came from Staffordshire. (1) In the Spode pottery, on the other hand, it is clear that decorating materials were prepared on the premises until 1803, when entries cease in the main recipe book. (2) The supply and preparation of colours and raw materials became the responsibility of Henry Daniel, who between 1805-22 supplied the pottery. (3) Although Daniel supplied all the factory needs and had his premises within the main pottery complex in Stoke, he was an independent contractor, renting the factory steam engine and gold pans but owning his own oven, utensils and hiring his own labour.

The smaller pottery was able, from the first decade of the nineteenth century, to obtain supplies of materials and in particular colours, from a growing number of specialist suppliers. William Stanaway's Hammel colour works were offered for letting in 1808 and were advertised as being in a position to supply to the pottery industry - zaffre,

1. : A. Smith, The Illustrated Guide to the Liverpool Herculaneum Pottery. pp.97-8.
 The suppliers were :
 BLUE : William Marsh and William Booth, of Hanley.
 CALX : Shorthose & Heath, Hanley.
 COLOURS : Robert Keay and THOMAS MAYDEW & COL. Burslem
 COLOURS, MOULDS, PENCILS & PRINTING PAPER : Machin
 & Baddeley, Burslem.
 COPPER PLATES : Andrew Eardsley, Newcastle.
 ENGRAVINGS : William Parker, Hanley.
 COPPER PLATES AND ENGRAVINGS : James Kennedy, Burslem.
 FLANNEL : Thomas Hulme & Son, Burslem.
 FLINT : James Steele, Tunstall.
 GOLD LEAF : Richard Shaw, Stoke.
 LAWNS ; George Twigg, Burslem.
 LEAD AND CALX : James Smith and J.K. Picard, Hanley.
 LEAD : Burton & Holbrook, Derby.
 PAPER : Machin & Baddley, Bur lem.
 PRINTING PAPER : James Smith, Newcastle.
2. : Spode Mss.: 893. Collection of Recipes. c.1760-1803.
3. : L. Whiter, Spode. pp.38, 43.

pearl ashes, antimony, arsenic, borax and litharge. (1)
Later advertisements for suppliers indicate a measure of further specialisation, with for example the British Cobalt Smelting Co. at Hanley, supplying only blue, a reflection of the popularity of blue printed earthenware. (2)

With the transfer from independence in the supply of certain raw materials to reliance on other manufacturers and retailers, the Staffordshire potters tended to purchase supplies in the short term, as and when required to complete an order or oven of wares. (3) The absence of stockpiling meant that a delay or failure of supplies could halt production in a very short time. Throughout the eighteenth century supplies of flint were frequently unequal to the demand for them and Baddeley, acting in his capacity as a flint merchant, was continually facing this problem :

"I came home only yesterday afternoon, haveing been at Willington Nottingham and Gainsbro to See out for flint & hope have Secured Enough to Serve me till I have a Cargo from Gravesend, I think it will be the Scarcest Article Ever known before Mayday next.."(4)

The failure of clay supplies at the Chamberlain works in 1792, occasioned by the loss of supplies to several of their merchant-suppliers, resulted in an immediate cessation of production, with customers being turned away daily. The business survived only by returning to their former policy

1. : Staffordshire Advertiser. 14. January 9th, 1808.
2. : Ibid. 27. August 4th, 1821.
3. : See : The Adoption and Use of Coal in the North Staffordshire Pottery Industry.
4. : SRO.: D1788.p.1. (1) January 14th, 1762.

of purchasing wares to decorate from Turner at Caughley :

"I have written to the manufactory & can only hear they have not one pound of clay to work, & that it is impossible to complete our Goods; to you therefore we must now apply, & trust we shall receive some acct. more satisfactory.... Mr. Barnes has just been up to say he can no longer find wares for the boys to work on a circumstance too distressing for to bear writing upon longer - pray write what we are to do." (1)

The problem of irregular supplies of raw materials was exacerbated by the escalation of haulage costs during the eighteenth century. Even when supplies of raw materials were obtained from the Potteries district, transport costs were high, mainly due to the condition of the local roads : "...lanes extremely dirty and scarcely passable."(2) Josiah Spode paid for his carriage of coals at the rate of 3.0d. per stack, the coal itself costing 6.0d. per stack. (3) With the need to import raw materials this position inevitably deteriorated; pack horses and waggons cost between 8.0d. and 10.0d. per ton per mile (4) and even after the canalisation of the rivers, or the cutting of new canals, freight costs were high - Chamberlain at Worcester in 1797, paid up to 2.6d. per ton for the carriage of coals from the Black Country, almost 18% of the total cost of the coal. (5)

An awareness of the economic advantages to be gained from controlling their supplies of raw materials encouraged those potters with adequate resources to invest in both the carriage and supply of materials. At least two potters

1. : Chamberlain Mss.: 5. 1791-5. Letter Book. Letter A. Chamberlain to J. Turner, July 12th, 1792.
2. : L. Whiter, Spode. p.21.
3. : Ibid. This represented a charge of 8d per ton mile.
4. : R. Whitworth, The Advantages of Inland Navigation. 1766.
5. : Chamberlain Mss.: 1796-1806. Cash Book.

attempted to reduce carriage costs on the waterways, Wedgwood commissioned the construction of the narrow boat 'Mercy' in 1786-7, (1) and Chamberlain purchased a Severn trow in 1803 for £43.4.0d. (2) Those potters unable or not wishing to become involved in boat ownership were able to control wharfeage facilities through the tenancy of one of the many wharfs constructed along the banks of the Grand Trunk or Caldon Canals. Edmund John Birch advertised one such wharf for letting on the Caldon Canal in 1806, it previously being part of his Shelton pottery estate. (3) The involvement of potters in road transport was more common, with several potters having pack-horses and panniers appraised in probate inventories - John Wedgwood in 1705 had five horses and pack saddles and Aaron Shaw the younger in 1737 had four horses and coal panniers. (4) Not all of the involvement in road transport centred on the management of pack-horses and in 1762 and 1763 the potters of Burslem petitioned Parliament for the improvement of local roads and in particular the turnpiking of the Burslem to Red Bull road, which then linked to the main Newcastle to Chester turnpike - the main route north by land for crated wares and imported materials. (5)

The development of a canal network in North Staffordshire from 1766 onwards, had involved pottery entrepreneurs - notably Josiah Wedgwood - who campaigned vigorously for both

1. : Wedgwood Mss.: 14203-15. Bill for materials and labour. The cost was £91.14.10.
2. : Chamberlain Mss.: 1796-1806. Cash Book. The sails were purchased from William Broughton on February 12th, 1803, for £1.18.6. In the twentieth century a few potters continued to use their own narrow boats - for example J. & G. Meakin. R.J. Wilson, Knobsticks. Canal Carrying on the Northern Trent and Mersey. p.21.
3. : Staffordshire Advertiser. 12. July 15th, 1806.
4. : LJRO.; B/C/11. John Wedgwood, Burslem, will proved October 11th, 1705;; Aaron Shaw, Burslem, will proved April 13th, 1737.
5. : A. Mountford, op.cit. pp.11-13.

the principle of the Grand Trunk Canal and for the routing of it through his Etruria estate in order that it might serve his projected factory. Pottery entrepreneurs interests were protected through their voting majorities on both the Assembly of Proprietors and the Executive Committee and upon their instigation branches were cut to serve the important production centre of Burslem. (1) But, the development of railway communications in North Staffordshire came at the very end of the period under investigation and the involvement of potters in their operation was initially confined to membership of the embryonic railway companies - C.J. Mason, W.T. Copeland and John Ridgway were active members of the Staffordshire Potteries Railway Company and the Churnet Valley Railway Company. (2) The first fruits of this involvement came with the remarkable speeding up of supplies of raw materials, Copeland and Minton were the first Staffordshire potters to receive their clay by rail and although the cost was considered to be the same as that for water carriage, the travelling time was cut from a month to two days. (3)

With many of the raw materials used in the decoration of wares coming from precious or semi-precious minerals, the scope for potters' investment in material extraction was from the outset limited to clay, stone and coal extraction, with other materials provided by specialist contractors. (4) In the Potteries, land holdings were not subject to restrictive covenants which precluded the right to extract clay, as had been the case with colliery operation, (5) and up to the

1. : J. Thomas, op.cit. pp.95-103.
2. : Staffordshire Advertiser. 51. January 18th, 1845 and July 26th, 1845.
3. : Staffordshire Advertiser. 55. April 14th, 1849.
4. : See Chapter 5.
5. : Gladstone Pottery Mss.: 1. Conveyance, June 28th, 1783.
The mineral rights for the Longton manorial lands were sold separately to Jeremiah Smith, but this did not include clay.

mid-nineteenth century potters extensively worked local clays for sagger making. Those potters not owning land were able to either lease estates capable of such working or lease directly a clay pit, as with Minton & Co. who paid £100 per annum for the tenure of a clay pit at Blurton, on the Trentham estate. (1) When the emphasis changed from a reliance on local clays to that of importing from the Cornish peninsula, potters broadened their investments to include the new clay workings, using the experience gained in local venture to provide the necessary technological and managerial skills.

Potters developing porcelain bodies required soaprock in addition to the Cornish and Devon clays and stone, and found the Cornish landowners readily amenable to the tenure of land for clay and mineral extraction. The potters establishing mining companies drew freely on the existing body of experience present in the Cornish people and many local farmers acted as mineral agents in their spare time. Baddeley and Yates required soaprock for their porcelain business and in 1760 took out a ten year lease on Lord Falmouth's lands near Kynance and Landewednack, Cornwall, taking over from the London potters Crisp and Sanders. (2) In 1752, the Warmstry House pottery purchased Richard Holdship's Bristol works, including a tenure of a soaprock mine with an agreed price of £18 per ton for soaprock extracted and sold separately. (3) Supplies evidently proved inadequate, for in 1776 the company purchase Messrs.

1. : The pits were worked between 1857-1860, the cessation may have been due to the exhaustion of the clay measures since no tenant was found to take over from the Mintons.
SRO.: D593/H/14/3/16a-17a.; 18d.; G/1/22/6
2. : E. Morton Nance, Soaprock Licenses. Transactions of the English Ceramic Circle. 1.3. 1935. p.79.
3. : H. Sandon, The Illustrated Guide to Worcester Porcelain. pp.6-7.

Christian's interest of seventeen years in a soaprock mine.

(1) The extraction of soaprock was tedious and care was required in picking over the mined rock and by the end of the eighteenth century the best veins had been exhausted and the poorer workings proved uneconomical. It was this supply problem that in all probability prompted potters to seek alternative materials for use in porcelain manufacture.(2)

Unlike soaprock mining, the china clay pits required only minimal capital investment, with high grade, thick beds of clay lying a few feet below ground level and the deepest beds only covered by thirty feet of stent or rubble.

(3) These pits had been in operation some time prior to Wedgwood's 1775 visit to Cornwall, and despite agitation from Cornish tin miners who feared the decline of their traditional workings with the rise in popularity of porcelains, leases for clay pits were readily granted - Wedgwood himself paying £10 per annum for an existing pit in St. Stephen's parish. (4) The terms negotiated by Wedgwood - a forty year tenancy with a mine rent of 4.0d. per ton for the first hundred tons of clay and 3.0d. thereafter (5) - were far better than those imposed on later ventures by Staffordshire potters. Spode and Wolfe successfully bid against Wedgwood, Derby, Coalbrookdale and New Hall for the lease of the Carloggas Moor clay sets, but were forced to pay in 1799 an annual rental of £900, for a fixed extraction quota of 300

1. : R. Binns, A Century of Potting in the City of Worcester. 1865. p.139.
2. : N. Pounds, The Discovery of China Clay. Economic History Review. 2nd series, 1.1.1948. p.32.
3. : K. Hudson, The History of English China Clays. pp.18-19.
4. : N. Pounds, The Discovery of China Clay. op.cit. p.32.
L. Jewitt, The Life of Josiah Wedgwood. 1865. pp.263-4.
J. Thomas, The Rise of the Staffordshire Potteries. p.36.
5. : Ibid.

tons of clay and 1,200 tons of stone. Despite the apparent success of the venture the partners required further supplies of clay and stone and by 1816 they were each holding, in addition, a one-third share in the Cornwall Clay and Stone Company. (1)

By 1814 there were seven groups of clay pits worked by potters, two each at Hendra and Treviscoe and one each at Goonamarris, Goovean and Trethosa, (2) with most of the smaller companies bought out by the larger co-operative concerns, as with the Potters Clay Company purchase of the Isle of Purbeck setts in c.1796. (3) Thomas Minton's Trelaver clay setts, purchased in 1799 were bought out in 1805, to consolidate the holdings of the Hendra Company, which had themselves been established in 1799. (4) The Hendra Company was a co-operative venture comprising the New Hall Joint Stock Company, Wedgwood ii, Minton, Anthony and Enoch Keeling and William Adams. (5) Unlike many of the contemporary mining companies, the Hendra partners purchased for the initial outlay of £170 not only the right to dig clay, but also raise : "...tin ore, tin stuff, copper ore, lead, lead ore and all other metals." (6) and in this respect was unusually ambitious, The company, despite its need for intensive capital investment to support the ore mining operations, was a profitable concern (7) and lasted until the 1830's, when apathy on the part of the surviving original partner - Wedgwood - forced its sale to Cornish adventurers.

1. : L. Whiter, Spode. p.34.
2. : K. Hudson, op.cit. p.19.
3. : R. Barton, A History of the Cornish China Clay Industry. p.36.
4. : J. Thomas, op.cit. p.40.
5. : Victoria History of the County of Stafford. 2. p.18.
6. : J. Thomas, op.cit. p.40.
7. : Staffordshire Advertiser. 16. October 13th, 1810.

The low profits obtained from clay, said in 1857 to be 1.0d. per ton of clay (1) and the difficulties experienced in negotiating new leases, eventually forced potters to abandon clay working in Cornwall. But the longevity of many of the early companies was in sharp contrast to the often serious failures of the contemporary pottery entrepreneur controlled collieries, where mining operations were more expensive and hazardous. (2)

Not all of the developments made in the composition of wares were fostered by a need to match changes in fashion or cheapness of materials and a recurring theme throughout the latter part of the eighteenth and early part of the nineteenth century was the search for materials which did not endanger the health of operatives. In many ways this was ironical, once found, the new materials were frequently ignored and the major health risk faced by potters, lead poisoning, was a result of the development of lead glazes, which had superseded the comparatively safe salt glaze :

"..while complaints were constantly made that the chlorine of the decomposed salt, as it poured out in fumes from the kilns, made in inhabitants of the district sneeze and choke to an irritating degree, it formed in reality a more potent disinfectant. It became a by-word with the doctors in charge of the poor of the parish of Lambeth that zymotic disease never spread within the influence of this searching vapour." (3)

The effects of lead poisoning had been understood in Italy by 1700, with translations of De Morbis Artificum Diatriba available in this country in 1705, (4) but in

1. : K. Hudson, op.cit. p.22.
2. : See Chapter 5.
3. : E. Gosse, ed. D. Dyles, Sir Henry Doulton, the Man of Business as a Man of Imagination. p.79.
4. : B.Ramazzini, De Morbis Artificum Diatriba. 1700
A Treatise of the Diseases of Tradesmen. 1705.

general the diagnosis of the symptoms of the disease was not fully understood until the latter part of the eighteenth century, at a time when job specialisation was intensifying the problem. (1) Initially, the cause of concern was the effect of lead glazed wares on their users, rather than manufacturers, with Dr. Percival attacking the Queensware produced by Wedgwood. (2) These observations were subsequently substantiated by Dr. Charles Thackrah : "The glaze of common earthenware is slightly soluble in animal oil, and more copiously in the acids of our common fruits, especially when their action is assisted by the heat necessary for cooking these articles.." (3). and were a clear refutation of the declaration of disbelief expressed by Wedgwood upon Dr. Percival's comments. (4) Public concern for the effects of lead poisoning eventually turned to the health of the dippers, whose trade was condemned as : ".. the most pernicious and destructive in the whole process of potting." (5)

Potters, in examining the effects of lead on dippers, differentiated between the use of white lead and litharge in glaze preparation, with white lead erroneously considered

1. : The effects of lead poisoning were given for a young man : "He was a cripple & his speech was injured." Wedgwood Mss.: 17631-20. Draft of letter, c.1820.
2. : Dr. Percival, Observations and Experiments on the Poison of Lead. 1774.
3. : A. Keikle John, The Life, Work and Times of Charles Turner Thackrah, Surgeon and Apothecary of Leeds. (1795-1833). pp.120-1.
4. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. pp.152-3.
The action of fruit acids upon lead glaze is best seen in the central decoration of punch bowls, which seldom survive to the present day without loss of the colouring or engraving, due to the action of the acids.
Discussion with Mr. H. Sandon, director, Dyson Perrins Museum, Worcester, July 17th, 1975.
5. : Appendix to the Second Report of the Commissioners.
1842. op.cit.

to be completely safe. (1) Concern was expressed that this alternative was an inadequate substitute for a completely lead-free glaze and in 1793 the Society of Arts offered a premium for the development of a leadless glaze, which was claimed by Coalport in 1820. (2) Inspired by this competition and other motives, some of which were perhaps philanthropic towards their operatives, a number of lead substitutes or reduction agents were introduced. Keeling patented in 1796 a substitute for red lead, which was claimed to be 30% cheaper than real lead, (3) and in the same year borax was introduced from Tibet, which enabled a reduction to be made in the amount of lead used in the glaze. (4) However, even with the addition of borax, the amount of lead used in glaze and colour preparation was high as the following recipes indicate :

"Fritt for glaze.

36 parts Cornish stone, 30 of red lead, 20 of flint, 20 of borax, 15 of crystal of soda, 5 of oxide of tin."

"Enamel Blue Green.

6 parts flint, 16 of red lead, 3 of borax, 1 of copper, 6 of white enamel." (5)

1. : Wedgwood Mss.: 17631-20. Draft of Letter. c.1820. :
 "...14 years constant dipping in a White lead glaze his health has become better."
 The Spode factory recipe book, for c.1760-1803, records only recipes based on white lead. Spode Mss.: 893. Recipe Book, c.1760-1803.
2. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. p.153.
Victoria History of the County of Stafford. 2. p.63.
 Job Meigh of Shelton was also awarded a medal by the Society for the development of a glaze for redwares based on red marls.
 A. Meiklejohn, op.cit. pp.120-1.
3. : Staffordshire Advertiser. 2. July 30th, 1796.
4. : R. Copeland, op.cit. p.50.
5. : W. Evans, Art and History of the Potting Business. 1846. pp.64,68.

Even after the award of the Society prize in 1820 investigation to find other lead substitutes continued, mainly because the principle constituent of an almost totally lead free glaze - boracic acid - introduced in 1833, was little used due to the high import duty placed on it when imported from the East Indies. (1) It would appear that the cost factor was the principle reason for most nineteenth century potters ignoring the means available to reduce the lead content of glazes, as Thackrah commented in 1831 : "I am told ... that the comparative cheapness of the leaden glaze is the chief recommendation." (2) With glaze accounting for up to 19% of the total cost of earthenware, (3) it is not surprising to find such reluctance on the part of entrepreneurs.

This reluctance continued despite considerable, informed, criticism during the middle to late nineteenth century. In 1831 a petition was submitted to the House of Commons by Staffordshire dippers, complaining of the Deleterious Effects of Articles Employed in the Manufacture of China and Earthenware." (4) and supported by seventeen medical practitioners, who regretted the diseases caused by lead poisoning - constipation, cholic, jaundice, epilepsy and palsy. The 1842 inquiries into working conditions in the pottery industry examined the incidence and problems of industrial disease and received evidence from both factory operatives and local doctors. (5) Thomas Goddard, a doctor, gave evidence and unlike

1. : Victoria History of the County of Stafford. 2. p.63.
Introduced by John Ridgway at his Cauldon Place Pottery, Shelton, in 1833.
2. : C. Thackrah, Effects of the Principle Arts, Trades and Professions on Health and Longevity. 1831. p.59.
3. : Spode Mss.: 797/3. Garrett's Costing Book. 1833. For 7" muffins in blue printed earthenware.
4. : Staffordshire Advertiser. 37. April 23rd, 1833.
5. : Report to the Commissioners on the Employment of Children. 1842. Appendix to the Second Report of the Commissioners. 1842. op.cit.

many witnesses, suggested means of overcoming the problems without the complete avoidance of lead compounds :

"All glazes contain more or less carbonate of lead, which render 'dipping' or 'glazing', a pernicious occupation. Men employed in this department, are subject to colic, epilepsy and paralysis of the fore-arms, which incapacitates them from labour. As the 'dippers' however, only require the first and second fingers, with the thumb of each hand, to be denuded while dipping, to enable to finger the ware, something might probably be done to diminish the risk of paralysis; and with this view I have recommended the use of long-sleeved gloves, impermeable to ware, which would limit the portion of skin exposed to the action of the glaze within very narrow bounds and thereby lessen the danger for absorption. But, as in the case of the 'china scourers', I have not been able to give effect to this suggestion." (1)

The evidence provided by the operatives substantiated Goddard's claims concerning manufacturers' indifference whilst being aware of the problems and risks involved in the use of lead. This was not a problem exclusive to potting, as Thackrah commented in his general discussion of industrial health :

"In many of our occupations, the injurious agents might be immediately removed or diminished. Evils are suffered to exist, even where the means of correction are known and early applied. Thoughtlessness or apathy is the only obstacle to success. But even where no adequate remedy immediately presents itself, observation and discussion will rarely fail to find one." (2)

Potters appreciated that lead dipping was a dangerous process and to recruit operatives for this task they paid higher wages to dippers than their other operatives :

"My business is to dip the ware as it comes from the printers and biscuit warehouse; the process does not take a moment but my hands and arms are always wet with the solution or

1. : Report to the Commissioners. 1842. op.cit. The suggestions put forward by Goddard are given in full in Appendix 11.
These opinions were similar to those held by Thackrah on this subject. A. MeikleJohn, op.cit. pp.120-1.
2. : A. MeikleJohn, op.cit. p.45.

mixture; I do not know what this mixture is composed of exactly; it is chiefly lead; they tell us that there is no arsenic, but we have our own thoughts about that; it destroys our health. We are obliged to keep ourselves very careful by keeping ourselves clean and out of the dust. We have no washing-rooms, but bring the water in a small vessel from a pump in the yard. There are 5 boys employed with me; their ages are from 13 up to 17. We come at 7 o'clock in the morning and leave at four, on account of its being bad stuff to work in; we work the effects off with opening medicine frequently or it would soon be all over with us. We get better pay here than in any other department of the bank: it is considered of greater risk." (1)

Although the inquiries reveal a large measure of indifference on the part of the employers, their operatives were not always sensitive to the risks involved and frequently ignored the precautionary measures taken by some potters. The Ridgways in Hanley provided water for washing purposes in their dipping houses, and encouraged their operatives to use the facility provided, (2) but many operatives chose to ignore washing facilities when provided :
 "...We have no wash-house as a general house; but each man has his own basin if he likes to use it; there is a pump in the yard; but the nature of the work does not require them to be particular in this respect, with the exception of the dipper, - he does require it unless he chooses to run the risk of destroying himself." (3)

Evidence before the inquiries revealed that although

1. : Appendix to the Second Report of the Commissioners. 1842. op.cit. Statement no. 13. Talbot's assertion that he received more money than any other branch of trade is not substantiated by evidence given by other Minton and Boyle operatives. Talbot received 27.Od. per week, whereas moulders received 27.Od. per week and modellers 30.Od. per week. His evidence was though supported generally by the 1842 Inquiry. Appendix to the Second Report of the Commissioners. 1842. op.cit. Sections 12-15.
2. : Appendix to the Second Report of the Commissioners. 1842. op. cit. Statement 99, by Ralph Bowyer.
3. : Ibid. Statement 35., William Griffiths of Messrs. Minton & Boyle, Stoke.

the most virulent, lead poisoning was by no means the only health risk faced by operatives in the handling of raw materials. Although largely ignored by masters, the high incidence of silicosis amongst scourers and ground layers did not escape official comment and particular attention was paid to this disease by the 1842 Commissioners. Henry Hulme worked for Messrs. Daniel and Sons at Stoke and commented on the work of ground laying : "The nature of our work is very pernicious; the mixing the colours and the laying them on in their finely powdered state; they are all mineral; they affect our lungs." (1) Similarly, arsenic poisoning, the occupational hazard faced by paintresses who took in minute quantities of the poison every time they licked a point onto a paintbrush, (2) was ignored by masters until the twentieth century.

The official recognition of the nature of these problems, through the use of legislation, was slow. After the publication by Dr. Arlidge in 1892 of a major treatise on the links between the dust created during potting and 'potters rot' or silicosis, the Government introduced in 1899 legislation to control these dangerous processes and potters were given six months to discontinue the use of lead. (3) However, at a more local level practical steps were taken to ensure that those who suffered from the effects of silicosis

1. : Ibid. Statement 61., Henry Hulme of Messrs. Daniel and Sons, Stoke.
G. Elliott, Some Descriptions of Pottery Making and Working Conditions. 1557-1844. p.26.
2. : Ibid.
Appendix to the Second Report of the Commissioners. 1842. op.cit. Statement 11., Hannah Baker of Messrs. Minton & Boyle, Stoke.
3. : W.J. Furnival, Leadless Decorative Tiles, Faience and Mosaic. Appendix A.

or lead poisoning - phthisis - were at least cared for during their ill health. The Adams pottery in Stoke ran its own sickness club which gave to subscribers : "on the payment of 1s. per month, receives in times of sickness, 7s. per week towards their support : " (1) and with no discrimination made against dippers. These operatives were fortunate, the dippers who belonged to the Amicable Society of Tradesman and Inhabitants of Tunstall, were required to pay "one shilling every month to the stock." (2) It was ironical that the very measures taken, which were few enough to ensure that the dippers did not suffer complete deprivation because of their work, should discourage them from benefiting through the recognition of their high risk of ill-health.

1. : Second Report of the Commissioners. 1842. op.cit.
Statement 55. Herbert Keeling, of Messrs. Adams, Stoke.
2. : Articles to be observed by The Amicable Society of
Tradesmen and Inhabitants of Tunstall..Instituted
the Fourteenth Day of July 1792. Rule xii.

CHAPTER FIVE :
THE ADOPTION AND USE OF COAL IN THE NORTH STAFFORDSHIRE
POTTERY INDUSTRY.

The diffusion of a coal fuel technology in British industry during the seventeenth and eighteenth centuries has been discussed by Ashton and Sykes, and Nef (1) and more recently by Professor Harris who suggested that the adoption of the technology was a critical factor in England's considerable economic lead over France in the eighteenth century. (2) Some of the first entrepreneurs to adopt the use of coal in their manufacturing processes were brewers, dyers and hatters in London, who had by the early sixteenth century : "...long sithens altered their furnaces and other fiery places and turned the same to the use and burning of sea coles." (3) Technological spin-off from these processes stimulated the adoption of coal by other furnace industries and by the early seventeenth century coal was used by brass founders, glass makers and maltsters. (4)

It has recently been suggested that historians have too readily accepted the concept of invention inevitably leading to immediate take-up (5) and assumptions have been made that

1. : T.A. Ashton and J. Sykes, The Coal Industry of the Eighteenth Century.
J. Nef, The Pre-Industrial Development of the British Coal Industry.
2. : J.R. Harris, Industry and Technology in the Eighteenth Century : Britain and France. (inaugral lecture, Birmingham University, May, 1971.) pp.8-11.
3. : Ibid. p.15.
4. : Ibid.
5. : J. Tann, Fuel Saving in the Process Industries During the Industrial Revolution : A Study in Technological Diffusion. Business History. 15. 2. July, 1973. p.158.

once introduced, coal became the principle fuel for all furnace industries. Although the depletion of charcoal supplies has generally been considered, and clearly was, the prime reason for the take-up of coal firing in some processes, (1) recent industrial studies have shown that a much more complex situation existed in others, especially in the manufacture of iron and glass. (2)

It has also been assumed that there was a rapid and widespread adoption of coal by the North Staffordshire potters. Eliza Meteyard for example, postulated that the depletion of the local woodlands precipitated the early use of coal. (3) The cost of transport and the relative fragility of charcoal limited the supply of fuel to five miles from the user in most parts of the country, although certain West Midlands furnaces recruited supplies over a distance of twenty miles. (4) Although the detailed archival material of the kind used by Hammersley is absent for North Staffordshire, it was reasonable to assume that potters were forced by rising prices and scarcity of supplies, to exploit the locally outcropping coal measures. In essence this was correct, the North Staffordshire coalfield had been continuously worked from the thirteenth century, particularly on

1. : P. Mathias, The First Industrial Nation. p.123. For example, the depletion of the Wealden woodlands forced the relocation of the iron industry in Wales, Cumberland Shropshire.
2. : G. Hammersley, The Charcoal Iron Industry and its Fuel, 1540-1750.
The Economic History Review. Second Series. 26.4. November 1973. pp.593-613.
 D.W. Crossley, The Performance of the Glass Industry in Sixteenth Century England. The Economic History Review. Second Series. 25.3. August 1972. pp.421-33.
3. : E. Meteyard, The Life of Josiah Wedgwood. 1.p.104.
4. : J. Wise and B. Johnson, The Changing Regional Pattern during the Eighteenth Century. p.169. fig.36 in : Birmingham in its Regional Setting. A Scientific Survey.

the Tunstall manorial lands. (1) The shallow bell pits or open seam workins were encouraged by the manor, which allowed unrestricted mineral extraction on all unenclosed lands until c.1700, when these rights were sold to George Parker. (2) These coals were extensively used by the Cheshire salt masters during the seventeenth century (3) and from 1768 onwards coal was increasingly used in the local iron industry. (4) Both of these industries continued to expand and stimulate the further exploitation of the coalfield, with for example, thirty-eight furnaces at work by c.1850. (5) However, the greatest stimulation for the development of the coalfield came from the pottery industry - there are isolated references to potters owning coal pits during the mid-seventeenth century (6) - and archaeological evidence substantiates a more widespread use by the 1680's. (7)

1. : WSL.: D.1490/33.
2. : J. Ward, History of the Borough of Stoke-upon-Trent.
1843. p.509.
S. Shaw, History of the Staffordshire Potteries.
1829. p.124.
3. A. Mountford, op.cit. p.11.
4. : W.J. Thompson, Industrial Archaeology of North Staffordshire. p.42.
The first coke fired furnace is reputed to be that erected by the Parkers at Partridge Nest, Newcastle-under-Lyme, in 1768.
5. : W.J. Thompson, op.cit. p.43.
6. : LJRO.: B/C/11. Thomas Daniel, Burslem, will proved April 11th, 1662. Colliery lease valued at £1 out of an estate of £54.
7. : The Sadler Teapot Manufactory Site, Burslem, Stoke-on-Trent Museum Archaeological Society Reports.
No. 7. 1975. p.1.



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1. : The map represents the extent and nature of the coal-field in c.1830 - the earliest reliable period for which numbers of pits at work are known.
J. Thomas, The Rise of the Staffordshire Potteries. p.45.
W.J. Thompson, op.cit. p.32.
S.R. Hind, Pottery Ovens, Fuels and Firing. p.1.
SRO.: D593/H/8/17a.
Ibid. H/477a. Hargreaves 1832 Map of the Potteries.

Nevertheless, coal did not completely replace wood as a fuel in the pottery industry for a dual technology in the firing of porcelain and enamelled wares survived into the nineteenth century. On the Yorkshire coalfield at Potovens, near Wakefield, recent excavations indicate the use of both wood and coal to fire kilns, wood extensively being used throughout the fifteenth and sixteenth centuries to fire Cistercian type wares in clamp kilns. (1) The use of wood continued on a more intermittent basis into the early eighteenth century, but had ceased completely some time before the closure of the potteries in c.1785. (2)

Searching for a suitable fuel to fire porcelain the mid-eighteenth century potter exploited the fast firing times possible with charcoal, (3) and although such manufacturers as Baddeley, of Shelton, eventually turned to the exclusive use of coal, many of the early porcelains were wood fired. (4) Similarly, the Pomona Pottery, Newcastle-under-Lyme, used coal to fire their red earthenware kilns, but employed charcoal from 1744-6 in a three-hearthed porcelain kiln, (5) and Cookworthy and Champion used charcoal at their

1. : P. Brears, Excavations at Potovens, Near Wakefield. 1968. op.cit. pp.11-12, 18-20.
L. Weatherill and R. Edwards, op.cit.
2. : Yorkshire Archaeological Society Library, Leeds :
Diary of Ralph Thoresby. Entry - March 16th, 1702.
Quoted by P. Brears, op.cit.
3. : Ibid. pp.137-51.
4. : J. Mallet, John Baddeley of Shelton. Transactions of the English Ceramic Circle. 6.2. 1966. pp.132-3.
Charcoal firing continued until c.1765.
5. : P. Bemrose, The Pomona Potworks, Newcastle, Staffs.
Transactions of the English Ceramic Circle. 9.3. 1975.
p.301.

Bristol porcelain works. (1) These fast firing qualities were ideally suited to the rapid but low temperature firing of enamelled wares, where a second firing fixed the metallic oxide stains on the previously glossed wares. Initially, enamelling was undertaken by specialist decorating workshops - for example the Warburtons at Cobridge (2) - and it was only in the later eighteenth century that this aspect of the manufacturing cycle was undertaken within the pottery. The earliest surviving business records to refer to enamelling are of this later period, when the transfer to coal firing had commenced, but was not complete. The recruitment of charcoal fuel supplies by Wedgwood's Chelsea decorating workshop, for instance, was difficult at times and Bentley, then manager at Chelsea, desperately considered the introduction of coal : "...I have read your queries and answers, which are very clear, but charcoal is not to be had here on any moderate terms, indeed you hint as if coals will do." (3) That economic supplies were obtained is evident from the continued use of charcoal at Chelsea, at least, into the early nineteenth century, although by this period the transfer to alternative fuels was well under way, with coke the more important fuel :

1. : J. Thomas, The Rise of the Staffordshire Potteries. p.67.
2. : A. Mountford, op.cit. p.56.
3. : Letter Wedgwood to Bentley, July 17th, 1768. Quoted by : J. Thomas, The Rise of the Staffordshire Potteries. p.67.

TABLE 6 : PURCHASES OF FUEL FOR THE CHELSEA DECORATING WORKSHOP, 1801-6 : (1)



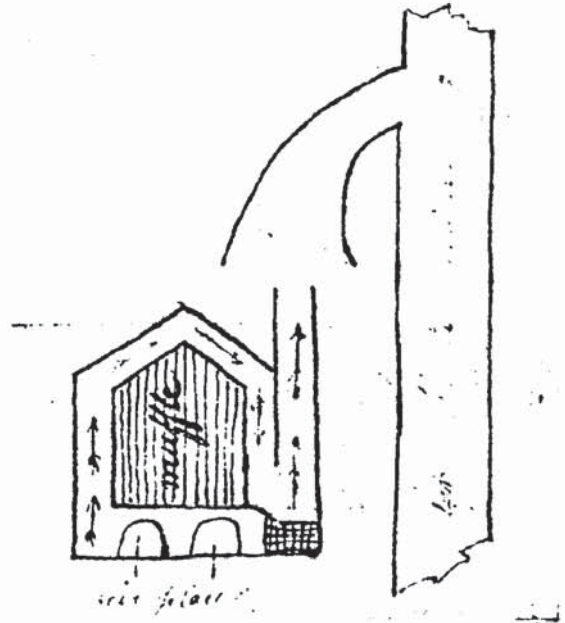
The main characteristics of wood as a fuel were its long flame and fast firing, advantages under certain circumstances but difficult to control. The absence of clinker in the firemouth (as found when firing with coal) enabled cold draughts to enter the firing chamber and the long flame resulted in uneven heating of the oven and intense heating directly opposite the firemouths. (2) The raising of the kiln floor and the provision of ground flues set into this kiln base overcame these problems to an extent, as for example in the two seventeenth century kilns excavated at Pottesbury, Northamptonshire, where the kiln floor comprised two D shaped pedestals raised 6" from the floor level, effectively providing two ground level flues which linked with the firemouths. (3) Wedgwood experienced similar difficulties : "... the flames will burst forth from the top of the chimney at any height." (4) and in 1796 sought the assistance of Boulton and Watt in the design of a new kiln :

"Is it not practicable then, to consume the flame under a dome, so that none shall appear at the top of the chimney in the open air, by making the chimney of the kiln or muffle under a dome, communicating with a chimney wider than that of the kiln, and at such a height above the chimney

1. : Wedgwood Mss.: Ledger A., Account Book 1801-6.
pp.34,107,155,212.
2. : P. Brears, op.cit. p.146.
3. : P. Mayes, Seventeenth Century Kiln Site at Pottersbury, Northants. Post Medieval Archaeology. 2. 1968.
pp.55-82.
4. : Boulton and Watt Mss.: Incoming Letters, Box 36.
Letter Wedgwood to Boulton and Watt, September 7th, 1796.

of the kiln as shall allow the flame to be consumed before it enters the kitchen chimney.

This sketch I believe will shew what I mean."(1)



James Watt in reply suggested modifications to the design, but also significantly, felt it necessary to advise : "I think also you should try burning coales in your present kiln,..."(2)

Although potters had already access to coal supplies and during the early eighteenth century extended their use of the fuel to include such ancilliary processes as the preparation of clay in heated vats, (3) the widespread take-up of the new technology was delayed through difficulties

1. : Ibid.
2. : Boulton and Watt Mss.: Office Letters Book. August 1796-July 1797. James Watt to Josiah Wedgwood, September 12th, 1796.
3. : The first known reference to a kiln for 'boyling clay' occurs in the probate inventory for John Middleton of Shelton, 1718. Shaw gives the first person to use such a kiln as being Ralph Shaw in 1732. SRO.: D1788. P61.B41. Arbitration award against Middleton for damage caused by his 'boyling' kiln. S. Shaw, History of the Staffordshire Potteries. 1829. p.147.

in the use of poor quality, surface outcrops - the earliest exploited supplies. The transfer to the new fuel required the modification of both kiln and firing practice and whilst entrepreneurs were assisted by the experience gained from using wood as a fuel, both were complex problems.

Unlike wood, coal formed clinker in the firemouth during firing and this obstruction to the air supply resulted in a more diffused heat build-up in the firing chamber. In many respects this modification suited the manufacturer - wares were more evenly fired and less subject to warping through excessive, partial heating - but it could only be achieved through the provision of a greater number of firemouths round the periphery of the kiln. The wood kilns used only a single firemouth, as for example with the late sixteenth century kiln at Crockerton in Wiltshire, (1) and the distinctive feature of all excavated early coal fired kilns is the provision of a large number of firemouths. A further distinction, the increased size of the coal-fired kilns, reflected the contemporary increase in demand for pottery. (2) The Albion kiln, Hanley, built between c.1690-1714, was of brick construction with seven firemouths equally spaced round the perimeter of the 10'0" diameter base. (3)

1. : P. Brears, op.cit. p.146.
- 2.. : The enamelled and porcelain wares were high cost pieces and therefore fired in small quantities, whereas earthenwares were cheaper and fired in bulk - a reflection of the market demand.
3. : F. Celoria and J. Kelly, A post-medieval pottery site with a kiln base found off Albion Square, Hanley, Stoke-on-Trent, Staffordshire, England SJ 885 474. City of Stoke-on-Trent Museum Archaeological Society Report No. 4. 1973. p.9.

The Old Hall Street kiln base, excavated in 1967, indicated a slightly modified kiln, built between c.1700-25, of brick construction and with six or seven firemouths spaced round the perimeter of the 12'0" diameter oven. (1) These findings are further supported by the excavated remains of kilns at Longton Hall and the Pomona Pottery, Newcastle, both of which displayed evidence of multi-flued construction. (2)

1. : J. Kelly and S. Greaves, The Excavation of a Kiln Base in Old Hall Street, Hanley, Stoke-on-Trent, Staffs. SJ 885 474. City of Stoke-on-Trent Museum Archaeological Society Report. No. 6. 1974. p.6.
2. : Ibid.
The kilns are all significantly larger than the oven described by Plot in c.1686, : "...the Oven, which is ordinarily above 8 foot high, and about 6 foot wide,..." R. Plot, Natural History of Staffordshire. 1686. p.127.

PLAN OF THE ALBION SQUARE KILN, HANLEY, c.1690-1714 : (1)



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1. : F. Celoria and J. Kelly, op.cit. p.54.

Further modifications occurred to the basic kiln form, principally to improve thermal efficiency and to effect a greater control over the temperature gradient within the firing chamber, thereby improving fuel economy and reducing kiln waste. (1) With peripheral firemouths, an inner wall flame temperature of 1,000 .C. (common with coal firings) could contrast sharply with a central kiln temperature of only 750.C. and the resultant unequal firing was only overcome after the introduction of a central flue set into the kiln-base - the forerunner of all subsequent up-draught intermittent ovens. (2) This empirical modification continued throughout the eighteenth and nineteenth centuries, with the occasional improvement protected through the grant of a patent. (3) The successful conclusion of these improvements is amply demonstrated in the following letter written by the Chamberlains at Worcester to an unidentified customer :

"By a late material improvement in our kilns we have been enabled to make a much larger quantity of china in consequence of which Messrs. Chamberlain's will be now happy in the favour of yr. orders. " (4)

One of the more persistent problems associated with the use of both coal and wood as fuels, was the frequent contamination of wares, (5) a problem also found in the glass

1. : The thermal efficiency of the Albion kiln was found to be an estimated 1%, whereas later intermittent ovens achieved 8.1%. F. Celoria and J. Kelly, op.cit. p.9. A group of Astbury-Type Pottery Found in Shelton, Stoke-on-Trent, Staffs. SJ879469. op.cit. pp.28-38. The finds were all over-fired biscuit wasters - or kiln waste.
2. : P. Mayes, Medieval Pottery Teaching Unit. 1968.
3. : For example : John Venables and John Tunnicliffe, Patent 9161, 1841; Joseph Bourne, Patent 11,831, 1847; Robert Heath, Patent 10,431, 1844.
4. : Chamberlain Mss.: 5. 1791-6 Letter Book. Letter, Chamberlain to unidentified person, January 7th, 1796.
5. : G. Savage, Porcelain Through the Ages. p.281.

industry. Glass manufacturers resorted to the use of closed crucibles to protect the molten mixture, (1) and in potting a similar technique was evolved - the use of saggars. (2) The serious nature of this problem is well illustrated by the following extracts taken from John Flight's diary, compiled during 1789 whilst manager at the Warmstry House Pottery, Worcester :

"June 28th, 1789.

The past week has indeed been a very trying one to me & what is worse the coming one will I fear be more so. We burnt the kiln every day in the week & still the sulphur continues & spoils the Ware on Monday I thought it was better Tuesday it appeared to continue to mend & was still better on Wednesday but on Thursday was worse again we hoped then it was owing to the Rain which had made the Place damp but it appeared otherwise by being no better Friday & yesterday what we shall do I cannot tell we think of trying to erect one upon the Plan of Chamberlains.."

"July 2nd., 1789.

We sent for the man who built Chamberlains kiln who gave us every necessary dimension & said he could easily build one for us... Advised to fire with saggars - all allright except crown saggars" (3)

The use of saggars was not entirely successful and from subsequent entries (4) it is apparent that Flight failed to identify the cause of the sulphur contamination - the poor quality coals used. It is uncertain how much this failure

1. : J.U. Nef, The Rise of the British Coal Industry, 1 p.218.,
2. : It is not known when saggars were introduced, but they were certainly in use by c.1686. R. Plot, op.cit. p.127.
3. : John Flight's diary, 1785-01. Private possession, C/o Mr. H. Sandon, Dyson Perrins Museum. Entry : June 28th, 1789. p.240. Entry : July 2nd, 1789. p.242.
4. : Ibid. Entry : November 21st., 1789. p.261.

was due to Flight's inexperience in technical matters (1) and how much the consequence of manufacturing away from a coalfield - for in North Staffordshire the discriminate exploitation of the various mines provided a wide range of coals, many of which were of low sulphur content, by the late eighteenth century.

The need to reduce the sulphur content of coals, in order to prevent contamination - usually evident as a blistering of the glaze or pitting of enamel colours (2) - was recognised by colliery agents in North Staffordshire, who indicated in their sale documents the uses to which their various coal could be put and directed mining operations to satisfy these needs :

"1792 - April 7th.

Woods mine on common -
Potters use it for biscuiting bothams will do for Glossing.
2/7 per load - getting and drawing." (3)

"1795 - December 3rd.

Cockshead Coals 6/0 per ton.
Clear, swift burning and hot - not a good potters' coal" (4)

Although the Cockshead coals were useful in achieving high firing temperatures, their fast firing made them uneconomic (5)

1. : Ibid. Entry : July 19th., 1789. p.245. Flight experienced difficulty in the manufacture of some of the porcelain bodies, mainly through a lack of understanding of the formulae used.
2. : P. Rado, An Introduction to the Technology of Pottery. p.244.
3. : SRO.; D593/M/2/1/4. Memorandum to the Marquis of Stafford from the Foley Coal Office agent.
'bothams' probably refer to the lower portion of the Five Foot Coal. J. Stubbs, A Glossary of the Geological Terms in use in the North Staffordshire Coalfield. Transactions of the North Staffordshire Field Club. 50. 1915-16. pp.49, 60.
4. : SRO.; D593/M/2/1/1. 1795. Coal Sales.
5. : The faster the burning of the coal, the more baitings or refuelings were required.

and with a 0.5% sulphur content they were considered, along with the Great Row seams (which had a 1.04% sulphur content), to be only useful for biscuit firing the very cheapest wares. (1) Contrary to this, the Rohurst, Burnwood and Peacock coals were considered "in general good potters' coal", a point observed by Josiah Wedgwood who discriminated in his purchases of coal between the 'Ruhurst' (sic) and Great Row seams. (2)

The search for more economic uses of coal and the practice of fuel economy reflected the enormous growth in the application and use of coal by potters during the latter decades of the eighteenth century. There are few long runs of business records surviving for the North Staffordshire pottery industry, but the isolated references indicate a steady increase in the amount of coal required by individual manufacturers from the eighteenth century onwards. The increasing significance of fuel costs in the financial structure of the business, necessitated changes in purchasing policy and encouraged the horizontal diversification of investment into additional activities, notably colliery operation.

The capital expenditure on coal varied with the capacity of the pottery and this was to a large extent dependent on the number of ovens available for firing ; "Every establishment has these 'hovels' and the extent of the operation is in some degree indicated by the number of them." (3)

1. : S. Hinds, Pottery Ovens Fuels and Firing. pp.56-8.
2. : SRO.; D593/M/2/1/1. 1795. Coal Sales.
Wedgwood Mss.: 1-595. Account Josiah Wedgwood with Hugh Ford, July-October, 1763. Ibid. 24265-32. Account with Billington for the carriage of materials. July 19th. - December 31st. 1784.
3. : The Penny Magazine. Supplement. May, 1843. p.204.

The capacity of individual potteries could only expand through the erection of additional ovens, a physical growth governed, in many instances, by the limitations of the site. (1) John Hendley Sheridan, for example, increased the capacity of the Gladstone Pottery, Longton, between 1815 and 1856, through the erection of additional workshops and ovens, the combined biscuit and gloss oven being replaced by three ovens by 1840 and two biscuit and two gloss ovens by 1856. (2) Whilst the process of incremental expansion at Gladstone Pottery was typical for the industry as a whole, the rate of growth was modest, when compared with that achieved at many contemporary, nearby works; Knight and Elkin worked nine ovens and W. and J. Baker worked eighteen ovens in 1826, and whilst representative of the larger manufacturer, the average number of ovens at that time was six. (3)

Within the limitations on capacity established by the number of ovens at a particular works, there were wide variations in actual fuel consumption. Ovens were, in the main, designed and built by the pottery entrepreneur rather

1. : See Chapter 6.
2. : Gladstone Pottery Mss.: 8. Deed of Partition, August 25th, 1815. Ibid. 14. Plan, 1840.
SRO.: D593/H/8/92. Ordnance Survey for Longton, 1:500. 1856.
3. : Wedgwood Mss.: 25219-33 : Letter C.J. Mason to Josiah Wedgwood, June 9th, 1826, containing details of the Chamber of Commerce levy charged at 5.0d. per oven, for the Lane End works. These figures are substantially similar to those provided by witnesses before the 1842 Commissioners : Appendix to the Second Report to the Commissioners, 1842. op.cit. interviews nos..103 and 104. William Ridgway's works, Hanley.

than by specialist contractors (1) and with rebuilding a frequent maintenance problem, there was considerable latitude in the performance of individual ovens. The physical characteristics of an oven were critical in determining the amount of fuel per firing, with the larger capacity ovens consuming proportionately less coal than their smaller counterparts. The Kerr and Binns biscuit ovens had a capacity of 4,800 pieces and required eight tons of coal per firing in 1854, whereas the Gladstone Pottery biscuit ovens, of contemporary construction, fired 40,000 pieces using nineteen tons of coal (2) In addition, the larger the number and size of firemouths, the more fuel was required per firing; an earthenware biscuit oven with eleven firemouths, each of 7.58 square feet area, consumed 26.7 tons of coal per firing, significantly more than the 17.65 tons required by a similar capacity oven with only ten firemouths, each of 5.25 square feet area. (3)

An additional factor in the determination of fuel consumption centred on the ability to shorten radically the

1. : This was still common practice in the early twentieth century, Mr. T. Simpson of the Elder Pottery, Cobridge, designed his own gloss kilns in 1930, even though some ten years previously he had commissioned H.Hewlett & Sons of Hanley to build two enamel kilns. Personal discussion with Mr. Simpson, August 1967 and private mss., since destroyed by the company. There were exceptions however; John Baddeley of Shelton hired Thomas Greatbach in 1756 to build ovens and in 1842 William Brookes of Waterloo Road, Burslem, advertised his services as a specialist kiln designer and builder. SRO.: D1788. V.94. Staffordshire Advertiser. 48. May 28th., 1842.
2. : Chamberlain Mss.: 87. 1854-5 Making and Estimating Book. Friends of the Gladstone Pottery Newsletter, 5. p.1.
It is not known whether an optimum oven size to efficiency ratio were ever achieved.
3. : S. Hinds, op.cit. p.64.

firing cycle, enabling a greater throughput for each oven, with an increase in the total amount of fuel required by the works during a given period. The most expedient, if callous, method required the drawing and re-loading of an oven whilst still hot, saving the time normally allowed for the safe cooling of the firing chamber. (1) This was an important consideration when the minimum firing cycle duration - that for a 16'0" gloss earthenware oven - was four and a half days, and the maximum cycle duration - for a 15'0" biscuit china oven - was fourteen days. (2) Allerton, Brough and Green worked the Park Works, Longton, in 1840-1 and were reported to fire between thirteen and fourteen ovens per week, a capacity impossible to achieve with the three ovens at their disposal unless they practiced the drawing of hot ovens. (3)

The need to provide potters with a more extensive range of coals, in increasingly larger amounts, forced the exploitation of deeper seams and as a consequence fuel costs rose during the late eighteenth century. (4) It was inevitable therefore, that with every ton of clay requiring between five and six tons of coal to process it, (5) fuel purchases should

1. : The Potters' Examiner and Workman's Advocate. Letter to the paper by Enoch Bradshaw, March 16th., 1844. See Appendix 12. The practice of drawing hot ovens continued until the final cessation of intermittent oven firing, in the 1950's. Discussion with D. Seckers of the Gladstone Pottery Museum, January 1976.
2. : S. Hinds, op.cit. pp.61-6. Sample firing cycles for up-draught ovens are : 20'0" diameter earthenware biscuit oven - seven days; 16'0" diameter earthenware gloss oven - four and a half days; 15'0" diameter china biscuit oven - fourteen days; 16'6" diameter china gloss oven - seven days.
3. : Gladstone Pottery Mss.: 14. Plan, 1840. Appendix to the Second Report of the Commissioners, 1842. op.cit. Interview 308 by Brough of Allerton, Brough and Green.
4. : See Chapter 8.
5. : Spode Mss.: 797/3. Garrett's Costing Book. 1833.

figure prominently in manufacturing costs. An analysis prepared by Thomas (1) of production costs for the Minton Pottery in the period 1823-35, indicates that, next to wages, coal purchases were the heaviest single expenditure, averaging 14% of the total financial commitment :

TABLE 7 : ABSTRACT OF EXPENDITURE BY MINTON ON WAGES, COAL AND CLAY, FOR THE PERIOD 1823-35. : (2)



Illustration removed for copyright restrictions

1. : J. Thomas, The Rise of the Staffordshire Potteries.
p.68.
2. J. Thomas, op.cit. p.68.

These figures, whilst representative are drastically oversimplified, as the Garrett costing analysis for the Spode pottery, prepared in 1833, indicates. (1) In the production of twenty dozen blue printed plates, the biscuit firing accounted for 1.9½d and the gloss firing 3.9d - 15.6% of a total cost of 35.8¼d. In this instance the clay accounted for 20% and printing 17% of the total cost. With the production of 6" muffins, the percentage cost of coal to the total was higher - 34.6%. as opposed to only 20% for the clay. (2)

In order to secure the different types of coal required, manufacturers purchased from several collieries or pits, either collecting orders personally or dealing with an independent contractor. The larger of these intermediary contractors were able to supply a wide range of fuels - Wedgwood obtaining five separate coals from Mr. Billington, (3) - but the smaller contractors were more limited in their supplies and the complexity of business with such agents may be gauged by the instance of Chamberlain, who between 1792-8 was required to order coal from no less than sixteen contractors. (4) This factor, combined with the high cost of the supplies, encouraged potters to purchase coal as and when required for a particular firing; with transport costs a major consideration, these small, regular purchases tended to be from local pits. The Priorfield and Meirheath collieries in Lane End served ninety-eight manufacturers between

1. : Spode Mss.: 797/3. Garrett's Costing Book, 1833.
2. : Similar variations are to be found in the Kerr and Binns costings, for the production of stoneware sacuers, clay accounted for 14% and coal 28%, of the total cost. On the more elaborate Vine Jugs, pressing accounted for 75%, clay 11% and coal only 3½%. Chamberlain Mss.: 87. 1854-5 Making and Estimating Book.
3. : Wedgwood Mss.: 24265-32. Account for haulage with Billington. July 19th., to December 31st., 1784.
4. : Chamberlain Mss.: 1789-92 Cash and Order Book; 65, 1792-3 Cash and Order Book; 66, 1792-8 Cash and Order Book; 1796-1806 Cash Book.

1810-13, all of whom, with the exceptions of William Dawson of Burslem and William Wright of Hanley, came from within two miles of the pits. (1) This method of purchasing fuel supplies persisted well into the nineteenth century and had the additional advantage of allowing the potter to dispense with a coal yard, a valuable saving in space when sites became restricted through intensive development. (2) The major draw-back of this policy was the risk of having to stop work through the interruption of supplies, either because of bad weather or through colliers' strike - the 1831 strike forcing most potteries to close within days of the first pit stoppage. (3)

The pattern of small, regular purchases is clearly demonstrated in the sales returns of Meirheath and Priorfield collieries on the Marquis of Stafford's Trentham estate. (4) The majority of potters purchased fortnightly - the Meirheath sales averaged 10 cwt. on any one occasion with a maximum fortnightly purchase of eight tons per manufacturer - the Priorfield sales were generally higher, with average purchases of two tons per manufacturer and maximum fortnightly purchases of fifty-six tons. Purchases were from several pits within each colliery, biscuiting and glossing coal being obtained from the Meirheath Woods Mine and biscuiting coal only from the Deepmine. The receipts for individual pits were combined

1. : SRO.; D593/M/3/1, 2, 4. See Appendix 13.
Potteries outside North Staffordshire adopted the policy of purchasing in fewer, larger lots; the proprietors of the Herculaneum Pottery, Liverpool, resolved in 1807 "...that a good stock of coals be kept at the Pottery, say not less than 50 or 100 tons."
Herculaneum Pottery, Resolutions of the Committee 1806-22. July 28th., 1807. LPRO.: H380, MD47, KF295.
2. : See Chapter 6.
3. : Staffordshire Advertiser. 37. May 28th., 1831.
4. : The following analysis is based on these returns for the period 1810-13. SRO.: D593/M/3/1, 2, 4.

at the sales office and no detailed financial breakdown is therefore possible. But, an average fortnightly account was £10 and only exceptionally rose above £30, representing individual annual purchases of between £250 and £750. (1)

In the absence of comprehensive company records for the potters supplied by the two collieries, it is impossible to equate purchases with actual fuel consumption. With such potters as Peter Hughes of Lane End, (2) the occasional purchases noted could only represent purchases from one particular source, and it is known that the Priorfield and Meirheath purchases by Spode were intended to supplement his Fenton Park supplies. (3) Such manufacturers as William Bailey (4) purchased between thirty-four and eighty-five tons of coal a month, between September 1810 and November 1812. The majority of these purchases were from the Priorfield Colliery and there are only occasional receipts for Meirheath coals. For the twelve months commencing March 1811, he purchased 647 tons, or the equivalent of Spode's fuel consumption for three weeks. (5) Whilst it is accepted that the Spode works were one of the largest in North Staffordshire, Bailey's pottery was far from insignificant and it must remain conjectural whether he purchased coal from other sources in order to maintain his required production. (6)

1. : Ibid. D593/M/2/1/4.
2. : Ibid. D593/M/3/1/2/2, 5. Purchases recorded : April 4th., 1811, 12 cwt.3., September 28th., 1811, 16 cwt.2., November 19th., 1811, 13 cwt., March 16th., 1814, 14 cwt.2.
3. : SRO.: D539/M/3/1/2/2, 4. Purchases noted between December 16th., 1812 and December 18th., 1813.
4. : Ibid. D593/M/3/1/1/1, 2, 3.; M/3/1/2/2.; M/3/4/3/2.
5. : L. Whiter, Spode. p.21. Spode required 10,400 tons of coal per year; by way of comparison, Bailey's consumption was the equivalent of sixteen weeks consumption by Turner, who bought 2,080 tons per year. Staffordshire Advertiser. 12. April 19th., 1806.
6. : S. Shaw, History of the Staffordshire Potteries. 1829 p.76.

Less frequently, potters became involved in colliery management, a diversification practised in other furnace industries, notably glass manufacture. The Dunbarton Glass Works required 1,500 tons of coal per year and up to 1792 owned collieries in order to supply these needs, after this date they disposed of these pits and took short-term leases of other collieries instead. (1) For the land owning potters, colliery ownership was often incidental to normal estate management, particularly where the land had been acquired before the introduction of the late eighteenth century practice of selling land with restrictive covenants excluding the mineral rights. (2) The Adams family owned several estates in the northern pottery towns in Staffordshire, developing the Cockshead and Greenfield pits, together with others at Sneyd Green and Cobridge. (3) Similarly, the proprietors of the Caughley (Shropshire) pottery owned land adjacent to their works and at the time of their bankruptcy in 1803, part of this land had been exploited for colliery workings. (4) Potters without such estates were still able to own coal pits, purchasing them as independent businesses. Thomas Shelley acquired his collieries in this way, being unable to sink pits on his Lane End property owing to restrictive covenants preventing mineral extraction. (5)

As an alternative to colliery ownership, potters could lease workings. Thomas Daniel of Burslem had on his death in

1. : J. Logan, The Dumbarton Glass Works Company : A Study in Entrepreneurship. Business History. 14.1. 1972. pp.62-4.
2. : Gladstone Pottery Mss.: 1. Conveyance. June 28th., 1783.
3. : The Victoria History of the County of Stafford. 8. p.139.
4. : Salopian Journal. September 21st., 1803.
5. : Gladstone Pottery Mss.: 1. op.cit. Ibid. 8. August 25th., 1815. Deed of partition.

1662, an estate valued at £54, of which the remains of colliery leases were valued at £1. (1) Whilst it is certain that the Adams family considered colliery ownership advantageous in supplying their own potteries, they also found the mines a useful investment, leasing out the Jackfield Colliery to Ralph and James Clews, potters, for £216 per annum in 1817. (2)

Whilst a tenancy still enabled the smaller potter to control his own coal supplies, a considerable financial investment was required and increasingly towards the end of the eighteenth century and into the nineteenth century, these small mining concerns were forced to close through acute financial problems. Colliery operators faced frequent claims for subsidence damages : "Blue Bell forms a long range of potwork & dwelling houses a little damaged & will be much worse if the colliery is carry'd on there." (3) and whilst the initial claim was often far in excess of the final settlement - the Fenton Park Colliery Company in 1837 paid only £4,862.13.9d. out of a total claimed of £116,192.8.9½d (4) - the draw on resources could be considerable. Colliery management demanded skills often lacking in the small pottery business and in particular they were called upon to resolve labour unrest. (5) Finally, the need for deep mining and pumping (6) forced the single tenant and owner from colliery

1. : LJRO.: B/C/11. Thomas Daniel, Burslem, will proved April 11th., 1662.
2. : The Victoria History of the County of Stafford. 8.p.139.
3. : SRO.: D593/M/2/1/1. Claim for damages by Middleton, January 20th., 1796.
4. : Spode Mss.: 530. 1837 Statement of claims and amount awarded.
5. : E. Richards, The Leviathan of Wealth, p.284. The Duke of Sutherland withdrew from colliery operation in the Lane End area due to labour problems.
6. : W. Thompson, Industrial Archaeology of North Staffordshire. p.34. By the 1830's workings reached 2,000' in depth and as a consequence required constant pumping. At the shallower levels soughs were used, as for example when Joseph Adams negotiated such a provision for his Ashmines with the Marquis of Stafford in 1788. SRO.: D593/M/1/4.

operation, their place taken by mining co-partnerships.

The colliery co-partnerships, whilst better placed financially to meet the considerable risks, were ultimately only marginally more successful than the earlier ventures, and many were short-lived. Samuel Perry and Company worked the Sneyd Green and New Hays Collieries for only two to three years, terminating their partnership in 1797, with the partners investing in other, similar concerns. Ralph Baddeley and Charles Bagnall joined John Turton, Esq., and Company in an attempt to continue mining at Sneyd Green, only to be disbanded in 1802. (1)

In the absence of financial records for any of these co-partnerships their failure is hard to explain, particularly since one such venture, the Fenton Park Colliery Company, became a thriving and important business. The company was initially formed in 1790 by Harrison, Spode and Company and comprised seventeen partners - sixteen potters and one experienced in 'The Trade and Business of coal masters' - (2) and leases on land in Fenton Park were taken out with the Fletcher and Armistead families. From the outset the company experienced difficulty with flooding of the workings and the need for constant pumping prompted the order in 1791 of a 20.8 h.p. Boulton and Watt engine, a severe strain on the company finances, with debts of £146.11.1d. still outstanding in 1800.(3) A second Boulton and Watt engine was ordered in

1. : The Victoria History of the County of Stafford. 2. p.19.
Staffordshire Advertiser. 4. October 6th., 1798.
Ibid. 8. January 23rd., 1802.
2. : L. Whiter, Spode. p.16.
Partners were - John Harrison, Josiah Spode, Thomas Wolfe, Thomas Hemmings, George Harrison, James Bray, John and Richard Meir Astbury, Samuel Barker, Richard Myatt, Charles Harboy, John Forrester, John Aynsley, Richard Barker and Thomas Shelley. Spode Mss.: 851.
Deed of Co-partnership. August 10th., 1791.
3. : Boulton and Watt Mss.: Catalogue of Old Engines.
Section L.P. 283B. J. Thomas, op.cit. p.71.

1802, at an estimated cost of £1,473, (1) with payment forstalled several times, prompting the terse comment from Boulton and Watt : "...such a continued disregard to our claims might be thought to warrent other measures on our part than the renewal of our solicitations." (2) The eventual settlement of the account was in all probability due to the generosity of Spode rather than the promptitude of the other partners.

Despite these financial handicaps, the company evidently prospered and was able to sell Ashmine, Knowls and Tabberners coals in 1795, all good potters' coals. (3) Clearly, by this period the company - now termed the Fenton Park Colliery Company - had reached an extractive capacity sufficient to support a general coal merchant's business in addition to the partnership needs and between 1813 and 1827 further tenancies and colliery purchases increased this side of the business. On the 20th of June, 1813, the Fenton Park Colliery Company extended their Fenton mines through the additional rental of the Yew Tree Farm, (4) and on the 19th of September, 1822, purchased for £11,000 the lease of collieries at Broadfield, Goldenhill and Tunstall. (5) Significantly, these

1. : Boulton and Watt Mss.: Incoming Letters, Box 7. v. May 25th., 1802. Letter from the Fenton Park Colliery Company to Boulton and Watt.
2. : J. Thomas, op.cit. p.71.
3. : SRO.: D593/M/2/1/1.
4. : Spode Mss.: 507. Lease, June 20th., 1813. The tenancy was for thirty years at a mine rent of 1/0d per stack. The partners were given as : Spode, Wolfe, Minton, Charles and Ralph Bourne, Baker, John Bourne and two non-potters - Pownall and Booth.
5. : Spode Mss.: 230. Indenture, September 19th., 1822. Rental was £42 per annum for 58 years. The partners were as per the 1813 agreement with the exception that Wolfe had died and his share was held by his widow, Rachel.

latter acquisitions, together with the Northwood Farm colliery rental taken out on September 2nd., 1827, (1) were situated well away from the potteries belonging to the partnership members and almost certainly these pits were intended to serve the retail business only. With the increased capacity of the colliery business - the Fenton Park pits alone employed 250 men in eleven pits in 1842 (2) - the value of the company increased. On the death of Spode in 1827 the entire company was valued at £14,000, by 1833 his half share was re-valued at £8,950. (3)

The demand for appreciable financial reserves for their pottery businesses, forced most of the original Fenton Park Colliery Company partners out of the business and at the time of the 1813 renewal of the main lease only two remained - Spode and Wolfe - both wealthy and successful pottery entrepreneurs. (4) This financial pressure was also, incidentally, felt by the remaining landed colliery owners and during the 1840's there was a progressive transfer of colliery management from the land-owning families to professional coal-masters, the Hatherton, Dartmouth and Heathcote families selling their mines. (5) By the 1850's the transfer from potters' involvement in colliery management to a position of total dependence on middle men, was complete, and remained on that basis until the final cessation of coal consumption in the 1950's and the ban on coal-fired ovens.

1. : Spode Mss.: 231/33. Rental agreement, September 2nd., 1827. Rental was : 2.0d. per 1,000 bricks, 1.0d. per cwt. for clay, one fifth of the value of all coal extracted - with a minimum of 2,031 tons per year.
2. : The second Report to the Commissioners, 1842, op.cit. Statement no. 163, by Thomas Cheadle for the Fenton Park Colliery Company.
3. : Spode Mss.: 541/1. 1833 Account of purchase of Spode estate. L. Whiter, Spode. p.34.
4. : Ibid. p.33.
5. : J. Ward, Land and Industry. pp.178-9.
The wealthy W.T. Copeland, who has previously purchased the Spode works and estate, sold the Fenton Park collieries in the late 1840's. The Victoria History of the County of Stafford. 8. p.222.

CHAPTER SIX :
THE DESIGN AND PLANNING OF THE POTTERY.

During the post medieval period and in particular the seventeenth and eighteenth centuries a characteristic building complex evolved in certain furnace and small metallurgical trades, with workshops grouped round the rear gardens of the master's house to form courtyards. It occurred with the seventeenth century West Midland's metalworkers, particularly in Sedgley and Walsall, (1) and with the late eighteenth century gunsmiths in the St. Mary's district of Birmingham. (2) The layout was also present in the pottery industry, seventeenth century examples having been excavated in the Eastgate at Bourne, Lincolnshire and the more extensive Potovens settlement. (3) In North Staffordshire the practice of locating ovens and workshops to the rear of the potter's house was widespread until at least the 1750's. (4)

Although more typical of eighteenth century industrial development, the domestic courtyard plan survived in the pottery industry in isolated instances, into the mid-nineteenth century. In particular the expansion of Lane End as a

1. : M. Rowlands, Masters and Men in the West Midlands metalware trades before the industrial revolution. pp.44, 50-1.
2. : D. Smith, Birmingham's Gun Quarter and its Workshops. Journal of Industrial Archaeology. 1.2. 1964. p.111.
3. : N. Kerr, A Medieval and Post Medieval Pottery Industry. Excavations in Eastgate, Bourne, Lincolnshire. Interim Report. 1974.
K. Bartlett, Excavations at Potovens, Near Wakefield, Post Medieval Archaeology. 5. 1971. pp. 4, 9.
4. : William Salt Library Mss.: 74/41. Map of Burslem by William Heaton. Subsequent edition attributed to E. Wood. c.1750.
F. Falkner, The Wood Family of Burslem. frontispiece.

manufacturing centre was marked by the development of potteries in the gardens of existing houses. Josiah Spode erected on behalf of his son Samuel, the Foley Pottery in the grounds of Foley Cottage, in c.1790, (1) and between 1790 and 1817 Robert Garner developed a works in the garden of Bank House, a property leased from the Marquis of Stafford. (2) Much of the subsequent small scale industrial development in this town occurred in the gardens of existing houses, although almost without exception the large potteries were sited on open land. (3) Outside the North Staffordshire Potteries there were isolated instances of pottery workshops being erected behind houses - Henry Doulton for example, provided a new terracotta works in the rear garden of a house near his Lambeth pottery, in 1840. (4)

More frequently, the pressure on potters to find additional manufacturing accommodation directed their attention towards the use of their homes as additional workshops and offices. Ralph Stevenson maintained a separate house at his Cobridge pottery until at least 1812, but this subsequently became part of the works, as did a row of terraced workers' cottages - Elder Place - located to the rear of the pottery. (5)

Even after the decline in significance of the potter's house within the manufacturing premises, the courtyard

1. : The Victoria History of the County of Stafford. 8. p.219.
2. : Ibid. p.240. SRO.; D593/B/1/11/15. Leases, January 5th., 1790. September 29th., 1817.
The works subsequently became known as the Crown Clarence Works.
3. : SRO.: D593/H/447a. 1832 Hargreaves map of the Potteries. D593/M/8/98. 1:500 Ordnance Survey for Longton, 1856.
4. : E. Gosse, D. Eyles, Sir Henry Doulton The Man of Business as a Man of Imagination. p.21.
5. : H.B.L.: EMT. 1. 812. Mortgage between Ralph Stevenson and John Aston, March 25th., 1812.
1:500 Ordnance Survey, 1878.

continued as the principle generator of pottery layouts, the place of the house taken by similarly proportioned and designed offices and showrooms. Jacob Marsh built the Boundary Works on land in Lane End leased from the Marquis of Stafford in 1818 and in common with other, subsequent, pottery entrepreneurs built ovens and workshops round a central courtyard, the street frontage being occupied with offices and warehouses. (1) This plan form persisted until the 1920's the last known example to be built in this form being the Vale Works, Goddard Street, Longton. (2)

1. : SRO.: D593/B/1/11/16. Lease by Jacob Marsh, September 25th., 1818.
2. : Site observations made in 1969, works demolished c.1970.

PLAN OF THE BOUNDARY WORKS, LANE END (LONGTON), 1856 : (1)



1. : SRO.: D593/M/8/98. 1856. 1:500 Ordnance Survey for Longton.
It is to be noted that although originally published at 1:500 scale, the above plan is based on the British Museum copy which has been photographically reduced to 1:1250.

The widespread and continued use of the courtyard pottery layout (1) reflected the economic and organisational advantages inherent in the plan form. In particular, it afforded the entrepreneur the opportunity to extend the manufacturing capacity and improve the efficiency of his pottery, without demanding the recruitment of large amounts of capital for the erection of a new works. In many respects this factor was central to the economic development of the pottery industry, especially in North Staffordshire where there were few sources of capital for large scale investment until well into the nineteenth century. (2)

The capacity of a pottery was generally considered in the eighteenth and nineteenth centuries in terms of the number of ovens fired, a point frequently made by agents disposing of premises : "...the pottery is in complete repair, compact and convenient plan. Produces 6 gloss ovens of ware a week."(3) Potters, as with entrepreneurs in other furnace industries, could only increase their manufacturing capacity through the erection of either larger, or more frequently, a greater number of ovens on the land available. The greater productive capacity generated through the adoption of the jigger and jolley in the 1840's (4) was ultimately subordinate to the ability to fire the additional wares.

1. : The courtyard plan also survived in other industries, notably brewing and distilling. J. Tann, The Development of the Factory. pp.100, 106 and 108.
2. : See Chapter 8.
3. : Staffordshire Advertiser. 45. August 24th., 1839.
The works belonged to Messrs. T. & J. Carey,
of Fenton.
4. : See Chapter 3.

Attempts to increase the capacity of coal-fired ovens were, with the exception of the practice of drawing them while hot, (1) largely unsuccessful, and between the mid-eighteenth and nineteenth centuries, potters achieved only small increments in the capacity of individual ovens - 1,500 to 4,800 pieces per firing. (2) This limited development was largely attributable to the disastrous and occasionally fatal consequences of attempts at building larger ovens:

"Last Tuesday a misfortune happened at the large Earthenware manufactory now erecting near this town, owing, as we are informed, to one of the master bricklayers hurrying up one of the tall hovels (as they are called) too expeditiously, by which the top fell in just when finished, and drove two men and two boys before it.

The boys were immediately carried to our Infirmary and one of them called Moses Hawkhead soon expired;..."(3)

Similarly, John Shrigley of Burslem, in 1765 attempted to build the then largest oven and experienced the total collapse of the structure :

"The largest hovel ever attempted, was finished at Burslem, by John Shrigley, in 1765, many persons witnessed the laying of the last brick, but no sooner was this completed, than the fabric began to crack and open, and in a few minutes the whole was level with the ground, and the builders escaped, almost miraculously, by sudden descent. This caused low hovels to be adopted." (4)

1. : See Chapter 5.
2. : A. Mountford, op.cit. p.37. Quoting from T. & J. Wedgwood ledgers compiled for the Big House Pottery, Burslem, in 1747. Chamberlain Mss.: 87. 1854-5 Making and Costing Book. These increments were modest when compared with the later modifications which enabled ovens to fire over 40,000 pieces. See reference 4.
3. : Leeds Mercury, August 28th., 1770.
4. : S. Shaw, History of the Staffordshire Potteries. 1829. pp.152-3.

These problems were only solved towards the end of the nineteenth century, when ovens were constructed to fire as much as 40,000 pieces. (1)

The entrepreneur who sought to increase the capacity of his pottery was therefore required to erect additional ovens and in most instances land for this expansion came from within the existing courtyards. When John Hendley Sheriden purchased the Gladstone Pottery in 1818, the single oven was used for both biscuit and gloss firings and to remedy this severe handicap he built during the subsequent forty years an additional biscuit and two gloss ovens within the courtyard. (2) This works had been part of a much larger estate until 1815, when it had been partitioned into three separate potteries - the Gladstone Pottery, the Park Place Pottery and the Park Pottery. Although the owner of the Park Place Pottery, Shelley, was unable to expand the capacity of the works beyond the provision of two ovens, the tenants of the adjacent Park Pottery benefited from the availability of a more extended courtyard layout and between 1815 and 1856, the number of ovens was increased from four to seven. (3)

1. : The Friends of Gladstone Pottery Newsletter. 5.
January 1976.
2. : Gladstone Pottery Mss.: 8. Deed of Partition.
August 25th., 1815.
Ibid. 9. Lease, March 23rd., 1818.
Ibid. 18. Conveyance, February 6th., 1857.
3. : Gladstone Pottery Mss.: 8. op.cit.
SRO.: D593/H/8/92. Ordnance Survey for Longton.
1:500. 1856.
See Appendix 14 for a detailed account of the development of the buildings at the Gladstone Pottery and Appendix 15 for plans of the three potteries.

DRAWING OF THE GLADSTONE POTTERY - CONDITION AS IN 1856 : (1.



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Illustration removed for copyright restrictions

1. : Illustration by courtesy of Gladstone Pottery Museum, Longton.

Pottery entrepreneurs also found the courtyards useful in providing building land for the general expansion of their workshops, and the infilling of the yards at the Gladstone and Park Pottery provides a good example of this process. (1) This was a widespread practice in Longton where, in particular, land for expansion of individual premises was restricted by the large landed estates, and by 1856 most small potteries exhibited a measure of courtyard infilling with both ovens and workshops. (2) With development dictated by the availability of surplus courtyard land rather than a comprehensive plan, the infilling of yards resulted in complicated sequences of manufacture :

1. : See Appendices 14 and 15.
2. : SRO.: D593/H/8/92. Ordnance Survey for Longton,
1:500. 1856.

ANALYSIS OF MANUFACTURING CYCLES IN LONGTON POTTERIES, 1856 : (1)



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1. : The base plans are taken from the reduced scale copy of the 1856 1:500 Ordnance Survey for Longton :-
SRO.: D593/H/8/92. op.cit.
The overlay, sequence of manufacture is based on :-
M. Upright, The Planning and Reconstruction of
Pottery Factories. Ceramics Journal. 1952.

For entrepreneurs working the larger pottery there was often the advantage of being able to subdivide the works to allow the separate manufacture of a large number of products. The Etruria Pottery maintained separate courtyards for each range of finished wares and by the mid-nineteenth century there were seven of these, including the Black Bank for the manufacture of basalt and an isolated yard where china could be made safe without risk of contamination of the raw materials. (1) The Copeland works at Stoke, described in 1847 as : "...quite a labyrinth of courts and passages, bounded by buildings in every direction, ..." (2) was organised to effect an ordered manufacturing sequence, with the workshops : "...divided into certain groups or compartments, according to the branch of manufacture carried on therein." (3) An earthenware model of the pottery made in c.1833 indicates this arrangement of workshops:

1. : Wedgwood Mss.: E18177-25. Letter Wedgwood to Bentley, December 17th., 1767.
Plan of the Etruria Pottery, c.1850. The Victoria History of the County of Stafford. 2. p.14.
2. : C. Knight, The Land We Live In. pp.41-4.
3. : The Penny Magazine. Supplement, May. 1843. p.204.
As late as 1876 potters reorganised their courtyard premises to rationalise production. In that year Hughes commissioned Scrivener, a Hanley architect, to reorganise his works in Waterloo Road, Burslem : "By a remodelling of the works, Mr. Hughes has thrown what was once the front, to the back, and by these means, as we have said, made the works much more commodious." Staffordshire Times, July 22nd., 1876.

ILLUSTRATION OF EARTHENWARE MODEL OF THE COPELAND POTTERY,
STOKE, IN c.1833. : (1)



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1. : The Victoria History of the County of Stafford. 8. p.204.

As the pace of industrial development in North Staffordshire accelerated during the mid-eighteenth century, it became evident that the expansion of existing domestic pottery workshops was insufficient in itself to provide the requisite increase in production. Entrepreneurs able to recruit sufficient capital, turned to the erection of purpose-built premises, and it was inevitable that these should attempt to provide the most efficient possible accommodation.

Wedgwood is credited with being the first potter to provide a rationally planned, purpose-built pottery (1) : "... the scheme of keeping each workshop separate,..." (2) and whilst the Etruria Pottery established the principle of sequential ordering of manufacturing processes as the most efficient basis for organising a works, it had an important precedent. In 1756 Roger Wood of the Ash, near Lane End, introduced rationalised production at his pottery : "...the first in which a regular plan for the arrangement of the separate places for the distinct processes was adopted. It is not large but very convenient." (3) At this time Wedgwood was working with Whieldon at nearby Fenton and the extent to which Wood's pottery influenced the design of Etruria can only be conjectured.

1. : N. McKendrick, Josiah Wedgwood and Factory Discipline. Historical Journal. 4. 1961. p.31.
2. : Wedgwood Mss.: E18248-25. Letter Wedgwood to Bentley, July 29th., 1769.
3. : S. Shaw, History of the Staffordshire Potteries. 1829. p.75.
A. Meigh, List of Potters of the Staffordshire Potteries. p.40.

It is significant that Shaw described Wood's pottery as "...not large but very convenient" since the Etruria Pottery was :...laid down about 115 yards long, but that will extend near 150 and be little or no more than I occupy at present."(1) It is evident from Wedgwood's description and from the accompanying plan that the early purpose-built pottery did not depart from the form or scale of the earlier premises :

1. : Wedgwood Mss.: 18181-25. Letter Wedgwood to Bentley, December 24th., 1767.

PLAN OF THE ETRURIA POTTERY IN 1767 : (1)



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1. : Wedgwood Mss.: 18181-25. Letter Wedgwood to Bentley,
December 24th., 1767.

Although these early purpose-built potteries were an undoubted improvement on their contemporary domestic counterparts, few were built until the early nineteenth century. In part this reflected the inability of most entrepreneurs to recruit sufficient capital - Josiah Wedgwood ii advised Seckerson in 1810 that the erection of a new pottery, organised on a rational sequence of manufacture, required the investment of a considerable amount of capital. (1) It also reflected the inherent problems in ordering each sequence of manufacture within a rigid organisational and physical structure during a period of rapid technological advancement. Obsolescence was partially prevalent in the part of the works concerned with the preparation of raw materials. Wedgwood at Etruria used a basic planning module of twenty-three by sixteen feet - the dimensions of his slip house and directed Pickford, his architect, to : "...let the whole range be the same." (2) Changes in the methods of manufacturing slip and a need for increased capacity required the introduction of larger slip kilns and by 1843 Copeland and Garrett had a : "...remarkable and very long building. This place consists of a low room a hundred and twenty feet in length, having on either side shallow slip-kilns and a passage down the middle." (3)

The continued use of domestic scale workshops and courtyard layouts had economic as well as organisational advantages for the entrepreneur. (4) In common with all

1. : Wedgwood Mss.: 8190-10. Letter P. Seckerson to J. Wedgwood, November 12th., 1810. Ibid. 8190-10A. Letter Wedgwood to Seckerson, November 15th., 1810.
2. : Ibid. 28629-43. Rough draft of Memorandums of Buildings at Etruria. 1768.
3. : The Penny Magazine. Supplement. May 1843. p.206.
4. : For example, during trade recessions works could be split into workers' housing and disposed of, as with Warburton's works in 1802 : Staffordshire Advertiser. 8. November 6th., 1802.

furnace industries, pottery manufacture held certain inherent fire hazards, but with the introduction in the 1720's of hovels around the kilns, these risks intensified. (1) Although few potters invested in either fireproof construction - Wedgwood at Etruria and the Masons at Victoria Place Pottery, Fenton, being notable exceptions - (2) or methods of fireproofing existing buildings, (3) it would appear that the compartmentalisation of most potteries was an adequate means of affording fire protection. Of fifteen pottery fires reported in the Staffordshire Advertiser, between 1795-1850, only four caused damage in excess of £500. The most serious fire involved only the gutting of the printing shop, biscuit warehouse and painting shop at Hackwood's Joiners Square works in 1830, despite its intensity and duration. (4) From the evidence of these reports, it would

1. : The first known reference to such hovels occurs in the 1719-21 probate inventory of Moses Steel, Burslem. SRO.: D1788. P67. B22.
The risks were well understood and a few manufacturers took out insurance to cover themselves against loss. In 1704 Ann Barston left the Norfolk House Pottery in Lambeth to her mother, stipulating in her will that a sum of £500 be left to provide insurance against fire damage. R. Edwards, Norfolk House, Lambeth: Excavations at a Delftware Kiln Site, 1968. Post Medieval Archaeology. 5. 1971. p.101.
2. : In 1813 Wedgwood wrote to Bage for advice concerning the design of beams for a small building : "You were so good as to day you would favour me with the proper proportions for iron beams for flooring with arches... The building is 36 by 31 feet clear inside measure. The beam might be supported in 2 places to make the bearing 10ft 4 ins. I shall be very much obliged by your instructions for the beams and for the span and rise of the arches - if that would be economical - the support will be iron pillars 9ft. high.-"
Wedgwood Mss.: 19963-28. Letter Wedgwood to Bage, November 23rd., 1813.
These dimensions accord with the Packed Crate Shed.
Charles and George Mason rebuilt their pottery in the 1820's and fireproofed the front warehouse.
S. Shaw, op.cit. p.70.
3. : D. Hartley successfully fireproofed warehouses at the Royal Docks, Portsmouth, in the 1780's, using iron plates to protect beams. J. Coad, Two Early Attempts at Fireproofing in Royal Dockyards. Post Medieval Archaeology. 7. 1973. p.89.
4. : Staffordshire Advertiser. 36. October 2nd., 1830.

appear that poor building construction and carelessness were the principle causes of the fires. (1) Hackwood's fire was stated to have resulted from the ignition of a joist built into the flue of a kiln and a small fire at the Hill Pottery, Burslem, in 1840 was considered the result of carelessness. (2)

Many of the consequences of using domestic type buildings directly concerned pottery operatives in their daily work. With the kilns and other artificially heated drying rooms in close proximity to the workshops there was no need for the entrepreneur to provide factory heating for the convenience of the operatives. (3) While steam heating was occasionally employed to heat drying and throwing rooms, as for example by Wedgwood and Spode, (4) it was not thought necessary to extend the system to other rooms.

Ineed, the operatives suffered from an excess of heat as Wedgwood testified in 1816 :

"Some of the rooms have rooms heated by stoves contiguous to them, for the purpose of drying the ware when placed in a wet state upon the moulds; and those drying rooms are necessarily open into the rooms in which the men work, and consequently raise the temperature of those rooms sometimes considerably." (5)

1. : Arson was also a cause, if only in isolated instances - in 1801 Thomas Hulme was jailed for committing arson at Smith and Jarvis's Stoke pottery. Staffordshire Advertiser. 8. January 2nd., 1802.
2. : Ibid. 46. March 21st., 1840.
3. : Minutes of Evidence, 1816, op.cit. p.60.
4. : Boulton and Watt Mss.: Incoming Letters. Box iv.W. Letter Wedgwood to Boulton and Watt. December 3rd., 1789. Appendix to the Second Report of the Commissioners, 1842. op.cit. Interview 47. Charles Sanders at Copeland and Garrett's, Stoke.
5. : Minutes of Evidence, 1816. op.cit. p.60.

Wedgwood considered that this heat was "an acceptable condition of manufacture." (1)

Pottery manufacturers, in general, relied on natural lighting for nine months of the year and used candles, or more rarely gas and oil, for the winter months and the occasional half nights which finished at 9.00p.m. Hours of work in 1816 were given as :

"from half past six in the morning to six in the evening, with half an hour for breakfast and an hour for dinner; but during a part of the year when there is not sufficient day light, the hours are of course, shortened to those in which they can do without candles." (2)

These hours were further amplified in correspondence of the same year :

"...the usual time of working by Candles from the 11th. of November to 2nd. of February say from half after seven in the Morning until six in the evening...." (3)

The expectation that working hours were governed by the availability of daylight is substantiated by the low level of expenditure by manufacturers on lamp oil and candles, the main form of supplementary lighting available in the eighteenth century. Chamberlain at Diglis, Worcester, spent an average of 2.0d. per week on candles for burnishers and 5.0d. per week on oil in 1792. (4) This reluctance to pay

1. : Ibid. p.69.

2. : Ibid. p.69.

3. : Wedgwood Mss.: 27705-36. Letter Rhode (for Wedgwoods) to unknown person, May 1st., 1816.

4. : Chamberlain Mss.: 65. 1792-1803 Cash and Order Book. In contrast Peel at Burton spent £168 per annum on candles and William Douglas of Pendelton used ten gallons of oil a day. J. Tann, The Development of the Factory. p.129.

for supplementary lighting was further demonstrated by the slow take-up of gas lighting, even after the introduction of town gas supplies in Stoke-on-Trent in the 1820's. (1)

The reliance on natural lighting could only have been detrimental to the majority of pottery operatives, with small domestic size windows constantly covered by clay dust and overshadowed by courtyard infill. The use of cellars for workspace added to these problems:

"It was a long, narrow cellar, the basement of a five-storey building with a handsome frontage...No daylight ever directly penetrated this place, being built below the surrounding earth, and only lit by the stove fire." (2)

One aspect of pottery working conditions attracted, during the early nineteenth century, considerable official comment - the health of operatives and the ventilation of workrooms. Thackrah, in his investigation of working conditions compiled in 1831, (3) observed the ill-effects of living and working in smoky, damp and ill-ventilated premises :

"Living or working in cellars, or confined or damp rooms produce occasionally purpura simplex, purpura hemorrhagica, and erythema of the lower extremities, and more frequently abdominal congestion, with consequent organic disease, sometimes muscular atrophy, and sometimes peritoneal inflammation." (4)

1. : Hanley and Shelton were granted in 1825 a private Watching and Lighting Act, followed by extensions to cover Burslem. E. Warrilow, The Sociological History of Stoke-on-Trent. p.268.
In the 1840's gas was used to light : "...churches, chapels, market-houses, and other public buildings." J. Ward, History of the Borough of Stoke-upon-Trent. p.268.
One of the few instances of gas lighting in a pottery was that of an earthenware works in Waterloo Road, Burslem, offered for sale in 1849. Staffordshire Advertiser. 55. October 13th., 1849.
2. : C. Shaw, When I Was a Child. p.47.
3. : C.T. Thackrah, Effects of the Principal Arts, Trades and Professions on Health and Longevity. 1831.
4. : A. Meiklejohn, The Life, Work and Times of Charles Turner Thackrah, Surgeon and Apothecary of Leeds. (1795-1833) p.24.

Government inquiries into factory conditions stressed in their examination of witnesses the importance that was attached to working in well ventilated premises and for potteries, evidence before the 1816 and 1834 Enquiries showed that ventilation was achieved by use of louvered or sash windows. (1) William Outrim gave evidence for the Spode Pottery and drew the parallel between the domestic nature of their works and the ordinary house, ventilation of work-rooms being : "As a common house, by windows, doors and chimneys." (2)

In the subsequent, more searching 1842 Enquiry, (3) the sanitation and ventilation of workrooms became the focal point of the investigation and inspectors were instructed to examine potteries under one of three categories :

Class I : Manufactories of recent construction with large, well ventilated premises.

Class 2 : Old Manufactories with damp and ill-ventilated premises.

Class 3 : Manufactories with conditions of a lower standard than no. 2.

In the final report the findings were classified as follows :

1. : Minutes of Evidence, 1816. op.cit.; Reports from the Commissioners, 1834. op.cit.
2. : Ibid., p.69.
3. : Appendix to the Second Report of the Commissioners, 1842. op.cit.
This inquiry examined 173 potteries by means of personal interviews, as opposed to a written questionnaire completed by fifteen potteries in the 1834 Enquiry and the evidence of Josiah Wedgwood alone at the 1816 Enquiry.

TABLE 8 : CLASSIFICATION OF POTTERY CONDITIONS IN 1842 : (1)



Although the most detailed of the nineteenth century inquiries into the pottery industry, it represented conditions in only the larger works. The number of works inspected closely parallels the number of potteries listed by Ward in 1840, (2) who is known to have only listed the largest establishments in each pottery town, and in the instance of Longton and Lane End, with thirty-eight inspected works, the figure does not take into account an additional twenty-one potteries known to be in work at that time. (3) Also, it would appear that the classification was founded on broader assessment criteria than those laid down by Scriven. Despite serious overcrowding in old premises. (4) Alcock and Co's Cobridge pottery was classified as Grade 1., a similar assessment to that recorded for Ridgway's Cauldon Place Pottery, Shelton, where the main buildings dated from c.1802 : "These premises are delightfully situated, some little distance from the high road to Stoke, by the side of the Cauldon Canal, and apart from every other building.

1. : Appendix to the Second Report of the Commissioners, 1842. op.cit. Report by Samuel Scriven, para. 7.
2. : J. Ward, History of the Borough of Stoke-upon-Trent.
3. : SRO.; D593/H/14/3/58. 1847. Stoke Parish Rates.
4. : The Victoria History of the County of Stafford. 8. p.135.

The rooms are lofty, spacious, and in all respects clean and health;..." (1) In these, and other similar instances, the classification reflected as much the attitude of the pottery entrepreneur as the age of the property, particularly with the enlightened nonconformist masters such as Ridgway.

Notwithstanding these exceptions, Scriven's report revealed that 80% of all potteries examined were insanitary and ill-ventilated, a consequence of the infilling of courtyards. This widespread incidence of insanitary conditions was therefore as prevalent in the new town of Tunstall - where 69% of all potteries examined were grades 2 and 3 - as in the much older community of Burslem, where 80% of premises were of these categories :

"The second class form by far the numerous, and are of greater or less extent, having from 50 to 800 hands engaged; most of them have been erected many years, and as the trade has increased, so the rooms appear to have increased in corresponding ratio. Some here and there, upon, around, and about the first premises, so that there is neither order, regularity, nor proportion; the consequence of this is, that men, women and children are to be seen passing in and out, to and fro, to their respective departments all hours of the day, no matter what the weather, warm, cold, wet or dry; the rooms, with very few exceptions, are either low, damp, close, small, dark, hot, dirty, ill ventilated, or unwholesome, or have all these disadvantages." (2)

The entrepreneur not only considered his pottery in the context of the most efficient manufacturing unit possible, but also as a valuable social asset, and the development of the factory often reflected both aspects. In an age when entrepreneurial skills alone were not always considered sufficient to attain respectability, (3) the aspiring master

1. : Ibid. p.167. Appendix to the Second Report of the Commissioners, 1842. op.cit. John Ridgway, of Shelton.
2. : Ibid., Report by S. Scriven, March 4th., 1841. Paragraph 9.
3. : L. Whiter, Spode. p.69.

potter could achieve a measure of social prestige through the mimicry of the landed gentry. This phenomenon was by no means confined to the pottery industry and almost every other manufacture or trade had socially aspiring entrepreneurs who acquired estates and built small country houses with landscaped parks and gardens. (1) In North Staffordshire, Josiah Spode built The Mount in a seventeen acre park in 1803 (2) and some twenty years earlier John Wood had completed Brownhill House near Burslem. (3)

1. : A good example is afforded by the brewer Whitbread.
D. Rapp, Social Mobility in the Eighteenth Century :
The Whitbreads in Bedfordshire, 1720-1815. Economic
History Review. Second Series. 27. 3. August 1974.
2. L. Whiter, Spode. p.36.
Described in 1840 as "...a local lasting trophy of
his success in the pursuits of trade.." J. Ward,
History of the Borough of Stoke-upon-Trent. p.502.
3. : The Victoria History of the County of Stafford. 8.
pp.113, 118.

ENGRAVING OF BROWNHILLS HOUSE, BURSLEM : (1)

Engraving and 1840

Following the year

1840 in 1840



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Engraving and 1840

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1. : J. Ward, History of the Borough of Stoke-upon-Trent. p 151.

Social prestige could be acquired by royal and noble patronage and the royal patronage bestowed upon Spode following the opening of the Portugal Street showrooms in London in 1796, enabled him to be listed in Boyle's Court Guide among : "All who move in the fashionable circle." (1) The order by Lord Nelson for breakfast, dinner and dessert services, placed in 1802 with the then recently established Chamberlain works in Worcester, generated sufficient prestige to attract similar orders from such influential patrons as the East India Company and established the pottery in the highest social circles. (2)

For the smaller manufacturer who lacked the capital to invest in country estates, or the manufacturing skills necessary to produce the richly ornate wares demanded by influential patrons, social standing could be achieved through involvement in local affairs and institutions. This practice was especially prevalent in the nonconformist pottery community, with such families as the Ridgways taking an active part in local religious and civil life. George and John Ridgway, together with Job Meigh, founded the Hanley Methodist New Connexion in 1797 and contributed towards the erection in 1798 of the first Bethesda Chapel. (3) The family were also involved in the administrative structure for the district, filling the office of Chief Bailiff for Hanley and Shelton in 1827, 1830 and 1841. (4) The pre-occupation with civil matters was also noticeable in the

1.: L. Whiter, Spode. p.16.

2.: Chamberlain Mss.: 7. 1804-6. Journal, Wholesale and Retail. Only the breakfast service was completed before Nelson's death - at a cost of £120.10.6d.

3.: The Victoria History of the County of Stafford. 8. p.294.

4.: J. Ward, op.cit. pp.371, 600.

social activities of Edward John Ridgway, who as well as being manager for the Potteries Central Savings Bank in 1840 and 1841, (1) was a Guardian for the Stoke Parish in 1841 and Shelton Ward in 1846. (2)

Associated with these moves towards self-fulfillment was a change in the attitude of some entrepreneurs to their factory street frontages. Narrow frontage, town centre sites, provided the ideal location for unpretentious factory buildings fronted by a small but architecturally significant elevation. Sites were frequently offered for disposal with either such a frontage, or the land to provide one. John and Edward Baddeley's Shelton pottery was offered for sale in 1801, together with a range of old buildings which could be desmolished to provide : "...an opportunity of making a handsome entrance to the public street or road." (3) When the Gladstone Pottery, Longton, was redeveloped in 1856, the old workshops were retained but a completely new street frontage was erected, (4) a distinction maintained by the vast majority of pottery entrepreneurs. Daniel and Sons' China works in Stoke were described in 1842 as exhibiting very different characteristics in the areas visited by the public, to those seen only by the operatives : "The rooms and buildings are very old and dilapidated, small, close, dirty, mostly damp and uncomfortable, never or rarely whitewashed. The painting, store and show-rooms are very good." (5)

Although a variety of architectural styles were used in the development of these pottery street frontages, English

1. : Staffordshire Advertiser. 46. December 26th., 1840.
Ibid. 47. December 24th., 1841.
2. : Ibid. April 3rd., 1841.
Ibid. 52. April 18th., 1846.
3. : Staffordshire Advertiser. 7. February 21st., 1801.
4. : Gladstone Pottery Mss.: 18. Conveyance, February 6th., 1857. The redeveloped elevation is given in Appendix 15.
5. : Appendix to the Second Report of the Commissioners, 1842. op.cit. Daniel and Sons, China Works, Stoke.

Palladianism attracted the most frequent attention, which was hardly surprising when it had gained such widespread acceptance by the builders of town houses and country seats. The Big House in Burslem, completed in 1751 by Thomas and John Wedgwood, (1) followed the basic principles developed by Lord Burlington - five bays of red brick with a projecting central bay surmounted by a pediment and rusticated stone lintels - and established in the Staffordshire pottery community principles of taste and fashion to be used in subsequent industrial and domestic development.



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1. : The Victoria History of the County of Stafford. 8.
p.110.

Josiah Wedgwood astutely cultivated influential patronage in order to promote his business interests and regularly entertained the nobility at his Burslem pottery - the Lords Gower and Spencer and the Duke of Marlborough visited him in the August of 1765. (1) With the expansion of Wedgwood's pottery interests and the acquisition of land for the Etruria Pottery, the choice of Palladian style for the works and adjacent hall was expedient, being a more secure form of social mimicry than the use of Gothic suggested by Bentley. (2)

Wedgwood commissioned a young and enterprising architect-builder from Derby, Joseph Pickford, to assist in the design of the Etruria Pottery and Hall in 1767, (3) but the extent and nature of the commission are uncertain. Wedgwood certainly supplied detailed plans for the works and specifications for many of the other buildings (4) but much of the detailing resembled that employed by Pickford in earlier commissions, especially the Assembly Rooms, Derby. (5) The pottery elevations were simple and plain - the three storey canal elevation had a projecting central bay surmounted by bell and cupola and pediment, with stone string courses to accentuate the strong horizontal lines of the facade, which was terminated by twin, domed circular structures which performed a similar function to the pavilions in the Palladian villa.

1. : Wedgwood Mss.: E18083-25. Letter Wedgwood to John Wedgwood, August 7th., 1765.
2. : Ibid. E18184-25. Letter Wedgwood to Bentley, January 3rd., 1768.
3. : E. Saunders, An Eighteenth Century Provincial Architect. Joseph Pickford of Derby. Country Life. November 9th., 1892. p.1209.
4. : Wedgwood Mss.: 28629-43. Rough Draft of Memorandums of Buildings at Etruria. 1768.
5. : E. Saunders, op.cit. p.1207.

ENGRAVING OF CANAL ELEVATION OF THE ETRURIA POTTERY : (1)



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1. : E. Meteyard, The Life of Josiah Wedgwood. 2. p.235.

In the completion of the Etruria works Wedgwood demonstrated the suitability of the Palladian idiom for factory development and Palladianism was adopted by successive generations of Staffordshire potters. The continued use of this style throughout the eighteenth and much of the nineteenth centuries, reflected not only the initial desire for social prestige, but also the ease with which the style could be applied to the new potteries. Throughout this period, the scale of pottery buildings changed little, with a continued pattern of prestigious street facades backed by small, domestic scale workshops. Palladianism was basically a restrained, domestic scale idiom and accorded readily with this scale of development and the accepted reserve of the North Staffordshire people. (1) Added to which was the ease with which potters could obtain pattern books containing standard elevational details. (2) One of the first emulators of Etruria, using a roadside site rather than a canalside one, was William Adams, who built the Greengate works, Tunstall, between 1784-6, enlarging the pottery established by George Booth in 1745. (3)

1. : E. Gosse, D. Eyles, op.cit. p.133.
2. : London booksellers frequently advertised copy books in North Staffordshire newspapers - a popular edition was Pain's British Palladio. Staffordshire Advertiser. 11. April 13th., 1805. William Turner, potter of Lane End, had Plaw's Architecture. in his library at the time of his bankruptcy in 1813. Staffordshire Advertiser. 19. May 22nd., 1813.
3. : The Victoria History of the County of Stafford.
8. p.100.

ENGRAVING OF GREENGATES POTTERY, TUNSTALL : (1)



1. : J. Thomas, The Rise of the Staffordshire Potteries.
p.68.

Between the completion of the Etruria works in 1769 and the erection of the St. Louis works, Longton, in 1876 - the last identifiable pottery to contain Palladian elements - there were few discernable stylistic variations. The Venetian window, a prominent feature of the Boundary works built in 1819, (1) was used in a succession of new potteries and in essence had changed little when used in John Aynsley's Longton china works completed in 1861. (2) The Daisey Bank Pottery, Longton, rebuilt by Hulse, Nixon and Adderley between 1854-78 (3) maintained the traditional plan and form with a pedimented main entrance and three storied frontage, but broke from traditional detailing in the use of contrasting bands of light brickwork and window heads against dark facing brickwork. (4) The same concept, taken to a greater extreme, was adopted by Taylor and Kent when they rebuilt the nearby Florence works in 1876. The traditional proportions of the street facade were preserved and in the place of sash windows came lancet windows set in round headed openings surmounted by terracotta keystones. (5) Where modifications occurred in the design of the street frontage, these were usually demanded by difficult site conditions, as with the corner entrance to the Hill works, Burslem, where the street elevation faced a steeply sloping road. (6)

Although potters continued to build in a Palladian style during the late nineteenth century, in general the period was marked by a decline in the number of pottery owners prepared to consider conscious stylistic treatment

1. : SRO.: D593/B/1/11/16.
2. : The Victoria History of the County of Stafford. 8. p.239.
3. : 1856 and 1878 1:500 Ordnance Surveys for Longton.
4. : Site Observations, March 29th., 1973.
5. : Ibid.
6. : The Victoria History of the County of Stafford. 8. p.135.

of street facades, a time : "...distinguished not merely by a neglect of beauty but by a positive cult of what was ugly. The utilitarianism of the period seemed to preclude not only the endeavour, but the hope, of reconciling use and beauty,..." (1) The decline in popularity of neo-classical architectural detailing was paralleled by a general disdain for other stylistic revivals in factory design - yet not, interestingly, in the detailing of houses or clerical commissions, many of the latter being presided over by potters. (2)

It is significant that the main advances made by potters in the break from Palladianism were made outside North Staffordshire. Sir Henry Doulton, eager to foster a market for his terracotta panels, commissioned George Tinworth to design the decorative panels over the main entrance to the new Lambeth Pottery, built in 1876. (3) The offices were prestigious in their use of decorative terracotta and displayed a flamboyance and command of the Gothic revival which was curiously absent from the extensions commissioned by Doulton at his Mile Street Pottery, Burslem, in 1884.

The absence of comprehensive, surviving, company records prevents the precise determination of the role of the architect in factory design. To an extent, industrial patrons saw the architect as a subordinate member of the team involved in the erection of a new factory and many saw him as merely the designer of the facade. Samuel Wyatt in the design of the Royal Mint was to : "...design the ornamental part but..." the client to "...sketch the useful..."(4)

1. : Written by W. Owen in 1910 and quoted in : E. Gosse and D. Eyles, op.cit. p.133.
2. : Good examples are Cobridge New Church by Lewis Vullamy, 1839-41, and terraced housing, Wharf Street, Stoke, c.1835.
The Victoria History of the County of Stafford. 8. pp.124, 182 and 183.
3. : E. Gosse and D. Eyles, op.cit. p.92. The architect was R. Stark Wilkinson. H. Hobhouse, Lost London. p.161.
4. : J. Tann, The Development of the Factory. p.161.

This attitude was widely held - Lord Chesterfield advised his son : "You may soon be acquainted with the considerable parts of Civil Architecture, and for the minute and mechanical parts of it, leave them to the masons, bricklayers, and Lord Burlington, who has, to a certain extent, lessened himself by knowing them too well." (1) Wedgwood in his dealings with Pickford maintained a similar attitude to that of Lord Burlington, not surprising for an entrepreneur who prided his total involvement in every aspect of factory management and had close contact with Boulton.

Wedgwood, through a series of detailed memoranda compiled in 1768, (2) together with copious correspondence, provided Pickford with a comprehensive guide for the design and construction of the Etruria buildings. Wedgwood proved to be a demanding client, constantly changing his mind over the basic planning and detailing of the works, (3) and revealing every flaw and weakness in his architect's work :

"Mr. Bentley Ho. (Bank House) not finish'd, neither is it build agreeable to the Plan as specified in the Agreemt. & the Wet comes thro' the roof and down the Walls from the Attick to the Grd. floor to such a degree that it is not habitable in Winter... The same with respect to my Offices the Plaistering there is already come off...Tw of the Balls being made of flawed stone are opened more by the frost, & on taking one of them down to prevent its falling it appears that they are put up without any Iron to support them."(4)

Wedgwood undertook his own surveying and stipulated that the works should be laid out in relationship to the canal :
"..respecting my works - a stake in Bakers Croft abt. 60 yds. West of the Canal at 17 inches from the ground is level with

1. : Ibid - quoting letter from Lord Chesterfield to his son, October 17th., 1749.
2. : Wedgwood Mss.: 28629-43. Rough Draft of Memorandum of Buildings at Etruria. 1768.
3. : Ibid. E18277-25., Letter Wedgwood to Bentley, December 17th., 1767; E18181-25 op.cit., December 24th., 1767; E18191-25 op.cit., March 3rd., 1768.
4. : Ibid. 28629-43. op.cit. Wedgwood took great delight in finding errors in the estimating undertaken on the Etruria work. Ibid. E18210-25. Letter Wedgwood to Bentley, September 15th., 1768.

the Twg. path." (1) This self reliance extended also to the choice and supply of building materials, with contracts agreed in April and September 1768 between himself and Challoner and Ford, for the supply of bricks. (2) During the erection of the factory, labourers from the Burslem pottery were brought in to build ovens and prepare for the earliest possible commencement of manufacturing :

"The works are covered in, and they are beginning upon the Cellar Arches, and the Chamber and ground floors: so soon as any of these are finished I shall order them to be fitted up and put some men into them to make sagars, prepare Clay, build ovens &c &c that we may begin to do something in earnest as soon as possible. The Partnership books should be opened on Monday, the 14th instant as some hands will begin there at that time." (3)

With the exception of Pickford, architects do not seem to have become involved in the design of new potteries until the middle decades of the nineteenth century, when the architectural profession had become institutionalised and there was a growing awareness of the need for specialist help in the design of potteries. (4)

George Coxon was commissioned by Joseph Clementson in 1845 to redesign the street frontage of his Phoenix Pottery

1. : Ibid. 28629-43. op.cit.
2. : Wedgwood Mss.: 28629-43. op.cit.
3. : Ibid. E18213-25. Letter Wedgwood to Bentley, November 6th., 1768.
4. : Wedgwood in 1768 undertook the erection of his own ovens, but increased kiln sophistication changed this independence. In 1875 a Mr. Bradbury was contracted to build ovens at Etruria on the same lines as those at Mintons. Wedgwood Mss.: 17-16032. Letter S. Arnoux to Etruria Pottery, October 5th., 1875.

in Broad Street, Hanley, (1) no doubt in an attempt to dispel the poor public image afforded by the then surviving works : "The premises are second rate, with small unventilated rooms, hot, close, and uncomfortable to work in." (2) The new street elevations were described as : "One of the chief ornaments of that part of the town, and highly creditable to the good taste and skill of Mr. Coxon, the architect." (3) Coxon was also involved in the activities of the Tunstall Building Society, designing and supervising the erection of houses for the society in 1850. (4) Robert William Armstrong, a Dublin architect with a London based practice, worked for W. Kerr and the Royal Worcester Porcelain works and completed the design for the rebuilt Severn Street facade in 1853, whereupon he transferred to the Belleck Pottery, Northern Ireland and designed the new pottery frontage there by 1856. (5)

Occasionally an architect provided plans for a pottery as a speculative venture, as with the Stafford architect William Boulton, who designed and supervised the tendering for : "...the different works required in the erection of an Earthenware Manufactory.." (6) Architects were also involved in the routine surveying necessitated by legal transactions and John Hendley Sheridan employed G. MacDougall in this capacity, requesting a survey of the Gladstone Pottery during

1. : The Victoria History of the County of Stafford. 8. p.168.
2. : Appendix to the Second Report of the Commissioners. 1842. op.cit. Joseph Clementson, Hanley.
3. : Staffordshire Advertiser. 55. June 2nd., 1849.
4. : Ibid. 56. May 11th., 1850.
5. : R. Binns, A Century of Potting in the City of Worcester. 2. p.214.
S. McCrum, The Belleck Pottery. pp.7-9.
6. : Staffordshire Advertiser. 51. July 5th., 1845.

negotiations for their letting in 1840. (1) In general though; the architect's design contribution in the North Staffordshire pottery industry was limited. To some extent, this reflected the intense pragmatism of Staffordshire entrepreneurs, but potters were not exceptional in this respect and there was a widespread reluctance amongst British entrepreneurs to employ an architect - a position that did not change until the twentieth century. (2)

1. : Gladstone Pottery Mss.: 14. Plan 1840.
2. : See Appendix 16.

CHAPTER SEVEN :
POTTERY WORKERS HOUSING IN NORTH STAFFORDSHIRE.

One aspect of the entrepreneur's role in the establishment of a factory, was that of recruiting and maintaining a centralised workforce. Pollard and Chapman, (1) using examples from the textile and iron industries, have indicated how the establishment of factory villages could not only aid labour recruitment, but also assist in controlling the employees. Walter Evans, for example, advertised for labour and offered inducements for families to move into his factory colony :

"Darley Cotton Mill. Families, particularly women and children to work at the said mill. They may be provided with comfortable houses and every necessary convenience either at Darley or Allestry." (2)

The establishment of factory and village was not necessarily simultaneous and many entrepreneurs must have relied upon existing facilities for their workers before building factory housing. Richard Arkwright built his first Cromford cotton mill in 1771 and it was not until 1777 that he completed North Street - two rows of substantial three storied houses - his first factory housing. The school came later. (3)

In direct contrast with these, and other eighteenth century entrepreneurs, (4) the North Staffordshire potters were rarely forced to build factory housing in order to

1. : S. Pollard, The Factory Village in the Industrial Revolution. English Historical Review. 89. 1964.
S.D. Chapman, The Early Factory Masters. pp. 157-60.
2. : S.D. Chapman, op.cit. p.159.
3. : F. Nixon, The Industrial Archaeology of Derbyshire. p.241.
4. : For example, there was extensive house-building activity by the Shropshire ironmasters, particularly at Lilleshall, Horsehay and Coalbrookdale. Working Class Housing in East Shropshire, 1750-1840. Attingham Conference, April 24th., 1971.

recruit a labour force. One such was Theophilus Smith, who in an attempt to capitalise on his purchase in 1787-8 of the Furlong Estate, Tunstall, (1) erected in c.1793 the Smithfield Pottery. (2) The location of the works a mile and a half from Burslem, the nearest large centre of population - Tunstall then being a small hamlet (3) - created problems in the recruitment of labour and in an attempt to secure a workforce, Smith built a colony of forty houses, shops and an inn, the village of Smithfield. (4) The venture failed and Smith was declared bankrupt in 1800. (5) On the whole though there is little evidence of a general labour shortage during the period 1750-1850. Wedgwood, for example, when faced with a stoppage of work by his men in 1772, during the middle of the annual hiring period, threatened to dismiss all of them and engage a new set of hands :

"On my asking them the reason of their assembling together, they told me they did not choose to begin to work 'til their prices were settled : I then talked to them altogether about quarter of an hour, and after producing several instances of their extravagant charges I told them we would make a new sett of hands, which they must be sensible was in my power to do." (6)

1. : The Victoria History of the County of Stafford.
8. p.91.
2. : The Victoria History of the County of Stafford.
8. p.91.
3. : The population of Tunstall rose from 500 to 800 between 1785-1801 whereas Burslem's rose from 4,800 to 6,486 in the same period. J. Ward, History of the Borough of Stoke-upon-Trent. p.43.
By 1802 there were thirteen potteries, in addition to Smith's working in Tunstall and the environs - all of which would have competed for the small resident working population.
The Victoria History of the County of Stafford. 8. p.99.
4. : Ibid. p.83.
5. : Staffordshire Advertiser. 6. July 26th., 1800.
6. : Wedgwood Mss.: E18381-25. Letter Wedgwood to Bentley, July 20th., 1772.

Manufacturers did, though, experience difficulty in the recruitment of highly skilled craftsmen and with their skills at a premium, housing was occasionally offered as an incentive :

"Wanted, a journeyman foreman...one who is a good workman, and understands throwing, and is capable of conducting a principal part of the business; he will have a house adjoining the premises, and every other convenience, with good wages and encouragement." (1)

In the 1850's the Mintons sought to recruit Continental artists in an attempt to secure a greater share of the high class ware market, and offered housing as an incentive. The houses, both detached and in pairs and known by the 1880's as The Villas, (2) were designed in a pronounced Italian style, with square towers, pantiled roofs and wide bracketed eaves. At about the same time, Herbert Minton built rows of deliberately picturesque cottages in red brick with gothic detailing, at Hartshill, a short distance from the Stoke works. (3) Both developments were successful in encouraging such artists as Arnoux, Jeannest, Carrier, Lessore and Protât to leave the Sevres company and join the Stoke firm. (4)

Late eighteenth century entrepreneurs found that their employees adapted slowly to the rigorous conditions of factory life and many of the traditional feasts and holidays held in the early part of the century, were still observed

1. : The Victoria History of the County of Stafford. 8. p. 91.
2. : The Victoria History of the County of Stafford. 8. p.183.
3. : Ibid. p.184.
4. : W. Mankowitz and R. Haggard, The Concise Encyclopaedia of English Pottery and Porcelain. p.151.
Leon Arnoux, for example, introduced a Majolica body to the Mintons in 1850 and this ware achieved notable success in trade exhibitions and the home market. Arnoux also raised appreciably the artistic standards of the company.
G. Godden, Minton Pottery and Porcelain of the First Period. 1793-1850. pp.106-7.

in the new factories. The keeping of the Burslem Wakes created havoc with carefully planned production schedules, as Wedgwood found :

"Our men have been at play 4 days this week, it being Burslem Wakes. I have rough's and smoothed them over, & promised them a long Xmas, but I know it is all in vain, for Wakes must be observed though the World was to end with them." (1)

Textile entrepreneurs offered company housing in an attempt to control their workers, but in the pottery industry, with the exception of Wedgwood, other means of control were employed, notably the binding contract of annual hiring.

Labour contracts varied considerably in the eighteenth century and from the evidence provided by one potter - Whieldon - it would appear that operatives were hired throughout the year and for terms ranging from one to three years. (2) By the end of the century potters had generally accepted the use of annual hirings, taking on their workmen at Martinmas, although at that time few entrepreneurs in other industries used a one year contractual period. Soho bound their workmen for periods of between three and five years and the Prestonpans chemical works for twenty-one years, although many adopted much shorter periods, Arkwright hiring his men for three months at a time and Ambrose Crowley for six months. (3) In the pottery industry, the abuse of annual hiring and the principal of 'good from oven', (4) were the two main issues in the 1836 pottery operatives' strike.

1. : J. Wedgwood, Letters to Bentley. 1771-80. 1903.
Letter Josiah Wedgwood to Bentley, July 5th., 1776.
The Burslem Wakes have continued to the present day, enshrined in the annual Potteries' Wakes fortnight holiday.
2. : Thomas Whieldon's Account and Memorandum Book. City Museum and Art Gallery, Hanley, Stoke-on-Trent.
3. : S. Pollard, Factory Discipline in the Industrial Revolution. Economic History Review. Second Series. 16.2. 1963. p.265.
4. : 'Good from oven' was the payment for piecework only when it was perfect after the drawing of the kiln.

Negotiations were refused by the masters on the principal of 'good from oven' and protracted discussion on the principal of annual hirings produced only a re-affirmation of the existing practice : "That the said workman agrees to be satisfied with what amount of work the said employer can fairly and reasonably find him during the said term." (1) With such powerful means of control, the majority of manufacturers considered it unnecessary to bind further the employees through tenancy agreements.

The principal of entrepreneurial involvement in the domestic as well as working life of an employee was well established by the mid-eighteenth century and continued into the nineteenth century :

"A master can, a master ought to interfere, he has a right to inquire into the way in which men spend their evenings, because on this depends their future usefulness to himself." (2)

It was therefore not surprising that Josiah Wedgwood, who introduced many innovatory practices in the direction and control of operatives, (3) should consider the provision of rented accommodation for his workers, using the houses as a means of not only securing the best craftsmen, but also disciplining them. But he was not, as is often stated, (4) the first North Staffordshire potter to house his workers, being preceded by twenty-one years by Thomas Thieldon at Fenton Vivian, whose industrial housing formed one part of a very diversified capital investment.

1. : H. Owen, The Staffordshire Potter. pp. 30-3.
The practice of hiring pottery operatives annually at Martinmas was still current in 1854, when the Worcester firm of Grainger and Penn engaged their workforce. Chamberlain Mss.: 10. 1854-72 Agreement Book.
2. : A. Meiklejohn, The Life, Work and Times of Charles Turner Thackrah, Surgeon and Apothecary of Leeds. (1795-1833). p.46. The words are attributed to Thackrah.
3. : The best survey of these practices is contained in : N. McKendrick, Josiah Wedgwood and Factory Discipline. Historical Journal. 4. 1961.
4. : The Victoria History of the County of Stafford. 8. p.150.

Thomas Whieldon had established a pottery at Fenton some time before 1740 when Simeon Shaw noted that the works were : "...a small range of low buildings, all thatched." (1) Subsequently he moved to Fenton Vivian as a tenant of John Peat, purchasing these works in 1748 on Peat's bankruptcy. (2) It is a matter of speculation as to whether or not Whieldon had purchased or built a scattered group of cottages in Fenton by this date, but it is known that he held several such properties by 1749, when his account and memorandum book was opened. Between 1749-60 the book records sixteen separate tenancies, five with employees at the Fenton Vivian pottery. (3) Of the eleven properties, none of those rented to his employees had any land contained within the rental, unlike the cottages let by Arkwright at Cromford, (4) neither did Whieldon pay the window tax on these cottages, as he did for other tenants.

Of the five tenant employees, the jobs of only two are known, William Cope being hired for handling, vining and casting and Samuel Jackson hired to make saggars. (5) There is a strong possibility that Whieldon provided accommodation only for the more skilled type of worker and with most tenancies based on a three year term, only the more stable workman could be considered. Whieldon's pottery in the 1750's was a small concern, employing between sixteen and twenty-five operatives in the years 1750-3.

1. : S. Shaw, History of the Staffordshire Potteries.
1829. p.155.
2. : SRO.: D239/M/2401a. Indenture, October 16th., 1748.
3. : See Appendix 17.
4. : I am indebted to Mr. L.D.W. Smith for this information.
5. : Thomas Whieldon's Account and Memorandum Book.
pp.39, 73.

TABLE 9 : HIRING OF LABOUR FOR 1750-3. (1)

	Boys	Girls	Men	Total
1750	4	0	15	19
1751	5	1	19	25
1752	8	1	15	24
1753	3	0	13	16

It is evident that Whieldon's workforce varied annually and one may surmise that the more specialised operatives were retained throughout the period and that the fluctuations came through casual hiring of itinerant labourers.

Whieldon received between 9.9% and 13.7% of the operative's weekly wage in rental. This ratio is slightly higher than that provided by the rentals for the Ebbw Vale furnacemen, who, in 1796, paid 8.5% of their wages for company housing but with the provision that they took in fellow workers as lodgers. (2) William Marsh, on March 25th., 1750, became a tenant at Fenton Hall, together with William Kent, and paid £2 as half the annual rental. On February 26th., 1754, he moved to a nearby house, paying a rental of £2.10. per year. At the time of his first tenancy he was paid 6.9d per week with a guinea in earnest, (3) and this was raised to 7.0d per week with 10.6d and an old coat valued at 5.0d in earnest when re-hired for three years on June 21st., 1753. (4) The rents therefore represent 9½d per week up to May Day 1754 and 11½d per week thereafter, or as a percentage of weekly income, 11.4% in 1750, 11% in 1753 and 13.7% in 1754. The move to a larger house followed an increase in wage, a principle not followed with every tenant. Robert Garner was paid only 6.6d per week and yet paid two guineas per year rent - 12.2% of his wages. (5) Samuel Jackson

1. : Thomas Whieldon's Account and Memorandum Book. - total
2. : S.D. Chapman, ed., The History of Working Class Housing - A Symposium. p.283.
3. : 'Earnest' - an annual payment in either cash or kind offered as an inducement to be hired.
4. : Thomas Whieldon's Account and Memorandum Book. pp.38, 50, 70.
5. : Ibid. p.70.

hired for 8.0d per week, paid only 9.9% of his wage in rent in 1751. (1)

Whieldon almost certainly considered his housing as an investment and certainly he retained Fenton Hall for this reason, purchasing it from Peat on June 23rd., 1749 (2) and living in it only while his new - Whieldon's Grove - was completed nearby. Fenton Hall was subsequently let to Marsh and Kent. (3) The hypothesis is substantiated by the number of houses owned at his retirement. In an abstract of title it is stated that in c.1777 he owned fifty cottages and although no records have survived to indicate the number of employees at that time, an analysis by Lorna Weatherill indicates that the average pottery employed fifteen persons. (4)

Whieldon had started to invest in property and provide factory housing when he took John Harrison and Josiah Wedgwood into partnership in 1754, Harrison withdrawing the same year. The partnership years (1754-9) were undoubtedly formative for Wedgwood and much of the organisation of the Etruria estate was based on this partnership experience. It is known that during this partnership time, Wedgwood refined and extended the range of wares produced by the Fenton Vivian pottery and it is a matter of speculation how far this expertise was applied to the management of the works and how far he was responsible for Whieldon's rapid accumulation of wealth, amounting to over £10,000 on his retirement in 1780. (5) It could be said that Wedgwood was extremely fortunate in his choice of business partners and friends, an axiom recurring throughout his career.

1. : Thomas Whieldon's Account and Memorandum Book. p.73.
2. : SRO.: D293/M/2402a. Indenture, June 23rd., 1749.
3. : Thomas Whieldon's Account and Memorandum Book. p.38.
4. : Abstract of the Title of the Revd. Edward Whieldon to property belonging to the late Thomas Whieldon, 21st. August, 1809. Quoted by A. Morley-Hewitt, Early Whieldon of the Fenton Low Works. Transactions English Ceramic Circle. 3.3.1954. pp.150-4. L. Weatherill, op.cit. pp.50-1.
5. : W. Mankowitz and R. Haggard, op.cit. p.239.

Wedgwood, as with all matters of business policy, exercised rigid control over the building of housing for his operatives, and deliberation as to how best to achieve this took much of his time towards the end of 1769 :

"... I have been confined to my room several days Planning with Mr. Gardner the remainder of my works here, which must all be built, besides a Town for the Men to live in." (1)

A period of a year lapsed between the opening of the works and the building of the village, during which time many of the workers must have walked in from neighbouring towns - Hanley being only half a mile distant. It is clear that Wedgwood made the completion of his own house his main priority after the completion of the pottery, a reflection on his ability to recruit a labour force.

The cottages were laid out along both sides of the turnpike between Newcastle and Leek, on land between the canal and factory and the Fowlea Brook. The site was convenient for Wedgwood, enabling him to supervise the every day life of his operatives, but the tenants suffered atmospheric pollution from the pottery and flooding from the Fowlea Brook, which by the early 1800's was the open sewer for Tunstall, Burslem and Hanley. (2) In 1840 the village was described as :

"...a continuous street of about 120 workmen's dwellings adjacent with an inn, and some houses of a better class, for farmers, clerks and others. (3)

1. : Wedgwood Mss.: E18269-25. Letter Wedgwood to Bentley, November 19th., 1769. Gardner was Pickford's assistant.
2. : The Victoria History of the County of Stafford. 8. p.159.
R. Rawlinson, Report to the Board of Health in Stoke Parish. 1850. p.45.
3. : J. Ward., op.cit. p.443.

It is evident that by the 1840's, the social composition of the village was mixed, although there was a preponderance of pottery workers. In 1843 at the time of Josiah Wedgwood's death, the houses were let at rents of between £3.15 and £24 per annum and the executors proposed the further development of the community through the building of houses on five plots of land to the south of the turnpike. At this time the cottages were, at their lowest rentals, providing the estate with a 13% return on capital (1)

1. : Staffordshire Advertiser. 50. June 29th., 1844.
HBL.: SP835. Sale Notice and Plan for the Etruria Estate.

THE ETRURIA ESTATE IN 1844 : (1)



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1. : HBL.: SP835. Sale Notice and Plan of the Etruria Estate, 1844.

The cottages were considered to be a considerable advance on contemporary workers' housing standards and were even described in 1774 as "that paradise". (1) It is evident that Etruria did not share the condemnation aroused by Josiah Spode's Penkhull housing and one hundred years after completion, Meteyard could only fault the Etruria cottages on their use of the front door to provide direct access from the street into the living room. (2) The cottages were mainly four roomed, with small paned casement windows, brick ground floors and long rear gardens. Wells and pumps provided the water supply and communal bakehouses charged $\frac{1}{2}$ d per loaf to pottery employees. Water closets were first introduced in 1887. (3)

The cost of building the village is not known, but details of cost and construction for two pairs of cottages are contained in the 1768 Building Memoranda. (4) On May 3rd., 1769, Wedgwood contracted with Thomas Shaw for the erection of a pair of cottages at a total cost of £65. A second pair of cottages were to have brick ground floor paving, plastered walls and ceilings and poplar bedroom floors, at a total cost of £120.10.6d. (5) These contract figures can be compared with £470 paid by the Liverpool Herculaneum Pottery in 1807 for ten cottages, and the £126 for a further pair of cottages in 1814. (6)

1. : Wedgwood Mss.: E1136-2. Letter Radcliffe to Wedgwood, July 24th., 1774.
2. : E. Meteyard, The Life of Josiah Wedgwood. 1. p.201. Meteyard was relatively uncritical of Wedgwood and the comments are therefore to be taken in this light.
3. : The Victoria History of the County of Stafford. 8. p.159. E. Warrilow, A History of Etruria. pp.23-5.
4. : Wedgwood Mss.: 28269-43. Copies of the Rough Draft of the Memorandums of Buildings at Etruria. 1768.
5. : Ibid. pp.20-2, 24.
6. : LPRO.: H380. MD47. KF295. Herculaneum Pottery, Resolutions of the Committee, 1806-22. March 10th., 1807; May 3rd., 1814.

The first pair of cottages were to be 39'0" by 14'0" or 546 square feet gross area each, with three principal rooms, one down and two up, with ceiling heights of 7'6" and 4'6", the latter being to wallplate only - an attic room. The second pair were to be 50'0" by 20'0" or 1,000 square feet gross area each, with four principal rooms, two down and two up, with ceiling heights of 7'6" and 5'0" - again an attic room. The first pair were to have eight windows, the second pair twelve, including five hopper lights. (1)

As with Cromford, the village was not initially conceived as a self-contained unit complete with school and chapel, the only educational provision being the existing dame school. The first nonconformist chapel was not built until 1808 and then only after considerable negotiations with the Wedgwoods, who opposed any development encroaching upon the estate. (2) Wedgwood finally succumbed to pressure and replaced the dame school in 1814.

Other eighteenth century North Staffordshire potters followed the example of Whieldon and Wedgwood, providing housing on a smaller scale for the mixed motives of profit and labour organisation. Josiah Spode ii followed the example of his father in buying houses as an investment, (3) but with the significant difference of allowing his workers to rent some of the properties. Shortly after 1803 he built forty-eight houses on three plots of land then recently

1. : Wedgwood Mss.: 28269-43. op.cit. pp.20-9.
By comparison R. Peel in c.1800 built a terrace of workers' cottages at Fazeley, each having 408 square feet of living space. J. Tann and L.D.W. Smith, Early Fireproof Housing in a Staffordshire Factory Village. Post Medieval Archaeology. 6. 1972.pp.191-7. Very few comparisons can be made between house types, costs and standards, for North Staffordshire housing, little archaeological work having been undertaken.
2. : E. Warrilow, op.cit. p.75.
3. : L. Whiter, Spode. p.22.

acquired near The Mount - his new home at Penkhull and close to the Stoke factory. Twenty of the houses were built round a central courtyard and were later known as Penkhull Square. (1) Each dwelling originally contained a living room and small scullery, with two bedrooms, one too small for a full-sized bed, and they were considered to be of a minimum standard even for the period. (2) The remaining twenty-eight cottages were built in Penkhull New Road and known as Ten Row and Seven Row and evidently built to the same low standards. (3) The cottages had a gross living area of 476 square feet, some 70 square feet less than that provided by Wedgwood in the smaller of the two pairs of houses proposed in 1768-9.

1. : The Victoria History of the County of Stafford. 8. p.219.
The houses were demolished in the late 1960's.
2. : The Victoria History of the County of Stafford. 8.
pp.183-4.
L. Whiter, Spode. p.36.
3. : The Victoria History of the County of Stafford. 8. p.184.

PLAN OF TYPICAL HOUSE PROVIDED BY SPODE IN PENKHULL SQUARE :(1)



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1. : The Victoria History of the County of Stafford. 8. p.115.

At about the same time, Spode built a further series of three squares at Cliff Bank, Stoke, which were considered in 1850 to be one of the black spots in local sanitary conditions. (1)

The extremes to which a manufacturer could take the use of housing in the control of his employees are provided by C.J. Mason of Fenton, "one of the most enlightened manufacturers of his day..." (2) With founding of the radical, union newspaper "The Potters' Examiner and Workmans' Advocate" in the December of 1843, his tenants acquired a means of voicing their grievances without fear of dismissal.

As early as December 23rd., 1843, these views were forcefully expressed by 'Mentor':

"... houses worth $2/3$ of $\frac{1}{2}$ of rent paid. Some of these are most handsome, and most convenient habitations, forsooth as the barrack for example....single men pay rent for unbuilt houses, rent stopped at source. As, for instance - and this but one case amongst a many - an oven man was engaged to work last year at 18s. per week, but was reduced in the middle of the year, without any fault on his part, to 12s. This he received for some time, but at length, through being determined not to put up with it, was raised to 14s. per week, upon condition of becoming a tenant of one of the master's respectable houses." (3)

On the 20th of January, 1844, 'Mentor' summed up his total rejection of Mason's commercial policy :

"But the low price, paid, by you, for labour, is far less criminal in its origin, although, perhaps, far more mischievous in its effects, than the other deeds of which you stand charged. Low prices might be caused by mechanical

1. : The Victoria History of the County of Stafford. 8. pp.183, 196.
2. : R. Haggard, The Masons of Lane Delph. p.52.
3. : The Potters' Examiner and Workmans' Advocate. December 23rd., 1843.

improvements, or necessitated competition, but the forcing of individuals into dwellings, unfit for the habitation of man, and the making of other pay rental for places they never inhabited, is a stretch of manufacturing tyranny unparalleled in the history of the Middle Classes." (1)

The majority of late eighteenth and early nineteenth century potters made no housing provision for their workers, initially, venturing only into this type of entrepreneurial activity when sufficient capital could be recruited or the need became acute. Of the fifteen potters who gave evidence before the 1834 Inquiry, all representing well established firms, only eight reported any provision of company housing. (2) The scale of provision by potters varied considerably, from single houses offered to sepcific craftsmen, as with the house auctioned by Ralph Wedgwood in 1797, together with his Burslem slip-house and yard, (3) to the forty houses let optionally with Ralph Hall's Tunstall earthenware works, in 1849. (4)

In the 'Staffordshire Advertiser' between 1795-1850, there appeared advertisements for a total of 477 potteries, of which number 100 were for disposal together with workers' housing, although only five possessed more than one group of houses. Josiah Mayer was exceptional in owning four separate groups of houses in Burslem, in 1818, three being in Nile Street and close to his pottery and colour works,

1. : The Potters' Examiner and Workmans' Advocate.
January 20th., 1844.

2. : Reports from the Commissioners. 1834. op.cit.

3. : Staffordshire Advertiser. 3. June 17th., 1797.

4. : Ibid. 55. April 21st., 1849.

The practice of building company housing did not die out in the nineteenth century, although instances became fewer in the later decades. W. Meath Baker in c.1887 built thirty terraced houses for his workers at the junction of City Road and Victoria Place, followed by an additional twelve in 1890. The houses, complete with corner shop, were built in moulded brickwork and terracotta detailing and still stand. HRL.: Fenton Local Board General Committee Minutes. 1887-92. p.73.

with a further group at the Flash. (1) Indications of a reversal of this trend towards the late 1840's are substantiated in the Longton Annual Small Rate returns compiled in 1847. (2) Fourteen potters were listed as owning industrial housing, half of them owning property in more than one location; and of a total of 102 houses valued, only twenty-one can be identified as being in the same street as the parent works. With the average group consisting of only four houses, it is evident that by the mid-nineteenth century the pressure on available land in the centre of Longton, was such that few manufacturers were able to acquire plots for domestic development close to their pottery and those sites that were available were restricted in size.

The paucity of surviving business records for the small manufacturer, makes any assessment of the number of employees housed in company housing, and the percentage of income paid in rent, difficult. Thomas Goddard employed 96 operatives in 1847 at an earthenware works in Commerce Street, Longton, and held seven houses in nearby Caroline Street. (3) If each house had only one occupant working for him, this represented only 7.3% of his workforce living in his property, considerably less than the estimated 24% in Spode housing. Theophilus Smith on his bankruptcy in 1800, owned several groups of houses in addition to his village, including Twenty Row, Burslem. The houses were described as : "...recently erected, uniformly built - each has a small garden at the front and 18 feet of land at the rear." (4) The cottages were, with the exception of two, let

1. : Staffordshire Advertiser. 24. February 7th., 1818.
2. : SRO.: D593/H/3/58. See Appendix 18.
3. : SRO.: D593/H/3/58. 122/2, 130/1, 2660/1/2.
W. Mankowitz and R. Haggard, op.cit. p.97.
4. : Staffordshire Advertiser. 7. February 14th., 1801.

at 1.7½d per week and this would have been within the means of the average pottery worker. The average weekly wage at this time was 17.11d.(1) and on this basis Smith's tenants would have been expected to pay approximately 9% of their wages in rent. The turnover of tenants in company housing appears to have been rapid, if John Deakin's tenants were typical. Of eight heads of household listed in the 1847 rating returns, only two were still resident in 1851, Charles Burton a potters' presser and Thomas Warren, a cratemaker. (2)

In discussing the provision of workers' housing, it is to be noted that potteries were frequently advertised for disposal together with land and whilst the majority of these plots were agricultural holdings, a few were for domestic development. Thirty-five of the potteries advertised together with housing between 1795-1850 (3) had land available for domestic development, although this only represented 7% of the total number of works offered during the same period. In 1802 on the bankruptcy of John Harrison, his estate at Stoke was sold and included seventeen houses together with 1,400 square yards of building land on which a further five houses could be built. The properties were at Honeywall, close to the Cliff Bank potteries. (4) It would appear that the land was held as an investment, which could have been exploited as the works grew.

1. : Figure based on wage payments made by Chamberlain at Worcester, on average, painters received 15.3d, potters £2.9.8d, daymen 14.11d, burnishers 13.1½d, boys 3.0d and girls 7.8d (used as paintresses as opposed to general labourers). Chamberlain Mss.: 1801-9 Wage Book.
2. : SRO.: D593/H/3/58. 2610/1/2/3/4/5/6/7.
H.O. 107/2007. 1851 Census for Longton, Enumerator District 2.
3. : Staffordshire Advertiser. 1795-1850.
4. : W. Mankowitz and R. Haggard. op.cit. p.105.

GRAPH OF FACTORY HOUSING PROVISION AND LAND AVAILABILITY
FOR DOMESTIC DEVELOPMENT, 1795-1850 : (1)



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1. : The graph is based on the notices given in the
Staffordshire Advertiser, 1795-1850.

The individual manufacturer was free to decide whether or not to house his employees. A few entrepreneurs may have been prompted by philanthropic motivation, the majority it would appear, by capital diversification and investment. The forty cottages offered by Hall in 1849 were described as 'optional' and regarded as an investment rather than a necessary part of the works, (1) as were the houses owned by Whieldon and Spode. In 1828 the personal estate of Spode ii included a valuation of £8,209 for houses at Boothon, Cliff Bank and Penkhull. (2) On November 21st., 1833, W.T. Copeland in purchasing the Spode estate, paid £11,000 for a total of 189 cottages, previously valued at £12,824. (3) It is not known how many of these were inhabited by employees, but in 1840 the pottery employed 800 people and on the conservative estimate that only one member of each household was a company employee, 24% of the workforce would have been living in company property. (4) For the Spodes, company housing was a small part of an estate valued in 1833 at almost £96,000 and as such one of many investments, rather than necessities. (5)

For the vast majority of pottery operatives, no housing provision was made by their employers and residential accommodation was sought on the open property market. In general terms, (6) the rise in population of The Potteries

1. : Staffordshire Advertiser. 55. April 21st., 1849.
2. : Spode Mss.: 543. (old ref. N/NL).
3. : Ibid. 521/1.
L. Whiter, Spode. p.78.
4. : J. Ward, History of the Borough of Stoke-upon-Trent.
p.504.
5. : L. Whiter, Spode. p.78.
6. : There are very few statistical sources with which to calculate the relationship between house-building and population increase.

outstripped the provision of houses until the 1820's house building boom. (1) After this period, working-class housing was provided to a standard considered by contemporaries to be generous, (2) and there were scarcely any middle-class houses from which the occupants had moved to the outskirts and their place taken by poorer tenants. (3) There were of course black spots, particularly where the industrial expansion had been rapid and on cramped sites - Massey Square and the 'Hell Hole', both in Burslem (4) - and in Longton a few back-to-backs survived until at least 1843. (5) Although in the majority of these houses instances of overcrowding were rare, in 1844 most properties were in single family occupancy, (5) living conditions were considered poor, the result of atmospheric pollution and inadequate sanitary provision. (7)

A fortunate minority of pottery operatives were able to find accommodation through building clubs. The first clubs formed in the Potteries, Joseph Moreton's Building Club at Longport and the Nelson Place Club, Hanley, both constituted in 1806, (8) came thirty-one years after the first known club in the country, and there was a steady rise in their numbers in Stoke-on-Trent over the next fifty years. The growth of the building society movement in North

1. : R.A. Lewis, The State of Large Towns in North Staffordshire. p.2.
2. : S. Shaw, History of the Staffordshire Potteries. 1829. p.26.
3. : The Victoria History of the County of Stafford. 8. p.114.
4. : Ibid.
5. : R.A. Lewis, op.cit. p.14.
6. : Ibid. p.11.
E. Warrilow, A Sociological History of the City of Stoke-on-Trent. p.176.
7. : Report to the Commissioners, 1842. op.cit. Appendix 1. J.B. Davies.
8. : Staffordshire Advertiser. 13. May 2nd., 1807.

Staffordshire accelerated in the late 1840's, with fifteen of the twenty-four societies formed by 1850, instituted between 1846-50. (1)

The building society movement depended for its success upon the strict adherence of the rules by its members, which generally included rules governing the regularity and amount of subscriptions. For most working potters, the need to pay regular, high subscriptions prohibited all but the fortunate minority from becoming society members. Taking the average weekly wage in 1806 as 17.11d, the income of a potter rose little during the subsequent thirty years - in 1836 the unions asked for an advance on the then current wage averages of between 17.0d. and 21.0d per week for a man, 6.0d to 11.0d for a woman and 3.0d to 3.6d for a child. (2) Society subscriptions varied considerably, but the Tunstall Building Society, formed in 1816 with thirty-two members, mostly working potters, could be said to be typical of the North Staffordshire clubs in expecting members to subscribe 7.0½d per week, or 39% of the average weekly wage. (3) This calculation does not allow for secondary incomes within the family, or the need to pay rent on a property until the society house was available if one should be made available at all.

Occasionally operatives were encouraged to purchase their own homes through a building club initiated by their employer and whilst this form of house purchase was rare, it did offer a very good prospect of maintaining the weekly payments. Enoch Wood encouraged his Fountain Place Pottery,

1. : Based on 'Staffordshire Advertiser' notices for societies, 1806-50.
2. : H. Owen, The Staffordshire Potter. p.318.
3. : S. Price, Building Societies. p.65.

Burslem, employees to provide their own homes and in 1824 twenty-one tenements were erected, together with a shop, to form a terrace called Tuppeny Row. (1)

In general, the standard of housing provided by the societies was far above that available in the general property market or even in company property. The Tunstall Building Society after five years of saving, built in 1821 two terraces of twenty houses each, forming the south side of Paradise Street and the north side of Piccadilly street, Tunstall (2) The houses had four rooms and a privy, an ash pit in the small backyard and each was served at the back by a central cobbled footway. Each house had a gross living area of 616 square feet. (3)

1. : The Victoria History of the County of Stafford. 8. p.114.
F. Falkner, The Wood Family of Burslem. p.82.
2. : The Victoria History of the County of Stafford. 8. p.85.
J. Ward, History of the Borough of Stoke-upon-Trent.
p.95.
Evidently not all of these houses were completed in 1821, for at least two, offered for sale in June 1822 by Enoch Wood and Hugh Robinson, were said to have been completed that spring. Staffordshire Advertiser. 28. June 1st., 1822.
3. : The Victoria History of the County of Stafford. 8. p.85.
The houses were demolished in the late 1960's.

PLAN OF TYPICAL TUNSTALL BUILDING SOCIETY HOUSE IN
PICCADILLY STREET : (1)



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The Burslem United Amicable Building Society, founded in 1807, provided three types of house and for the highest share payment of £1 per month, the member could expect a house having six principal rooms and a gross living area of 1,014 square feet. For 15.0d and 10.0d per month, members could expect houses with 616 and 468 square feet of gross living area respectively. (1) The smallest house had eight square feet of living space less than that provided by Spode at Penkhull and although an exception to the general high standard of society housing, at a weekly subscription rate of 2.3½d this represented only 12.8% of the average weekly wage and was therefore within the means of the working potter.

In the absence of rating assessments for The Potteries for the early nineteenth century, it is impossible to substantiate the claim of Leveson Forrester in his evidence before the 1842 Inquiry - that the 1836 potters' strike became the watershed in the provision of workers' housing :

"The strike of 1836-7 created at that time a considerable depression among the mechanics; many of them were ruined, and never recovered their position or circumstances since; many sold their houses;.." (2)

It was though a conclusion reached by Scriven, calling upon the wider body of evidence given during the whole inquiry. (3) Other witnesses testified to the presence of owner-occupiers among the pottery workers :

"Perhaps there is no manufacturing district in the kingdom where so many freeholds are held by working men - one whole street, called Hot Lane, is possessed exclusively by them, in this immediate neighbourhood." (4)

1. : S. Price, op.cit. p.64.
2. : Report to the Commissioners. 1942. op.cit. Interview no. 167, Leveson Forrester working for Jonathon Chetham, Longton.
3. : Ibid. Report by S. Scriven, paragraph 11.
4. : Ibid. Interview no. 204. James Godwin, principal of Messrs. James and John Godwin, Cobridge.

During the frequent periods of commercial depression in the pottery industry, the ability to pay a regular weekly subscription to a society diminished, as it did in any of the alternative schemes for the purchase of a home. This increasing section of the housing market was filled by the cheap lodging house, which until the 1848 Public Health Act ordered registration, were entirely without control or scrutiny :

"Longton - Stafford Street. Lodging-houses kept by Mrs. Tomlinson. In one house there are two rooms, four beds in one, and two in the other; they charge 3d per night for adults, and 1d for children. There are three houses and six bedrooms; eleven beds in the three front rooms, and five in the back rooms, making in all sixteen beds in six rooms. These rooms are about ten feet square, and one window in each room. The back yards are confined, and the privy and cesspool broken and filthy." (1)

Even after registration, the lodging houses continued to offer cheap, but squalid accommodation, and in the late nineteenth century, after a further house building boom, (2) which provided houses for renting at 4.0d to 5.6d per week, (3) these houses continued to thrive, serving the casual pottery labourer :

"But there is also another class, and a pretty numerous class too, who do not hesitate to patronise 'cottage lodging houses'. Their work is carrying and drawing ware. For a day's work they receive 2s 9d; but it is casual labour.so they 'doss' for 4d per night on the floor, bench or table." (4)

1. : Stoke Board of Health, Preliminary Inquiry. 1848.
It is to be noted that similar conditions existed in neighbouring Newcastle.
2. : H. Owen, The Staffordshire Potter. p.347.
For example the Duke of Sutherland from 1867 onwards developed, extensively, his land between Uttoxeter Road and Trentham Road. The Victoria History of the County of Stafford. 8. p.227.
3. : H. Owen, op.cit. p.347. The average weekly wage was then 30.0d and these payments represented 13% and 18% respectively of the total income.
4. : H. Owen, op.cit. p.351.

Whilst it was still possible in the mid to late nineteenth century for the better class of operative - the thrower, turner and fireman - to : "...keep up a home which time and opportunity may allow to pass, without much noticeable change, into that of the manager, or even the small manufacturer." (1) for the vast majority of pottery operatives living conditions were far from satisfactory. In the end, the working habits which had in part driven Wedgwood to provide the Etruria village cottages, combined with the high cost of house purchase and had forced the majority to live in the worst possible conditions :

"If on the other hand, he has a large family of young children, is of careless and improvident habits, and has a wife who works as a transferer, or in the warehouse, at 15s. to 18s a week, the home becomes neglected, and the whole family may sink to the lowest level of its class." (2)

1. : H. Owen, opcit. p.344.

2. : Ibid.

CHAPTER EIGHT :
CAPITAL RECRUITMENT IN THE POTTERY INDUSTRY.

The take-up of the factory system in the North Staffordshire pottery industry during the eighteenth century, required of the entrepreneur a greater skill in the recruitment and deployment of capital, than had previously been necessary with domestic production serving limited markets. The development of high quality and diversified wares required the importation of raw materials from areas well outside the manufacturing district and exploitation and haulage charges figured prominently in higher production costs. In addition, the new materials required more skilful manipulation and control during their use and this requirement was directly expressed in increased craft specialisation and the erection of purpose-built workshops for material preparation. In many instances these developments merely extended the scope of existing manufacturing techniques and the already present need for capital recruitment. The introduction, for example, of a liquid lead glaze in the 1740's, together with the need for increased manufacturing capacity, forced the widespread adoption of the hitherto occasional practice of firing separately biscuit and gloss wares. (1)

The increase in the manufacturing capacity of individual firms was paralleled by an expansion of the pottery industry as a whole as newcomers entered the trade. There were thirteen potteries in Lane End in 1784 and by 1802 the number had risen to thirty-seven, an expansion typical of The Potteries during this period. (2) Growth was sustained

1. : Although controversial, this conclusion is increasingly supported by archaeological evidence from excavations in The Potteries. F. Celoria, J. Kelly, A post-medieval pottery site with a kiln base found off Albion Square, Hanley, Stoke-on-Trent, Staffordshire, England. SJ 885 474. City of Stoke-on-Trent Museum Archaeological Society Report. 4. 1973. p.6.
2. : Bailey's Western Directory. 1784.
Allbut's Staffordshire Pottery Directory. 1802.

through the ability of the smaller manufacturer to commence in business in rented premises and expand his trade with a minimum of capital and security.

During the late eighteenth and early nineteenth centuries, potters could rent varying sizes of factory - often complete with utensils and machinery - which enabled an immediate commencement of production. Robert Garner, for example, offered his Lane End works for letting in 1821 and advertised the utensils as an optional item subject to valuation and an extra rental. (1) Furthermore, after a sharp increase during the early decades of the eighteenth century, (2) pottery rentals remained, on average, at between £80 and £150 per annum until the mid-nineteenth century. (3) Only occasionally were there exceptions to this grouping - in 1823 a works was advertised for letting with the rent payable in earthenware (4) and in 1846 William Adams let the Hadderidge Pottery, Burslem, to Heath, Blackhurst and Bourne for £245 per year. (5) An additional attraction of an industrial tenancy was the avoidance by the lessee of all maintenance charges other than those incurred with the kilns, a considerable saving. (6) Typical of such agreements was that entered into

1. : Staffordshire Advertiser. 27. March 3rd., 1821.
2. : In c.1715 the average pottery rental was £5 per annum.
Wedgwood Mss.: E18988-26. Letter Wedgwood to Lord Auckland, January 28th., 1792.
3. : The Victoria History of the County of Stafford. 8.
Staffordshire Advertiser. 1795.1850.
HBL.: EMT. Adams Family Papers.
SRO.: D593/H/14.; G/1 rentals.
4. : Staffordshire Advertiser. 29. August 23rd., 1823.
5. : HBL.: EMT. 15/863. Lease, October 10th., 1846.
6. : Routine maintenance apart, incidental damage to a works was far from uncommon. Messrs. Rogers of Longport had their chimney demolished in the December gales of 1814. Staffordshire Advertiser. 20. December 24th., 1814.

by Thomas Taylor of Shelton with John Fenton, for the tenancy of a pottery in 1749, at £10 per annum, with the landlord paying all maintenance charges except those involving the ovens and all taxes except the Window Tax. (1)

Although few details of pottery rentals survive for the period 1795-1805, the availability of rented factory accommodation between 1795 and 1850 is determinable from at least one major source - the Staffordshire Advertiser. Whilst potters were always assured of a reasonable choice of manufacturing premises, the state of the industrial property market was largely dependent on the level of economic activity in the pottery industry. In particular trade recessions, either in this country or the largest foreign market - America - markedly increased the range of accommodation advertised for disposal. The 1808-10 Napoleonic blockade and the 1812-14 American war were both keenly felt by Staffordshire potters, in 1822 alone thirty firms closed completely, (2) and the sharp rise in the number of works for disposal during this period reflected this low level of industrial activity. (3) The 1820's witnessed further market losses, first in America and subsequently in this country, (4) and after a short respite in the late 1830's, a further cutback in the American trade caused a marked rise in the number of works for disposal. Interestingly, during this last recession, the number of leasehold potteries advertised was in excess of the number of freehold

1. : SRO.: D1788. P.44. B.9. Lease between John Fenton and Thomas Taylor, September 29th., 1749.
2. : Staffordshire Advertiser. 18. January 18th., 1812.
Ibid. March 7th. 1812.
B.H. Tolley, The Liverpool Campaign Against the Order in Council and the War of 1812. in : J.R. Harris - ed., Liverpool and Merseyside. pp.98-132.
3. : See subsequent page, and the graph of property availability.
4. : In 1820 the exports of pottery to America were one quarter of the value exported in 1814. J.K. des Fontaines, Letters from Thomas Sparks, Engraver to Wedgwood, 1815-1819. Proceedings of the Wedgwood Society. 1966. 6. p.99.
L. Whiter, Spode, p.61.

premises - the reverse of the 1808-15 recession. It is significant that despite the advantage of enjoying low factory rentals, potters could still be put out of business through a contraction of the staple market for earthenwares, a reflection of the risks involved in the trade.

GRAPH : NUMBERS OF POTTERIES AVAILABLE FOR SALE AND LETTING,
1795-1850. (1)



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1. : The graph is based on the advertisements placed in the Staffordshire Advertiser, between 1795 and 1850. For explanation of overlay data see Page 228.

The reliance on rented factory accommodation continued at least until the mid-nineteenth century, both the Appendix to the Second Report of the Commissioners, 1842, and the Stoke Parish rateable values for Longton, prepared in 1847, indicate a predominance of rented potteries and a complex pattern of property management. (1) Most of the rented potteries were let by entrepreneurs who owned only the single works and had either retired or wished to reduce their commitment on the site. Only a small number of works were offered for letting by speculative developers and, similarly, only a minority of potters owned more than one works and let them all out. Of the small group of entrepreneurs who owned several works, the example of John Hendley Sheridan offers insight into the relationship between active potting and property management. In 1815 Sheridan bought the Gladstone Pottery, Longton, and by 1818 had let part of the works to Simkin and Waller. With his retirement, the entire site was let to Allerton, Brough and Green and William Gerrard. Associated with this property was a second pottery in Union Square, Longton, which was entirely worked by tenants. (2) The turnover of tenants in rented factory accommodation was high and of twenty-three potters recorded in the 1842 Inquiry, only twelve were still operative in 1847, and of those one firm had reduced its commitment to a single works. (3)

1. : SRO.: D593/H/14/3/58. 1847 Stoke Parish rates for Longton. Appendix to the Second Report of the Commissioners. 1842. op.cit. See Appendix 19.
2. : Gladstone Pottery Mss.: 25. Abstract of Title for John Hendley Sheridan to the Gladstone Pottery, Longton, 1856.
Ibid. 9. Indenture, March 23rd., 1818.
Ibid. 14. Plan, 1840.
SRO.: D593/H/13/3/58. op.cit.
Rented accommodation also provided the larger manufacturer with extra manufacturing capacity during trade booms. For example, Allerton, Brough and Green also rented for short periods from Seckerson and from Young.
SRO.: D593/H/14/3/58. op.cit.
3. : See Appendix 19.

The transfer from rented premises to the ownership of a pottery necessitated a considerable financial commitment. Although the rents of most potteries remained at a constant level throughout the late eighteenth and early nineteenth centuries, the prospective purchaser faced a marked appreciation in the capital value of potteries. (1) Although throughout the period it was occasionally possible to purchase a works for a nominal amount, (2) on the whole the values of potteries increased from approximately £500 to £3,000. (3) The Gladstone Pottery, despite a reduction in site area and general physical deterioration - in 1842 it was described as being : "...small dirty, dilapidated, and unhealthy." (4) - rose in value by £1,250 between 1789 and 1857. (5) This trend is shown in much sharper focus by the increase in

1. : Although frequently advertised, pottery sales rarely provide the actual sale price and the following conclusions are based on occasional references in the Trentham estate papers and in the Adams family papers : SRO.: D593/B/1 - ; HBL.: EMT, various.
2. : Richard Daniel bought a Cobridge works for £30.5.0d. in 1769. HBL: EMT. 10/767.; John Hammersley bought a Shelton pottery in 1815 for £110 and Joseph Clementson purchased another nearby works for £100 in 1844. HBL.: EMT. 7/815a, 11/844.
3. : Alexander Daniel purchased a Cobridge pottery in 1787 for £550. HBL.: EMT. 11/787b. In 1815 Ann Taylor purchased a Shelton works for £2,747.14.0d. Ibid. 11/815c.
4. : Appendix to the Second Report of the Commissioners. 1842. op.cit. interview. 299, 300. The works was classed as the worst possible - Class 3.
5. : The entire Gladstone site was purchased by Ward in 1789 for £900 and one section resold in 1815 for £1,020. In 1857 this section was sold for £2,150. Gladstone Pottery Mss.: 2, 3. Lease and release. June 2nd., 3rd., 1789.; Ibid. 9. Conveyance, March 23rd., 1818. Ibid. 18. Conveyance, February 6th., 1857.

value of £3,444 for the Old Foley Pottery, Longton, between 1790 and 1822. (1)

The potter who purchased his own works, required not only the initial capital outlay but also cash in hand to establish it as a manufacturing unit - especially for the purchase of tools. Most potteries sold had separate auctions for the disposal of the utensils and machinery and by such means, entrepreneurs who needed to equip a works, could acquire them and subsequently take them from pottery to pottery. (2)

The potter who wished to build his own works faced a similar financial commitment, but had the advantage of being able to spread the expenditure over a longer period. In common with other West Midlands entrepreneurs, (3) many of these premises were built on sites rented from large land-owners, reducing the fixed capital investment, but at the loss of the security of the premises. The Worcester potters, Grainger and Wood commenced in business in 1801 on the Pheasant Meadow, rented from the City Corporation for £1.10.0d per annum. (4) This tenancy continued into the late nineteenth century, even though additional land was

1. : The Old Foley works were bought by Myatt in 1790 for £700 and in 1822 his son valued the premises at £4,144.14.3d., a figure considered too high by Burgess, the Trentham estate agent, who advised purchase for between £3,000 and £3,400.
SRO.: D593/B/1/11/9. Lease, January 16th., 1790.; Ibid. D593/M/2/2/7. Valuation, February 25th., 1822.; Ibid. D593/M/2/2/4. Letter Burgess to Lewis, February 25th., 1822. See Appendix 20.
2. : Yates and Shelley of Hanley, sold their utensils in 1804 and finally disposed of their pottery in 1807. Staffordshire Advertiser. 10. December 22nd., 1804. Ibid. 13. May 2nd., 1807.
3. : Kenrick, the metalware manufacturer, for instance, leased a site in Spon Lane, Smethwick, in 1791, and subsequently purchased adjoining land in 1818, the original land being purchased only in 1832. R.A. Church Kenricks in Hardware. pp.28, 49-50.
4. : Grainger Mss.: (uncat. in private possession) : Tenancy, August 1st., 1801.
See subsequent page.

purchased in 1818 to accommodate further manufacturing premises and the division of ownership was maintained through the physical division of the pottery workshops. (1)

1. : Grainger Mss.: Conveyance, May 21st., 1818. (land adjoining - £403 for 1,863 square yards.)
ibid. Conveyance, April 26th., 1852.

PLAN OF THE GRAINGER POTTERY, ST. MARTINS GATE, WORCESTER,
1885. : (1)



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1. : For details of tenancies and purchases of land on the Pheasant Meadow - St. Martins Gate - see previous page. The plan is based on these details and uses the 1885 1:500 Ordnance Survey for Worcester as a base. Worcester Record Office : BA.1650/2 & 2650/3. Sheets - 38/1, 38/2.

During the early nineteenth century, land suitable for industrial development in The Potteries was valued at approximately £827 per acre, representing a financial commitment of between £339 and £3,600 for a factory site. (1) As with land tenure, the purchase of land in North Staffordshire was a relatively inexpensive process and entrepreneurs outside this area faced higher prices - for example Grainger was required to pay £1,048 per acre in 1818 for land adjacent to the Pheasant Meadow. (2) Alternatively, site rentals were generally between £3.10.0d. and £5.6.8d. per acre, a commitment of between £1.8.0d. and £22.13.4d. for a factory site. (3) Jacob Marsh took out in 1818 a ninety-nine year tenancy on 'The Little Wood' at the Foley, Lane End, a site containing three-quarters of an acre and let for £3 per year. The tenancy was subject to a covenant stipulating that the works proposed for the site - subsequently known as the Boundary Works - should be completed within two years of the agreement being signed and at minimum cost of £1,500. (4) Outside The Potteries rentals were higher and Archibald Kenrick paid the equivalent of £11.10.0d per acre in 1791. (5)

1. : Land at Bournes Bank, Burslem was sold in 1811 for £847 per acre, the same price paid per acre by George Lander in 1835 for part of the Gladstone site. Staffordshire Advertiser. 17. March 9th., 1811. Gladstone Pottery Mss.: 13. Conveyance, October 9th., 10th., 1835. Pottery sites ranged from between 0.4 and 4.25 acres, evidence based on advertisements placed in : Staffordshire Advertiser, 1795-1850.
2. : Grainger Mss.: Conveyance, May 21st., 1818.
3. : In 1798, three acres of land were offered in Parrotts Croft, Burslem, at an annual rent of £16 and in 1811 the 46 year remaining term of a lease on two acres was offered at £7 per annum. Staffordshire Advertiser. 4. December 29th., 1798. Ibid. 17. December 7th., 1811. Calculations based on the same range of site areas as those used in reference 1.
4. : SRO.: D593/B/1/11/16. The pottery was built in 1819 and is still standing - site observations, January 1976.
5. : R.A. Church, Kenricks in Hardware. p.28. Kenrick leased 4,356 square yards of land at £10.0.0d.per annum.

As with other industries in the early Industrial Revolution, the establishment of a pottery firm did not necessarily lead immediately to a large investment in factory buildings. Robert Chamberlain commenced as an independent china decorator in Worcester in 1786, in rented premises, and by 1788 had undertaken his first biscuit ware trials, being able to undertake the total production of wares by 1795, when imported pieces accounted for only 7% of the total finished ware stock. (1) In part this remarkable growth was at the expense of the original Worcester porcelain works, at that time managed by John Flight, but it is evident from the latter's diary, that by 1789 the two factories were able to compete economically for the same market : "Chamberlain I believe does hurt us a little but our trade does not seem much diminished if at all.." (2) The transition to full production was marked by an associated investment in factory buildings, which through additional tenancies and purchases, had increased in value from £700 in 1792 to £4,456.6.10d. in 1795. (3)

The need to recruit long-term capital occurred at specific and generally predetermined points in the expansion of pottery businesses, whereas short-term capital was by far the most frequent and extensive requirement. In common with many entrepreneurs during the Industrial Revolution, potters frequently experienced a liquidity crisis, (4) with demands for working capital exceeding the day to day profits of the business, a point succinctly made by Enoch Wood of Burslem in his will :

1. : Chamberlain Mss.: 32. Stock Book. Valuation, Christmas 1795.
2. : John Flight's Diary, 1785-91. (private possession) October 11th., 1789. p.255.
3. : Chamberlain Mss.: 32. Stock Book. Valuation, June 5th., 1792.
Ibid. Valuation, Christmas 1795.
See Appendix 21.
4. : S.D. Chapman, Working Capital in the British Cotton Industry. 1770-1850. Paper given before the Ealing Business History Seminar, May 1975.

...invested in Trade and Partnership with my Sons Enoch Joseph and Edward and if they should be required immediately or soon after my decease to pay in the principal of such Legacies to the Parties entitled to receive the same the Trade might be seriously inconvenienced and my said Sons distressed to raise such Sums." (1)

Within this pattern of short-term capital needs, two elements were clearly dominant throughout the period of transfer from domestic to factory production - labour and material costs. As early as c.1715 labour costs accounted for 42% of the total production cost, with materials accounting for a further 24%, (2) and during the subsequent decades the industry became more labour intensive, with labour costs rising in proportion to the total expenditure. (3) Pottery operatives' wages rose less in North Staffordshire than in other production centre : "Cooper is hired for three years at 13/- per week in the Country, and 16/- at Chelsea," (4) but their wages were still higher than those for workers in other industries. (5)

The adoption of craft specialisation broadened this wage structure and by the 1840's there existed a wide differential between the wages of children and unskilled labour - for example sorters - at 2.0¹/₂d and 9.0d respectively per 72 hour week, and the highly trained throwers and painters

1. : LJRO.: B/C/11. Enoch Wood of Burslem, will proved February 2nd., 1841. Legacies of £2,500 each were due to his daughters and a similar amount for the children of his late daughter Ann Brettell.
2. : Wedgwood Mss.: E18988-26. op.cit.
3. : SRO.: D1788. V.94. Accounts for John Baddeley's pottert. Shelton, 1759-60.
4. : Wedgwood Mss.: E18299-25. Letter Wedgwood to Bentley, May 12th., 1770.
5. : In particular they were higher than those paid to colliers; in 1815 the Marquis of Stafford sent a number of Lane End colliers to work his Brora Colliery in Scotland, and one, William Cadman, complained that he would lose financially by moving, since his wife could earn enough by potting to keep them both. SRO.: D593/M/2/2/2. Letter Cadman to Marquis of Stafford. February 5th., 1815.

at £2 per week. (1) With such a high labour content in manufacturing costs it was inevitable that entrepreneurs would turn to the use of less skilled labour wherever possible, especially in the making and decoration of wares - for example pressers and transferers at £1.10.0d. and 10.0d per week - and the general use of children. (2)

"That of the whole number of persons employed in carrying on these Trades and Manufactures, a large portion are under thirteen years of age, and a still larger portion between thirteen and eighteen." (3)

Despite such measures, full factory production, as achieved at the Etruria Useful Works, was still labour intensive and this element could account for 40% of all manufacturing costs. (4)

Although wages were the greatest single item of expenditure at Chamberlain's Worcester pottery, they were also the most stable element, a surprising situation when they were controlled by piecework and commissions - both unpredictable factors. Operatives, even when fully employed, undertook various commissions, especially in the painting departments :

1. : Appendix to the Second Report of the Commissioners, 1842. op.cit. Report by Scriven, paragraph 12.
2. : Ibid.
3. : Appendix to the Second Report of the Commissioners. 1842. op.cit. Summary of findings. paragraph 3.
This conclusion is substantiated by the 1851 census returns for Longton, when, for example, James Beach employed 67 children out of a total labour force of 115, or 59%. 1851 Census Returns for Longton. District 5.
4. : V. Bladen, The Potteries in the Industrial Revolution Economic History. 1. January 1926. p.126.

"Ford	: 6 Plates painted groups at 6d each $\frac{1}{3}$ 3/-	: 1
Gyngell	: 10 Parian Vases finishing grass and flies.	$3\frac{1}{2}$ each : 2/11
	1 large flower dish & cover painted, roses and rose bud wreath	5/- $\frac{1}{3}$ 7/11 : 2/8"
		(1)

This detailed pattern is more clearly reflected in the weekly hirings of individual classes of operative :

1. : Chamberlain Mss.: 4. Painters Work Book. 1854-5.

GRAPH : NUMBERS AND TYPES OF OPERATIVES EMPLOYED BY
CHAMBERLAIN IN 1801 : (1)



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1. : Chamberlain Mss.: 1796-1806 Cash Book.
Ibid. 30. 1796-1804 Cash and Order Book.
Ibid. 15. 1804-14 Cash and Order Book.

In fact, the manufacturing costs for the Chamberlain works for the period 1801-6 indicate a relatively steady outflow of cash for wage payments, as opposed to a widely fluctuating demand for credit to finance the other manufacturing costs :

GRAPH : EXPENDITURE ON TOTAL PRODUCTION AND WAGES BY
CHAMBERLAIN, 1801-6 : (1)



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1. : Chamberlain Mss.: 1796-1806 Cash Book.
Ibid. 15. 1804-14 Cash and Order Book.
Ibid. 30. 1796-1804 Cash and Order Book.

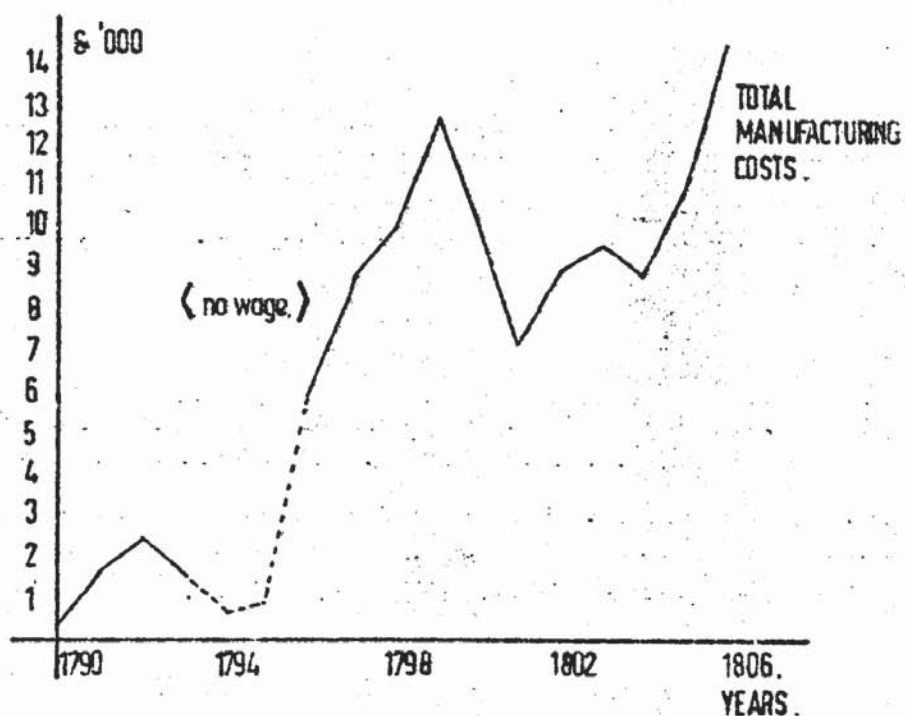
Increased prices for raw materials (1) were reflected in rising production costs at Worcester, as the subsequent graph indicates, In 1792 it cost £1,588.2.2d. to sustain a finished ware stock valued at £2,102.2.9d. by 1795 manufacturing costs had risen to £6,165.18.6d. for only a 50% increase in the value of the finished stock. (2) Whilst these increased charges were a major factor in the rising costs, they were not in themselves the cause of the very marked fluctuations recorded in the monthly cash payments. The decline in the manufacturing costs during the first half of 1803 in part reflected the purchase in February of the company's own boat and the ability to control the very high transport costs hitherto paid on all raw materials. (3) The very sharp up-turn in costs which followed this decline was in no way a reflection of increased commissions (4) and there were no major price increases

1. : For example, coal costs rose steadily between 1760 and 1828. Surface addit mining in the 1760's was very inexpensive - Thomas Barker paid 1.0d per stack or 9¹/₂d per ton to the Trentham estate in 1765. The need for deeper mining forced an increase in price and by 1789 potters were paying between 6.0d and 8.9d per ton, a price generally maintained in North Staffordshire until the early 1800's. There were regional exceptions and Chamberlain paid 14.0d. per ton in 1798, a price exclusive of haulage charges. Apart from a minor drop in 1820, in an attempt to secure larger orders at a time of general economic recession, prices continued to rise and by 1828 potters were required to pay up to 9.3d per ton.
 SRO.: D593/M/1/4. 1765-8 Meirheath Colliery Account Book.
 Wedgwood Mss.: 24280-32. 1789, Account with Billington.
 Chamberlain Mss.: 1796-1806 Cash Book.
 SRO.: D593/M/2/2/3. Letter, Loch to Burgess, June 19th., 1820.
 R. Haggart, Abner Wedgwood's Recipe Book. Northern Ceramic Society Journal. 1. 1972-3. p.21.
2. : Chamberlain Mss.: 32. Stock Book. Valuations. op.cit. Ibid. 1789-92 Cash and Order Book. Ibid. 66. 1792-8 Cash Book.
3. : Ibid. 30. 1796-1806 Cash and Order Book. Entry, March 22nd ., 1803.
4. : Orders for 1801, 2, 3 were : £1,44.19.3d; £1,745.6.6d; £1,402.9.0d. Chamberlain Mss.: 30. 1796-1806 Cash and Order Book.

for either labour or materials. Rather, it is suggested that the sudden deterioration reflected the financial crisis in the country at large, (1) and the withdrawal of mercantile and other short-term credit, which could only have adversely affected the firm.

1. : Staffordshire Advertiser. 10. February 11th., 1804.

GRAPH : ANNUAL PRODUCTION COSTS FOR THE CHAMBERLAIN WORKS,
1790-1806 : (1)



1. : The figures for 1793-5 are based on incomplete data, no wage payments are known for these years.
Chamberlain Mss.: 26. 1789-92 Cash and Order Book.
Ibid. 65. 1792-1803 Cash Book.
Ibid. 66. 1792-8 Cash and Order Book.
Ibid. 30. 1796-1804 Cash and Order Book.
Ibid. 1796-1806 Cash Book.

Although records have survived giving the value of individual commissions, there are no surviving accounts showing when these were completed. It is therefore impossible to correlate costs to value of wares manufactured.

Pottery entrepreneurs faced with the need to recruit substantial amounts of long-term finance, sought this capital from a variety of sources. For the established entrepreneur, it was possible to 'plough-back' retained profits, although this restricted the operation to the successful manufacturers and to the limit of the annual profits. It was a widely adopted technique amongst emergent, West Midlands businesses, many of the late eighteenth century Burton-upon-Trent merchant brewers 'ploughed-back' surplus capital and in the early decades of the subsequent century, the Kenricks employed this means to capitalise their expanding business. (1) Although potters are known to have made reasonable profits during trade booms, Wedgwood for the year ending August 10th., 1771, cleared a gross profit of £3,953.8.2d. for the Etruria Works and in 1831 the Spode pottery made a profit of £8,000, (2) in the absence of adequate, surviving business records it is not possible to do more than assert that potters were able to 'plough-back' profits from a large number of potential sources. Thomas Whieldon in 1750 received an income on £106 per year from his land and housing, supplementing the conjectured profits of the pottery, (3) and the year in which Spode made

1. : C. Owen, Merchant Brewers of Burton-upon-Trent in the Eighteenth Century. North Staffordshire Journal of Field Studies. 14. 1974. pp.86-7.
R.A. Church, Kenricks in Hardware. p.46.
 It was not only the West Midlands business which were to make use of ploughed-back capital - the Dunbarton Glassworks Company increased their share capital from £61,500 to £84,050 between 1809-13, mainly through plough-back. J. Logan, The Dunbarton Glassworks Company : A. Study in Entrepreneurship. Business History. 14.1. 1972. p.79.
2. : Wedgwood Mss.: Letter Wedgwood to Bentley, August 31st., 1772.
L. Whiter, Spode. p.75.
3. : Thomas Whieldon's Notebook. City Museum and Art Gallery, Hanley, Stoke-on-Trent.
 It was possible to secure a 7½% return on capital with housing. Staffordshire Advertiser. 38. February 18th., 1832. This compares rather unfavourably with the 13% return on capital achieved by the Chamberlains at Worcester, from their pottery, in 1798.
Chamberlain Mss.: 2. 1796-1800 Order Book.

an £8,000 profit on the manufacturing side of the business, the London showroom returned an £11,501 profit. (1)

A more widespread method of securing long-term capital amongst North Staffordshire entrepreneurs - including potters (2) - was the use of mortgages. Josiah Spode purchased the Banks and Turner pottery, Stoke, in 1776, using a partnership bond of £500, paid by Thomas Mountford and a mortgage of £1,000 from their wealthy landlord, Jeremiah Smith. (3) The Gladstone Pottery, Longton, was purchased a number of times during the late eighteenth and first half of the nineteenth century, using mortgages secured amongst wealthy Staffordshire families, businessmen and entrepreneurs. When William Ward purchased the Gladstone site in 1789 he secured a mortgage for £900 from John Blagg of Cheadle, gentleman, £200 of which sum was required to redeem an earlier mortgage on the property taken out by its former owner, Michael Shelley, from the Stake sisters of Trentham. (4) With the partition of the works in c.1815, the executors of the deceased Michael Shelley disposed of part of the estate to John Emery, securing a mortgage with four prominent businessmen and gentlemen - William Brett, a banker from Stone, Nathaniel Jackson and James Astbury, gentlemen of Lane End and Meaford respectively, and Phillip Seckerson, described as gentleman but an active partner in Harley and Seckerson, tenants of part of the Gladstone Pottery complex. (5) Subsequent mortgages for the works

1. : L. Whiter, Spode. p.75.

It is not known how much firms subsidised the wares sold to their retail showrooms in order to encourage sales. However, it is certain that whilst profits were likely from such retail outlets, the cost to establish showrooms was high, in 1822 the Davenports spent between £30,000 and £40,000 on their Liverpool warehouse. T. Lockett, John Davenport and his Wares. Transactions English Ceramic Circle. 9.1. 1973. p.24.

2. : The eighteenth century Burton merchant brewers used this means. C. Owen, op.cit. p.81.

3. : L. Whiter, Spode. p.8. It would appear that Smith made his fortune from colliery workings. The Victoria History of the County of Stafford. 8. pp.169, 222, 246.

4. : Gladstone Pottery Mss.: 3. Release, June 3rd., 1789.

5. : Ibid. 7. Lease, August 24th., 1815.

were also secured from within the industry itself and when Thomas Cooper purchased the pottery from John Hendley Sheridan in 1857 he obtained two separate mortgages, one for £1,200 from William Baker - in all probability the Fenton potter - the other for £400 from Sheridan himself. (1)

The recruitment of long-term capital by means of mortgages required some form of security and although this could be almost any asset - for example Lydia Cyples in 1845 had a mortgage debt of £300 secured on the grounds of her home (2) - the main collateral used by potters in such transactions was the works itself :

"WANTED ON MORTGAGE of a Capital Earthen Ware Manufactory, and severall Dwelling Houses, newly erected on Freehold Land, in a most eligible situation in the Staffordshire Potteries; from £1500 to £2000 for which £.5 per cent will be given, and the interest will be regularly paid half yearly." (3)

Thomas Grainger successively mortgaged his entire pottery site between 1807 and 1818, in order to raise £1,940 (4) and when Joseph Myatt in 1800 failed to meet a debt of £500 with Thomas Nickisson, a local flint merchant, he mortgaged his Foley flint mill to raise the capital, only resorting to the sale of his entire estate four years later when the

1. : Ibid. 21. Mortgage, February 7th., 1857. To secure £1,200.
Ibid. 22. Mortgage, February 7th., 1857. To secure £400.
The purchase price was £2,150.
The Victoria History of the County of Stafford. 8.p.219.
2. : LJRO.: B/C/11. Lydia Cyples, Longton, will proved October 31st., 1845.
It is to be noted that whilst the Calender of Wills at Lichfield contains numerous wills for potters, few of these record details of financial commitments, mortgages or other financial matters.
3. : Staffordshire Advertiser. 4. December 8th., 1798.
4. : Grainger Mss.: Mortgage and Assignment of Lease, June 23rd., 1807, to secure £940. Ibid. Mortgage, October 1st., 1818 to secure £1,000.

debts were still pressing. (1)

The disadvantage inherent in this form of capital recruitment stemmed from the limited value of many pottery premises when considered as collateral for a mortgage. (2) Although in absolute terms the expansion of the Staffordshire pottery industry generated an increase in fixed and circulating capital investment, in relative terms fixed capital rarely accounted for 50% and usually considerably less, of the assets of the firm. (3) Mason's Canning Street Pottery, Fenton, typified this capital structure, with fixed assets valued at £900 in 1831, against stock set at £2,200 or 29% of the total assets. (4) Chamberlain invested heavily in buildings and plant between 1792-5, increasing the proportion of fixed assets, but even after this considerable expansion it only accounted for 49% of the firm's capital. (5) This was acceptable when only relatively small sums were required but on the whole

1. : The original debt comprised £400 owed for flint and £100 for money lent. The purchasers in 1804 were Nickisson and a Manchester cotton merchant, Thomas Brookes. SRO.: D593/B/1/11/9.
2. : In addition, potters without an existing works, or without any form of collateral, could not obtain a mortgage, unless the financier immediately took the works, one so bought, as collateral.
3. : This relationship between fixed and circulating capital is paralleled in, for example, brewing and iron-smelting. P. Mathias, The First Industrial Nation. p.148. The Kenricks for example, in 1813, had fixed assets of £712 against a trading capital of £21,930 - or 3%. R.A. Church, op.cit. p.49.
4. : Spode Mss.: 933. Letter, G. Mason to Ward, January 22nd., 1831. This point is substantiated by the generally lower insurance valuations for Staffordshire as opposed to other potteries. For example, the Bow Pottery valued at £4,000 in 1749 and Warmstry House Pottery valued at £1,000 in 1757, were both appreciably more than the £500 assessment for Bank's works, Stoke made in 1763. Guildhall Mss.: Sun Insurance Records. 11936/87. 116996. July 7th., 1749. Ibid. 11936/118 February 19th., 1757. Ibid. 11936/150. November 12th., 1763. See Appendix 22.
5. : In 1792 fixed assets totalled £700, in 1795 £4,456.6.10d; in 1792 circulating assets totalled £2,102.2.9d, by 1795 £4,454.13.2d. Chamberlain Mss.: 32. Stock Book. op.cit.

mortgages were either supplanted by or augmented with other sources of finance. (1)

A major supply of long-term capital was occasionally obtained from within the entrepreneur's own family, Robert Chamberlain financing the expansion of his Worcester pottery in 1796 by means of a bond for £1,145 taken out with his father, at 5% interest per annum. (2) When this source proved unsuccessful, loans were obtainable from other potters and whilst it is doubtful whether this continued long after the establishment of local banks in the early nineteenth century, it was certainly a common practice up to then, with monies out on loan often forming a significant part of the potter's estate. James Taylor of Sneyd Green, a potter, loaned out £10, or almost one quarter of an estate valued at £38.19.4d. (3) and over half of John Shaw's estate in 1733 comprised : "Money at Interest (sic) - £117.16.-".(4) In the absence of comprehensive, surviving legal papers, it is conjectural as to how far Staffordshire attornies acted as intermediaries in such transactions, as they did in Liverpool. (5) Certainly Thomas Kinnersley, whose practice was based in Newcastle-under-Lyme, acted for the disposal

1. : For example the annuity of £50 secured by Charles Meigh on his Hanley Pottery in 1823.
HBL.: EMT. 14/823b.
2. : Chamberlain Mss.: 2. 1796-1800 Order Book. Bond dated December 1st., 1796. loose receipt.
3. : LJRO.: B/C/11. James Taylor, Sneyd Green, will proved April 13th., 1704.
4. : Ibid. John Shaw, Sneyd Green, will proved May 9th., 1734.
5. : J.R. Harrie, ed., Liverpool and Merseyside.
B. Anderson, The Attorney and Early Capital Market
in Lancashire. p.51.

of works and took an active part in the pottery industry (1) and may have negotiated forms of long-term finance.

When the use of the pottery failed to achieve the required measure of collateral in securing a loan, or mortgage, entrepreneurs turned to other forms of investment, notably land, to support negotiations. Whilst many potters had farms, these were frequently only held on a rental from the large landowner and even when owned, the prestige value of the land was often greater than the capital realisation value. John Davenport in buying out Thomas Kinnersley's £17,000, quarter share of the business in 1827, appreciated too late the inadequacy of much of his estate in collateral terms :

"I have bought too much, & laid out too much on land - and all we have to do is to work hard, and live cheap. As to the Gr. Junction shares they may be sold and will fetch perhaps 12 - 13000 - we have not any other property which is saleable."
(2)

1. : Thomas Kinnersley was both lawyer and businessman, with interests in coal mining - at the Kids Grove and Whitehill pits - and in land. He was a sleeping partner in Davenport and Son and Co., Longport, a major pottery concern. His activities extended to include acting as agent in the disposal of potteries and in 1790 he was instrumental in the sale of Myatt's Foley Estate.
T. Lockett, John Davenport and his Wares. Transactions of the English Ceramic Circle. 9.1. 1173. pp.25-6.
J. Ward, History of the Borough of Stoke-on-Trent. pp. 124, 127-9, 526, 532.
SRO.: D593/B/1/11/9.
In general solicitor's papers provide very little evidence of capital recruitment in the pottery industry.
2. : T. Lockett, op.cit. pp. 23-5.
Hereford Record Office : B47/IV/D/50. Letter, John Davenport to Henry Davenport, January 11th., 1828.

For the majority of the small manufacturers, the investment in land or other securities - including their own premises - was often impracticable and for these potters, capital was recruited in the same manner as their larger counterparts, by means of partnerships. Whilst a number of partnerships were used to secure technical expertise, these were in a minority and of all advertisements placed in the Staffordshire Advertiser between 1795-1850 seeking partnerships for pottery concerns, over 60% sought capital and of the remainder, the vast majority considered some technical knowledge was an additional requirement to the advancement of capital : (1)

"A Manufacturer of Earthenware who has other concerns on hand, which claim a part of his time, is desirous of forming a connexion with a Gentleman, as Partner, who will dedicate his attention to the Manufactory and who can advance from £500 to £1,000." (2)

Newcastle-under-Lyme, the commercial centre for North Staffordshire during the Industrial Revolution, supplied much of the partnership capital for the smaller pottery concern. Some of this surplus capital was channelled from the still important iron-trade, Richard Taylor becoming a partner of the Longton potter John Mare, in 1722 and other funds were made available from the embryonic local banking concerns - Thomas Fletcher the banker supplying £4,000 at 4½% per annum interest, in 1761, to John Baddeley of Shelton. (3)

1. : Thirty-five separate advertisements were placed in the Staffordshire Advertiser, between 1795 and 1850.
2. : Staffordshire Advertiser. 10. January 7th., 1804.
3. : L. Weatherill, op.cit. p.57. SRO.: D1788/P40. B. Ibid. p..27/b20.

Occasionally the small business recruited partnership capital from outside Staffordshire - Baddeley had previously taken two Liverpool merchants as partners, Reid and MacNeale (1) - but in the main it was the larger concern which recruited to this extent. The Davenports maintained three separate partnerships, one with the Liverpool manager Mountford Fynney and another with the London agent Henry Pontigny. (2)

The recruitment of long-term finance, whilst critical at certain, generally predetermined points in the expansion of a business, was overshadowed by the more vital day to day recruitment of working capital. In effect, the two principal elements comprising these needs - material and labour costs - combined to determine and structure both technological development in the industry and factory organisation. Horizontal organisation became increasingly characteristic of the pottery industry during the early nineteenth century as potters attempted to restrict demands on circulating capital. Manufacturers increasingly relied on the services offered by specialist outwork firms, especially for the decoration of wares, a branch of manufacturing particularly labour and material intensive. Spode contracted certain lettering work to Molly Poulson, who charged 2d per dozen plates lettered. (3) Similarly, William Davis at Worcester sent much of his on-glaze decorated ware to James Giles in London for gilding, even though in 1768 he had engaged several experienced Chelsea decorators to undertake such work. (4) The small manufacturer was able to compete with his larger counterpart through the extension of credit

1. : E. Adams, Towards a More Complete History of the Liverpool China Manufactory. Northern Ceramic Society Journal. 1. 1972-3. p.6.
2. : T. Lockett, op.cit. pp.19, 25.
3. : Spode Mss.: 893. Chemical Plans and Experiments. c.1765.
4. : H. Sandon, The Illustrated Guide to Worcester Porcelain. p.49.

sales into a barter transaction and the common practice of purchasing wares from another potter in order to complete an order. (1)

Mercantile credit was the frequent basis of transactions between potters and the cratesmen who sold their wares, with settlement of the account up to a year after the completion of the commission. (2) By the mid-eighteenth century such credit was a major part of a potter's finances. The probate inventory for Peter Bagnall recorded in 1761 an accumulated total of £595 in debts, of which amount £203 were desperate. (3) The emphasis on credit transactions continued into the early nineteenth century, as the accounts for the Chamberlain and Rockingham (Swinton) potteries indicate. Between 1792-8 the total value of Chamberlain's book debts rose from £1,290.16.9d. to £4,405.3.11d, or the equivalent of the total cash receipts for the period 1789-92. (4) The Rockingham works, during a period of stringent financial control imposed by their landlords, the Wentworth family, sold between Christmas 1825 and July 1826, goods valued at £2,158 of which amount £1,222 was by credit transaction. (5)

1. : For example, Baddeley gave John Yates a parcel of moulds valued at £5.14.6d. SR0.: D1788. V.100 Yates Account. January 7th., 1768. Wedgwood Mss.: 22814-30. Invoice and receipt for Royal ware for £29.14.6d. sold to Thomas Shelley of Lane End, May 30th., 1787, Barter transactions were also common in the Burton brewing industry. C.C. Owen, op.cit. p.185.
2. : L. Weatherill, op.cit. p.50. Whe Theophilus Smith was declared bankrupt in 1800, his chief creditor was Robert Preston of Liverpool, a merchant. Staffordshire Advertiser. 7. January 24th., 1801.
3. : LJRO. : B/C/11. Peter Bagnall, Burslem, will proved April 15th., 1761. The debts totalled £595.2.8d. out of an estate valued at £963.13.0½d.
4. : Chamberlain Mss.: 2. 1796-1800 Order Book. Ibid. 32. 1789-92 Stock Book. In 1792 the debt was accumulated by 175 customers, with debts ranging from 5.0d to £127.9.7d. Several were considered desperate.
5. : Wentworth Mss.: G47/7. Swinton Pottery. Account of Stock manufactured from Xmas 1825 to July 1826.

During the eighteenth century credit transactions were extended to include the purchase of raw materials, particularly coal. The Trentham estate, through their Foley coal office, allowed generous credit facilities to their customers, an important concession when it is considered how important coal purchases were in the manufacturing costs of a pottery. Most potters purchasing from the Priorfield and Meirheath pits and making use of the Foley office, were allowed to extend their credit repayments over a long period and only occasionally were customers requested to settle their account completely. Robert Garner was one such customer, but despite frequent warnings he was only able to pay off a nominal amount from his account - £10 in August 1811, and his account continued to show extensive credit facilities for some time afterwards. (1) By 1823 the Foley coal office had accumulated debts amounting to £1,752. 17. Od. of which sum potters accounted for £1,101.12.6d. and in the November of that year Lock - the chief agent for the estate - wrote to Burgess at the office recommending a restriction of credit to two weeks. (2) Burgess replied, stressing caution, for although "...those that are well do think it would be a good thing,...they think it will in some degree prevent them of small capital from doing so much business." (3) With the Marquis of Stafford himself a major creditor - owing £105 - the proposal was doomed to failure and was never implemented. (4)

1. : SRO.: D593/M/2/2/1. Letter Garner to Burgess, August 12th., 1811. By the end of the month £17.0.8½d. was still owed. Ibid. D593/M/3/4/3/2.
2. : Ibid. D593/M/2/2/5. Letter Lock to Burgess, November 6th., 1823.
3. : SRO.: D593/M/2/2/5. Letter Burgess to Lock, November 21st., 1823.
4. : Ibid. Letter Burgess to Lock, November 8th., 1823.

In addition to mercantile credit, potters conducted some of their business through bills of exchange, promissary notes and drafts and in particular used this means to secure short-term finance. Grainger and Lee, of Worcester, secured £2,000 from a Mrs. Hannah Moore of St. John in Bedwardine on a short term bond, borrowing the money on the 1st of October 1818 and repaying it on the subsequent April 1st. (1) There are few details of how many of these bills and drafts were secured or negotiated. It is possible that until the development of an extensive local banking service in North Staffordshire in the first decades of the nineteenth century, potters followed the example of Burton brewers and used London and continental finance houses (2) or the services of the Newcastle-under-Lyme bankers. (3)

Many of the earliest banking concerns founded in The Potteries were subsidiary interests of potters. The Wood and Alcock families provided a banking service in Burslem between 1809 and 1840 (4) and in Longton the only daily banking service was provided by Charles Harvey. (5) The middle decades of the nineteenth century saw the extension

1. : Grainger Mss.: Bond, October 1st., 1818. In all probability this capital was used to secure their 1818 mortgage.
2. : C.C. Owen, op.cit. p.85.
3. : J. Thomas, The Rise of the Staffordshire Potteries. p.135.
4. : J. Ward, History of the Borough of Stoke-upon-Trent. p.267.
5. : Ibid. p.572. Harvey established his bank in 1827. The value of having an interest in a banking concern was clearly demonstrated in the financial position of Peter Greenall, partner in the Pilkington glassworks in c.1830. He used his family interest in the local bank - to secure an overdraft which fluctuated between £13,410 and £20,000 when assets in the form of partnership capital totalled £25,660 and in addition to the overdraft they had a mortgage for £6,000. T.C. Barker, The Pilkington Brothers and the Glass Industry. pp.63, 95.

of this system to include the establishment of local branches for larger regional banks, including the Manchester and Liverpool District Banking Company, which opened a branch office in Hanley in 1830. (1) Potters were regularly returned in the annual register of members, (2) although whether in their own right or on behalf of their firms it is impossible to determine. (3)

Although this banking system was able to provide the bulk of daily cash requirements, on occasions a shortage of working cash forced potters, as with other businessmen, to turn to less orthodox means of securing their needs. Despite strikes called by pottery throwers in 1825 in an attempt to curtail the practice, and the declaration signed in 1828 by fifty-six potters promising to end such payments, many firms avoided large weekly cash payments for wages by paying in truck. (4) An extension of this practice, the payment in 'trade tokens' occurred from time to time in the industry. Between 1770 and 1780 W. Davis at Worcester paid his wages in ceramic tokens and in the face of an acute shortage of small change in 1811, Wedgwood ii ordered £100 of copper coins from the Soho Mint. (5)

1. : Staffordshire Advertiser. 36. October 16th., 1830.
2. : Amongst the potters returned in the 1845 Register were Felix Pratt, Joseph Mills and Thomas Mayer.
Staffordshire Advertiser. 51. February 22nd., 1845.
3. : No records apparently survive for these early banks, other than the advertisements placed in the provincial papers.
4. : Staffordshire Advertiser. 31. April 2nd., 1825. Ibid.
34. June 21st., 1828.
Meetings were still held in The Potteries in 1830 in order to demand the abolition of truck.
Staffordshire Advertiser. 36. November 20th., 1830.
5. : H. Sandon, op.cit. p.84.
J. Thomas, op.cit. p.135.
The Pinxton works also issued its own tokens in 1801, following the Worcester example and making them in a ceramic body. L. Jewitt, The Ceramic Art of Great Britain. 1883. p.364.

Potters made few attempts to study the detailed fluctuations in wage and material costs as an aid to better management, in part because short-term capital was generally easy to recruit (1) and in part because of the unpredictable nature of many of the circulating capital requirements. (2) In the absence of such calculations, the management of short-term capital and the finances of the firm in general, were often haphazard and retail prices often bore little relation to manufacturing costs, as Wedgwood discovered in 1772 :

"It appears very clearly from this calculation inclos'd that we have advanc'd the prices by the inches out of all proportion to the real expence - for instance see No. 1. of 9, 12 & 14 inches - The expence of Manufacturing & the advance of price upon each.

	Expence.	Price.
No. 1. - 9 in -	4 : 10 $\frac{3}{4}$	0 : 12 : 0
12 in -	5 : 7 $\frac{1}{2}$	1 : 7 : 0
14 in -	7 : 11 $\frac{1}{2}$	2 : 0 : 0

An so of the rest as you'l observe." (3)

It is significant that Wedgwood should make such a discovery in 1772, for it represented the first fruits of a long and detailed examination of his financial affairs and in particular the relationship between manufacturing costs and sale prices, necessitated by a serious economic crisis. (4) The deterioration in the marketability of

1. : Although short-term capital was easy to recruit potters still faced liquidity crises, mainly because of their lack of forward-planning and predictive costings and analysis.
2. : The 1836 strike caused an immediate cessation of work and a hard winter had a similar effect. Staffordshire Advertiser. 42. September 10th., 1836. Appendix to the Second Report of the Commissioners. Report by Scriven. Paragraph 7.
3. : Wedgwood Mss.: Leith Hill Place. Letter Wedgwood to Bentley, August 23rd., 1772.
4. : For a lengthy discussion of these costings see : N. McKendrick, Josiah Wedgwood and Cost Accounting in the Industrial Revolution. The Economic History Review. Second Series. 23. 1. April 1970. pp.45-67.

Staffordshire wares forced many potters to materialise assets and recruit ready cash, an object of some difficulty in an industry so heavily dependent on credit. (1) To avoid immediate bankruptcy many potters turned to the most expedient measures, the dismissal of operatives (2) the holding down of wage levels and the lowering of prices :

"In short the General trade seems to be going to ruin on the Gallop - large stocks on hand in London and the Country, and little demand. The Potters seem sensible of their situation, and are quite in a pannick for their trade, and indeed, I think with great reason, for low prices must beget a low quality in manufacture, which will beget contempt, which will beget neglect and disuse, and there is an end of the trade." (3)

Although the decision to lower retail prices had been endorsed by the Potters' General Assembly (4), a trade organisation established to regulate wages, prices and general working conditions (5), no effective guidance was offered to individual firms as to how best achieve the necessary economies demanded by price restraint. In the absence of such guidance Wedgwood determined to effect his own financial policy and as his detailed analysis of manufacturing costs proceeded he realised the long term benefits which could accrue from such an understanding :

"I have been puzzling my brains all the last week to find out proper data, and methods calculating the expence of manufacturing, Sale, loss &c to be laid upon each article of our Manufacture,....for it will be of the greatest use to us to establish some such scale as I have now been attempting to examine all our new articles by, that we may not fix the prices so high as to prevent sale, nor so low

1. : This point has been made earlier, but an additional example will reinforce this point : LJRO.: B/C/11. Joseph Cartlich, will proved April 24th., 1740. Estate valued at £81.1.6d of which £55 was in form of money out on bond and note.
2. : For example in 1810 Hamilton and Stevens dismissed workers in order to reduce costs. V. Bladen. The Potteries in the Industrial Revolution. Economic History. 1. January 1926, p.126.
3. : Wedgwood Mss.: Leith Hill Place. Letter Wedgwood to Bentley, April 21st. - 22nd., 1771.
4. : A. Finer and G. Savage, The Selected Letters of Josiah Wedgwood. p.128.
5. : J. Thomas, op.cit. pp.151-167.

as to leave no proffit upon them." (1)

In the immediate short-term Wedgwood was able to survive the recession and put his staff in order, removing his head clerk whose previously undetected fraud and embezzlement had reduced profits to a considerable extent. (2) These were in themselves important achievements, but were of less significance in the long-term than the introduction of an effective costing policy which enabled the firm to increase its profitability, further rationalise manufacturing techniques, (3) and survive subsequent trade recessions. (4)

Wedgwood's detailed costing exercises represented a considerable advance in cost accounting techniques and were far more rigorous than the routine daily double entry accounts prepared by potters. (5) The simple accounting system used by the majority of potters provided a running total of expenditure and income and could with ease be delegated to a clerk. (6) The use of business accounts as an aid to

1. : Wedgwood Mss.: Letter Wedgwood to Bentley, August 23rd., 1772. N. McKendrick, op.cit. p.49.
2. : Wedgwood Mss.: Letter Wedgwood to Bentley, September 1st., 1772. N. McKendrick, op.cit. p.61.
3. : Wedgwood rationalised his production techniques to effect the greatest possible saving in the areas of greatest outlay and in particular determined to use available mass production techniques to a fuller extent. His use of standard moulds to rapidly turn out large amounts of ware stems from this time. Wedgwood Mss.: Letter Wedgwood to Bentley, August 23rd., 1772.
4. : N. McKendrick, op.cit. p.57.
5. : S. Pollard, The Genesis of Modern Management. p.221. For example this system was employed by the Chamberlain works, during the early years of the firm's existence.
6. : "Manager wanted for China Manufactory & possibly to travel. If he can do bookeeping - all the better." Staffordshire Advertiser 17. March 23rd., 1811.

predictive costing was uncommon in the pottery industry, even in the nineteenth century. The costings prepared by Garrett in 1833 for use in the Spode pottery and that prepared by Kerr and Binns between 1854-5 for their Worcester works, are exceptions. (1)

The deployment of suitable managerial expertise in financial matters, whether through the owner of the works or an appointed manager, became a matter of extreme urgency in the early nineteenth century and a failure fully to appreciate this aspect of business organisation was almost inevitably ruinous. The Bramelds at the Rockingham Pottery failed to control decorating costs adequately in the 1830's and this led to the eventual failure of the firm in 1842. (2) In many respects the failure of the Bramelds is a cameo of the pottery industry as a whole - the reliance on credit being advantageous in periods of expansion but directly contributing to the collapse of the firm during a recession - a position clearly demonstrated in the report submitted to Brameld's landlord and chief creditor, Lord Fitzwilliam, in 1826 :

"..their Embarrassments have risen mainly from the following causes - The great depression in the home Trade after the ratification of the Peace in 1815, and their wish notwithstanding to employ their works to the full extent (supposing thereby to render them more profitable) drove them into the foreign - their first returns from thence gave them the most flattering promise of further advantage, they were led to make greater consignments; till at length a positive loss of 22,000 £ was the result, as has been clearly made appear to us in this investigation.

1. : Spode Mss.: 797/3. Garrett's Costings. 1833.
Chamberlain Mss.: 87. Making and Estimating Book. 1854-5.
2. : D. Rice, The Illustrated Guide to Rockingham Pottery and Porcelain. p.6.

The withdrawing of so great a capital from their concern drove them to the delusive expedient of supplying that defficiency by drawing Bills of accommodation and to raise money for the payment of currt. Wages and expenses by giving their Bills in exchange for Cash Notes obtained from Shopkeepers and others - and which Bills they received from time to time at an enormous expense of commission, Interest, Stamps etc. - In fact they appear for the last 5 years to have been working upon this system of false capital borrowed at a rate of interest of from 12 to 15 pr. Cent p. annum. - We feel satisfied that had it not been for the before mentioned losses and disadvantages their manufactory would now have been carried on so as to leave a considerable profit." (1)

1. : Wentworth Woodhouse Mss.: Petition presented by Messts. Brameld's Creditors to Lord Fitzwilliam, April 13th., 1826.

APPENDIX 1 :

JOSIAH WEDGWOOD'S PURCHASE OF THE RIDGEHOUSE ESTATE :

Josiah Wedgwood was tenant of the Brick House works, Burslem, from 1762 until the owner, William Adams, came of age in 1769 and assumed control. Wedgwood was aware of the termination of his tenancy, although there was some flexibility in the operation of the lease, since Thomas Wedgwood continued working this pottery as the Useful Ware branch of Etruria until 1773, when accommodation was completed at the main factory.

(1) Added to the termination of his lease was a growing concern to find suitable premises for his ornamental ware production, an undertaking he did not wish to carry out at Burslem:

"I have just begun a Course of experiments for a white body and glaze which promiseth well hitherto... I do not intend to make this ware at Burslem and am therefore laying out for an agreeable and convenient situation elsewhere." (2)

It is known that Wedgwood was deeply involved in the promotion of the Grand Trunk Canal and it would be surprising if he had not, at that early conceptual stage, considered bringing the two projects together. From an early stage in the negotiations for the routing of the canal, the proprietors had agreed to settle for a line following the Fowlea Brook, avoiding the already congested and developed high ground to the east. The land was mainly rough pasture and offered Wedgwood the chance of purchasing a site relatively cheaply, the more especially since

1. : The Victoria History of the County of Stafford. 8. p.133
2. : Wedgwood Mss. : E18070-25. Letter Josiah Wedgwood to John Wedgwood, March 6th., 1765.
The reluctance of the part of Wedgwood to produce the new ware at Burslem may have been due to the conditions he was working under there. The works had been founded in c.1657 and enlarged by Ralph Adams in 1727 and must have been dilapidated by the 1760's.
Victoria History of the County of Stafford. 8. p.133.

Building land at that time in Burslem was expensive and available premises unsuited to Wedgwood's exacting demands :

"Land had become trebled in value in and about Burslem during the preceding twenty years. Manufacturers and owners were as unwilling to let upon lengthened lease as to sell; and those works which on rare occasions came into the market for sale or hire, were wholly inadequate to his propose." (1)

In 1766 Wedgwood found that the Ridgehouse estate, lying between Burslem and Newcastle-under-Lyme, was likely to be offered for sale on the death of its owner, Mrs. Ashenhurst. Wedgwood sent his friend Mr. Hodgson to Ireland to discuss the possibility of such a purchase with Mrs. Ashenhurst's son and on the success of this visit, initiated negotiations with her steward, completing the transaction only after some considerable difficulty. (2)

Wedgwood, as in every aspect of his personal and business life, confided with Bentley and it is this series of correspondence which illuminates the difficulties encountered in the negotiations for the estate. Early letters show Wedgwood confident of an early settlement in the transactions and such was the certainty that he wrote to Bentley on July 18th., 1766 informing him that he was to pay £3,000 at Michaelmas next for the land. (3) Two months later Bentley received an invitation to visit the Wedgwoods at Burslem in order that he might advise on the layout of the estate and in particular, the landscaped gardens :

"Besides she will not fix upon a spot for either house or gardens, no nor even the stables, 'till you have viewed and given your opinion of the premises." (4)

1. : E. Meteyard. The Life of Josiah Wedgwood. 1. p.457.
2. : Ibid.
3. : A. Finer, G. Savage. Letters of Josiah Wedgwood. p.41.
4. : Wedgwood Mss.: E18127-25. Letter Wedgwood to Bentley, September 15th., 1766.

That these negotiations were not concluded successfully and indeed, were proving to be both tedious and protracted is indicated in a later series of letters to Bentley, written in the following year :

"At present indeed I am not in possession of the Land you know to build you either a House, or Works, but am now in treaty with the Old Lady's Steward, and you have furnished me with a very strong inducement to comply with almost any terms they shall propose." (1)

With the first sod of the Grand Trunk cut on July 26th., 1766, (2) and the termination of the Burslem lease two years away, there was a strong incentive to conclude the negotiations successfully. The July of that year saw no end to the problems, although as he wrote to Bentley on July 26th., he clearly thought that he could complete the vase works by the end of the summer:

"Mrs. Ashenhurst has wrote a most violent letter to her agent, complaining of my ill usage in not returning a proper answer to her proposal by Mr. Hodgson 6 months since, and threatens if I do not immediately comply with her demands (which is only double what she ever made of her Estate), she will let her Estate to some other Person, and has advantageous offers from Staffordshire for that purpose. - She scolds and huffs away at a large rate, and seems to be in a good way for making me a hard bargain.

I have wrote to her by Mr. Hodgson, and instructed him to treaty with her. If he succeeds, I hope yet to be able to build a Vase Works by the latter end of this summer." (3)

The optimism expressed in the correspondence of the July was not to last for long and in the August, Wedgwood declared that he would soon be leasing a works with a "tolerable smart house to them", (4) warning Bentley to settle his affairs in preparation for a sudden return to Burslem.

1. : Wedgwood Mss.: E18146-25 Letter Wedgwood to Bentley, May 20th, 1767.
2. : E. Meteyard. The Life of Josiah Wedgwood. 1. p.453.
3. : Wedgwood Mss.: E18160-25. Letter Wedgwood to Bentley, July 26th., 1767.
4. : Ibid. E18161-25. Letter Wedgwood to Bentley, August 5th., 1767.

It is a matter of conjecture whether Wedgwood knew how ill Mrs. Ashenhurst was, for in the latter months of 1767 he visited Pickford at Derby to discuss plans for the Etruria works and house and matters were evidently well in hand when she died in the December of the same year.

The negotiations had been protracted and expensive for Wedgwood, but they had resulted in the acquisition of a large and valuable estate which provided the ideal location for the new factory premises. With considerable astuteness Wedgwood realised that the estate would provide status and social standing, but that this could be impaired by the unfortunate choice of neighbours, particularly at a social level. Only days after the purchase of the Ridgehouse estate, he indicated to Bentley that he was negotiating for the purchase of adjacent land :

"...indeed it is not because I shall have money to spare, that I make this purchase, but firstly (for I have many reasons) it is full of limestone which I shall unavoidably lay dry in guttering for my own, secondly, I would have the wharf on that side of the land, and perhaps my works too, and thirdly, if I do not buy it for those purposes somebody else will, who may be very disagreeable neighbours." (1)

It is revealing that in the pursuit of social prestige, the choice of neighbours was to be as important a factor in the location of Wedgwood's factory as that of transport and the supplies of raw materials.

1. : E. Meteyard. The Life of Josiah Wedgwood. 1. p.497. Letter Wedgwood to Bentley, December 24th., 1767.

APPENDIX 2 :

INVENTORY OF UTENSILS AT JOHN BADDELEY'S POTTERY, SHELTON, 1761. : (1)

BREWHOUSE CHAMBER :

A pr. of Tin Scales and a few Brass Weights.
One Large Ark made of Deal planks.
Nine Deal Boxes.
Two Diping Tubs.

THROWING HOUSE :

One Throwing Wheel.
Two Flint Tubs.
Thirteen Boards.
Seventeen Do.
Stillians.

TURNING HOUSE :

One Laith.
One Do.
One Do.
One Iron Vice.
Fifty Short = Boards.

VAULT :

Stillians.
30 Boards.
Three Beating Flats.

HANDLING HOUSE :

Five Handling Tubs.
116 Boards.
Stillians.

SAGGER HOUSE :

Stillians.
66 Boards.
Two Brass Sieves.
One Hair Sieve.
Two Tubs.
One Bench.
Four Flags.

SLIP HOUSE :

4 Flags.
2 Do.
3 Do.
3 Blunging Tubs.
2 Do.
5 Do.
2 Pails.
2 Do.
One Leading Gawn.
One Iron Beater.
Two Paddles.
One Do.
One Shovel.
One Lawn.
One Do.
One Do.
One hair Sieve.
Beating Flags.

BLACK SAGGER HOUSE :

One pair Stillians.
17 Boards.
One Flag.
One Do.

STOVE :

One Brass Sieve.
One Brick Mould.
Sixty-Eight Boards.
Three Brick Moulds.
Stillians.

WHERE THEY MAKE SAGGERS :

One Sagger Wheel.
One Paddle.
One Do.
One Clay Beater.
One Small Grinding Mill.
Two frames for Saggers.
One Small Flag.
One Hair Sieve.
One Tub.
One Do.
Stillians at ye door in ye Yard.

BLACK DIPING ROOM :

One Diping Tub.
One Do.
One Pail.
Forty Boards.
One Bench.
Stillians.
One Box.
One Iron Riddle.
One Brush.

CHINA DIPING ROOM :

Stillians.
73 Boards.
One Wire Riddle.

RED TURNING HOUSE :

One Laith.
One Bench.
One Do.
One Do.
Ninety Boards.
One Lawn.
One Do.
Stillians.

RED THROWING HOUSE :

One Throwing Wheel.
One Tub.
Thirty Boards.
One Screw Box to make Handles.
One Iron Mortar.
One Pistil.
One Do.

HOTT HOUSE :

Forty Boards.
Stillians.

CHINA SLIP-HOUSE :

One Mill to grind Collours.
One Do. to grind Lead.
Slip in Several Tubs.
Four Flags.
Two Do.
One Pail.
One Do.
Four Tubs.
Two Do.
Two Do.
One Iron Furnace to Blung Slip.
One Lawn.
One Do.
One Hair Sieve.
One pair Tin Scales.
One Small Hair Sieve.
One Paddle.
Two Boards.
One Large Scale & 2 Gibbits.
One small Grindle Stone.

BLACK STOVE :

Forty Boards.

THROWING HOUSE :

One Throwing Wheel.
77 Board.
One Flag.
One Do.
Stillians.

One thir'd Share of a Flint Mill at Botchlow (sic) wth ye Shaire of
Boothers & Flint and all other materials belonging to the Mill.

CHINA WAREHOUSE :

A Painting Stool.
One Diping Tub.
One Iron Wheel.

BLACK & RED WAREHOUSE :

Spout Mould.

APPENDIX 3 :

INVENTORY OF CHAMBERLAIN'S POTTERY, WORCESTER, 1795. (1)

PAINTING ROOM :

Grinding Glasses, Stones and Mullers.
Frames.
3 Profileering Wheels.
69 Ware Boxes.

ENAMEL KILN :

42 Ware Boxes.

COACH HOUSE :

2 Weighing Boxes.
Scales & Weights.
3 Tub Covers.

MANUFACTORY YARD :

i Iron Roofed Tub & 4 Covers.
i New Iron Muffle.
Stones laid down for Saggers.
Flat Tub Iron Hoppes.
29 Enamel Boxes.

1. : Chamberlain Mss.: 32. Stock Book. 1795.

SLIP HOUSE :

6 Sieves & Lawns.
3 Mills.

SAGGER HOUSE :

19 Board Batts.
16 Drums.
5 Large Board Batts.
Sagger Clay frame.
40 Plaister Batts.
8 Frames.
2 Frames.
Mortar & Riddle.
Clay Beater.
Sponge.

POTTERS ROOM :

167 Boards.
2 Wheels & Lathes.
Fitting up The Room as estimated : £25. 1. 0.
Ditto by Mr. Lewis : £5.
50 Chocks & Screw Box.
By Moulds & etc. Models ; £210.

KINGS STOVE :

24 dosn. Plate Rings.
2 Barrels & covers.
11 Pr. of Stilliards.

BISCUIT KILN :

1 Large Stilliard.
43 Potting Boards.
2 Frames.

BAKERS STOVE:

Glaze Sieve.
6 Dipping Tub & Cover.
61 Pitting Boards.
7 Pr. Stilliards.
Trimming Bench.
Large Stilliards.

LIST OF ROOMS AND BUILDINGS AT THE POTTERY : (1)

Sliphouse.
Mill House.
Sagger house.
Slip kiln house.
Enamel kiln house.
Potting and Painting Rooms.
Glaze kiln room.
Biscuit kiln room.
White warehouse.
Biscuit warehouse.
Burnishing room.
Biscuit kiln.
Glaze kiln.
Burnt ware room.
Glazed warehouse.
Coach house.
Kings Stove.

APPENDIX 4 :

LIST OF POTTER'S MILLS IN NORTH STAFFORDSHIRE : (a)

MILL :	LOCATION :	OWNER/TENANT :	TECHNICAL :	DATE :
Alton.	R. Churnet.		4 pans, also sawed stone. Water powered.	N.D. (1)
Cheddleton. South.	Ibid.		20'5" x 5'5" wheel.	pre 1780
North.	Ibid.		22'0" x 5'9½" wheel.	pre 1783
			Both mills had a total capacity of 50,000 p.p.y.	(2)
Consall.	Ibid.		3 wheels, one 28'0" x 11'0".	c.1750 (3)
Consall Station.	Ibid.		Water powered	N.D. (4)
Frogall.	Ibid.		2 x 12'0" pans 2 x 6'0" pans 12'0" x 4'4" wheel.	N.D. (5)
Bear Mill.	Scotch Brook, Moddershall.		20'0" x 5'6" wheel. 2 x 7'0" pans. Flint, bone & glaze.	c1780 (6)
Bottom mill.	Ibid.		9'0" wheel. 1 pan.	N.D. (7)
Coppice mill.	Ibid.		20'0" x 6'6" wheel. 2 pans, 10'0" & 11'8"	pre 1720, 1854 flint. (8)
Hayes mill.	Ibid.		20'0" x 6'3" wheel. 1 pan.	c.1750 (9)

a. The notation has been altered for the convenience of sheet layout and ordering of the data. All reference numbers will run consecutively and footnotes appear at the end of the appendix.

MILL :	LOCATION :	OWNER/TENANT :	TECHNICAL :	DATE :	
Ivy Mill	Scotch Brook, Meddershall.	Blt. Gallimere, Astbury, Bensen.	19'0" x 6'0" wheel. 2 pans, 6'0", 12'0".	c.1740	(10)
Meddershall. (Lower)	Ibid			N.D.	(11)
No. 2.	Ibid.			N.D.	(12)
Mestylee.	Ibid	Two 'earth potters'.	20'0" x 6'0" wheel. 1 flint pan 12'6", 6 colour pans	1716 fulling 1756 flint.	(13)
Ochre mill.	Ibid.		12'0" x 12'0" wheel. 2 x 9'0" pans.	c.1829	(14)
Splashy mill.	Ibid.	Aynsley's China.(1958)	16'0" x 6'0" wheel. bone. 1 x 11'6" pan.	c.1796	(15)
Wetmere	Ibid.		21'0" x 7'0" wheel. 2 x 12'0" pans, 2 x 9'0" pans.	N.D.	(16)
Cotwalton.	Stone.			1811	(17)
Stone mill.	Ibid.		1,000 p.p.w.	1814, 1827.	(18)
Wise Hays.	Ibid.			1845,	(19)
Hanford mill,	River Trent.		Flint.	1838, 1842.	(20)
Hee mill.	Ibid. (Ingestre)		Flint.	N.D.	(21)
Lower mill.	Ibid. (Trentham)		9'6" pan, 240 p.p.w.	1815.	(22)
New Inn.	Ibid.		14'0" pan, 360 p.p.w.	1815.	(23)
Strongford.	Ibid.		flint.	N.D.	(24)
Trentham, Sprat Slade	Ibid.		500 p.p.w.	pre 1782	(25)

MILL :	LOCATION :	OWNER/TENANT :	TECHNICAL :	DATE :	
Colour mill.	Stanley. (Endon)		Colour. Water powered.	1835.	(26)
Hercules mill.	Ibid.			1887.	(27)
Victoria.	Ibid.	$\frac{1}{3}$ share: Adams, Yates, Godwin.	Flint.	1796.	(28)
Crew Gutter.	Ipstones.		Flint.	1811.	(29)
Wolstanton.	Wolstanton.		Flint.	1746.	(30)
Beeches.	Tunstall.	Thomas Machin.	Flint.	1746.	(31)
Greenfields.	Tunstall.	Jesse Breeze.	Flint. Converted to steam.	1806.	(32)
Mill.	Ibid.		Colour.	c.1830	(33)
Parsonage St.	Ibid.		Flint.	1859.	(34)
Soho.	Ibid.		Flint. Steam.	c.1851.	(35)
Tunstall.	Ibid.		Corn/flint.	c.1830.	(36)
Whitfield.	Norton in the Moors.		Flint.	1834.	(37)
Beeches Lane.	Burslem.		Flint.	1844.	(38)
Bycars.	Burslem.	Wood & Caldwell.	Flint.	1806.	(39)
Fountain Place.	Ibid.	Enoch Wood.	Flint, wind. steam - 1,500 p.p.w.	c.1789. c.1841. 1845.	(40)
Furlong.	Ibid.	Alfred Meakin. (1926)	Flint.	1843.	(41)
George Bewers.	Ibid.	George Bewers.	Flint.	1853.	(42)
Hammel.	Ibid.		Flint.	1808.	(43)
Heston.	Ibid.		Flint.	1834.	(44)
Hot Lane.	Ibid.		Flint.	1865.	(45)
Jackfields.	Ibid.		Flint.	1835.	(46)

MILL :	LOCATION :	OWNER/TENANT :	TECHNICAL :	DATE :	
Jenkins.	Burslem.	Thomas & John Wedgwood.	Windmill, des. James Brindley.	c.1750	(47)
Longport.	Ibid.		Flint.	c.1820.	(48)
Small Bridge.	Ibid.	John Wedgwood	Flint.	c.1840 c.1881.	(49)
Thomas	Ibid.	Thomas Wedgwood.	Horse pug mill.	1657.	(50)
Mill.	Cobridge.		Flint.	1818.	(51)
Bagball.	Hanley.		Flint. 3 mills.	1818.	(52)
Barnes.	Ibid.	John Barnes.	Flint.	pre 1857.	(53)
Botslow.	Ibid.		Flint.	1822.	(54)
Eastwood.	Ibid.		Flint.	c.1800.	(55)
Etruria, wind.	Etruria.	Josiah Wedgwood.	Flint.	1779.	(56)
Etruria, steam.	Ibid.	Josiah Wedgwood.	Flint, colour, saggars.	1834.	(57)
Meigh St.	Hanley.	Old Hall E'ware Co. (1863)	Flint.	1863.	(58)
Mill.	Ibid.		2 glaze, 3 colour pans.	1831.	(60)
Nelson Place.	Ibid.	John Booth.	1 x 10' 10", 1 x 9' 10" flint. 6 colour. Steam.	1838.	(61)
Westwood.	Ibid.		Flint.	1848.	(62)
Mill.	Bucknall.		Flint.	c.17th.	(63)
Bells.	Shelton.		Flint.	c.1568.	(64)
Hill St.	Ibid.		Flint.	1818.	(65)
Ivy House.	Ibid.	John & Ralph Baddeley.	Flint.	1770.	(66)
New Hall.	Ibid.	New Hall Co.	Flint.	1806, 1833.	(67)

MILL :	LOCATION :	OWNER/TENANT :	TECHNICAL :	DATE :
Dresden.	Calden Canal.		Flint.	1834. (68) 1870.
Mill.	Ibid.		Flint.	1802. (69)
Z. Boyle mill.	Stoke.	Zachariah Boyle.	Steam flint.	1845. (70)
Bridge St.	Ibid.		1 x 12'0" flint. 1 x 8'0" stone. 4 x 6'0" glaze. 9 colour. 2 plaster.	1844. (71)
Church mills.	Ibid.		Flint.	pre 1837. (72)
Copeland St.	Ibid.		Flint.	1851. (73)
Epworth St.	Ibid.		Flint.	1834. (74)
Glebe St.	Ibid.		Flint.	1834. (75)
Hamilton.	Ibid.	Hamilton.	Flint. Steam.	1807. (76)
Mill.	Ibid.		Flint. 1,000 p.p.w.	1825. (77)
Portland St.	Ibid.		Flint.	1851. (78)
Spode mill.	Ibid.	Josiah Spode.	Flint. Steam/water. 300 p.p.w. flint, 150 p.p.w. colour.	1779. (79)
Fenton mill.	Fenton.		Steam/water.	1843. (80)
Fenton mill.	Ibid.	T. Whieldon.	Flint.	1742. (81)
Fenton mill.	Ibid.	Bourne & Baker.	Flint.	1829. (82)
Great Fenton mill.	Ibid.	Josiah Wedgwood.	Flint.	c.1782. (83)
Foley mill.	Ibid.	John Smith, Elkin, Knight, Elkin.	Flint, steam.	c.1820. (84)
Foley mill.	Ibid.	J. Myatt.	Flint. 26'0" wheel.	1820. (85)

MILL :	LOCATION :	OWNER/TENANT :	TECHNICAL :	DATE :
Anchor Rd.	Longton.	Thomas and John Carey.	Corn/flint. steam.	c.1820. (86)
Bridgwood.	Ibid.	Bridgwood.	500 p.p.w.	1818. (87)
Charles St.	Ibid.	C. & W. Harvey.	Flint.	c.1822. (88)
Gem's mill.	Ibid.	S. Bridgwood.	Flint.	1851. (89)
Turner mill.	Ibid.	J. Turner.	Flint. steam.	pre 1782. (90)

1. : R. Wailes. Water-Driven Mills for Grinding Stone. Talk given to the Newcomen Society, April 5th., 1967.
2. : R. Copeland. A short history of pottery raw materials and the Cheddleton Flint Mill. pp.35-8.
3. : R. Wailes. ep.cit.
4. : Ibid.
5. : Ibid.
6. : Ibid.
7. : Ibid.
8. : Ibid.
9. : Ibid.
10. : Ibid.
11. : Ibid.
12. : Ibid.
13. : Ibid.
14. : Ibid.
15. : Ibid.
16. : Ibid.
17. : Staffordshire Advertiser. 17. July 20th., 1811.
18. : Ibid. 20. March 12th., 1814. Ibid. 28, March 2nd., 1827.
19. : Ibid. 51. October 11th., 1845.
20. : Ibid. 44. November 10th., 1838. Ibid. 48. January 29th., 1842.

21. : Rex Wailes. op.cit.
22. : Staffordshire Advertiser. 21. June 17th., 1815.
23. : Ibid.
24. : Ibid. 43. December 16th., 1837.
25. : Boulton and Watt Mss.: Incoming Letters. Box 36. Letter. c.1782.
26. : Rex Wailes. op.cit.
27. : Ibid.
28. : Staffordshire Advertiser. 2. March 12th., 1796.
29. : Ibid. 17. September 21st., 1811.
30. : Uncatalogued collection of misc. mss.: City Museum and Art Gallery,
Hanley, Stoke-on-Trent.
31. : The Victoria History of the County of Stafford. 8. p.99.
32. : Ibid. p.100.
33. : Staffordshire Advertiser. 37. March 12th., 1831.
34. : Victoria History. op.cit. p.101.
35. : Ibid. p.99.
36. : Staffordshire Advertiser. 37. March 12th., 1831.
37. : Ibid. 40. March 22nd., 1845.
38. : Victoria History. op.cit. p.136.
39. : Ibid.
40. : Ibid.
J. Ward. History of the Borough of Stoke-upon-Trent. p.260.
41. : Victoria History. op.cit. p.138.
42. : Ibid.
43. : Staffordshire Advertiser. 14. January 9th., 1808.
44. : Victoria History. op.cit. p.138.
45. : Ibid.
46. : Staffordshire Advertiser. 41. May 30th., 1835.
47. : E. Meteyard. The Life of Josiah Wedgwood. 1. p.156.
48. : Victoria History. op.cit. p.138.
49. : Ibid. p.131.
50. : Ibid. p.133.
51. : Staffordshire Advertiser. 24. March 14th., 1818.

52. : Ibid. 24. September 12th., 1818.
53. : Victoria History. op.cit. p.168.
54. : Staffordshire Advertiser. 28. January 26th., 1822.
55. : Victoria History. op.cit. p.168.
56. : E. Meteyard. op.cit. pp. 29-30.
57. : Victoria History. op.cit. p.168.
58. : Ibid. p.167.
60. : Staffordshire Advertiser. 37 February, 12th., 1831.
61. : Ibid. 44. March 17th., 1838.
62. : Victoria History. op.cit. p.168.
63. : R. Wailes. op.cit.
64. : Victoria History. op.cit. p.163.
65. : HRL.: ENT. 11-819.
66. : Victoria History. op.cit. p.165.
67. : Ibid. p.167.
Staffordshire Advertiser. 39. May 25th., 1833.
68. : Victoria History. op.cit. p.168.
69. : Staffordshire Advertiser. 8 December 4th., 1812.
70. : Ibid. 54. November 25th., 1848.
71. : Ibid. 50. July 6th., 1844.
72. : Ibid. 43. December 16th., 1837.
73. : Victoria History. op.cit. p.204.
74. : Ibid.
75. : Ibid.
76. : Boulton and Watt Mss.: Catalogue of Old Engines. Section A.p.56.
Fertfelie 97.
77. : Staffordshire Advertiser. 31. October 29th., 1825.
78. : Victoria History. op.cit. p.203.
79. : Boulton and Watt Mss.: Incoming Letters. op.cit.
80. : Staffordshire Advertiser, 49. January 14th., 1843.
81. : Victoria History. op.cit. p.218.
82. : Ibid. p.219.
83. : Ibid. p.221.
84. : Ibid.
85. : Staffordshire Advertiser. 26. August 26th., 1820.

- 86. : Victoria History. op.cit. p.242
- 87. : Staffordshire Advertiser. 24. February 21st., 1818.
- 88. : Victoria History. op.cit. p.241.
- 89. : Ibid.
- 90. : Boulton and Watt. Mss.: Incoming Letters. op.cit.

APPENDIX 5 :

SPECIFICATION FOR A BOULTON & WATT ENGINE, CONSIDERED BY WEDGWOOD FOR USE IN THE ETRURIA MILL, c.1792. : (1)

"Steam Engine - for the power of ten horses, to perform the following operations.

1. To grind flint in a pan... feet diameter.
2. To grind Enamel colours, in a number of small pans, in the chamger above the flint pan. The upright shaft A, which comes into the middle of this room, in order to work these small pans, must have a drum wheel upon it, B, from which is to go a strap C for every pan, which is likewise to have a drum head D. The pans, which stand some height on a plank bench F are to have bottoms made of glass, and a glass runner H in two parts. In order to carry this runner round, the spindle or shaft for each pan must be divided into two parts, each part to have two prongs at bottom, which are to go into two holes left for this purpose in the upper part of the glass runners. The runners are made in two parts because, when one piece is made to turn round on its centre, it does not wear away so fast there as at the circumference so that the centre remaining higher prevents the circumference from bearing upon the matter to be ground and from doing the execution which it would do with an equal bearing.
3. To work a stamper for pounding our broken sagers into a powder that will pass through a coarse hair sieve - The floor of this stamper must consist of a large granite or boulder stone with a flat surface - It must be nearly square - three sides of plank - the fourth to take off when it is to be emptied - This may be made in the manner of the stamping machine for stamping tin or other hand ores.
4. To temper clay - An upright shaft A is turned by a strap of straps on a large drum B under the floor C. The timbers D from the shaft support a circular flooring of planks E, on which the clay is to be laid. Over this two wood rollers F F are hung, and weighted with iron or lead weights, which force the rollers down within a given distance of the surface of the planks E. These rollers are notched, half way round in a longitudinal direction, the other half tranverse one, and they are so placed in this respect, that the tranverse notched part of one shall come over the surface of the clay which has been indented by the longitudinal notches of the other.

1. : Boulton & Watt. Mss.: Incoming Letters, Box 36. Letter Wedgwood to Boulton & Watt, c.1792.

As this pressure will have a tendency to force the clay to the edge of the circular pan, a number of bows H. H. strung with wire, are to be situated as to cut off this clay in thin slices as it is protruded beyond the edges of the plain. Between the plain and the shaft is a kind of hopper I I, into which one part of this clay will fall and is to be taken up with a pitchfork and laid again on the plain. The clay which is cut from the outer edge will fall upon the floor, which must be kept clean as to receive it - and the clay must be returned like the other to the plain above till sufficiently tempered".

APPENDIX 6 :

LIST OF NORTH STAFFORDSHIRE POTTERS WITH STEAM ENGINES : (1)

POTTER :	LOCATION :	ENGINE :	MAKER :	DATE :
W. Adams.	Upper Cliff Bank works, Stoke.			1834. (2)
J. Booth.	Nelson Place Hanley.			1838. (3)
Z. Boyle.	Stoke.			1845. (4)
J. Breeze.	Tunstall.			1806. (5)
T. & J. Carey.	Longton.			1828. (6)
R. Hamilton.	Stoke.	32 h.p.	Boulton & Watt.	1807. (7)
E. Keeling.	Hanley.		Bateman & Sherratt.	1833. (8)
C. J. Mason.	Fenton.	20 h.p.		1834. (7)
T. Minton.	Stoke.	24 h.p.	Kirk.	1819. (8)
J. Ridgway.	Cauldon Place Pottery, Shelton.			1834. (9)
J. Smith.	Foley Pottery, Foley.			c.1820. (10)
Knight, Elkin, Knight.				

1. : The notation employed is as per Appendix 4.

This list is of necessity a reduced list of the actual works equipped with steam power, few company records survive and with the notable exception of the Boulton and Watt engine books, we do not have even a complete list of engine suppliers, even less their customers.

POTTER :	LOCATION :	ENGINE :	MAKER :	DATE :	
Josiah Spode.	Stoke.	'Fire-engine.'		1779.	
		10 h.p.	Boulton & Watt,	1802.	
		36 h.p.	Ibid.	1810.	(11)
John Turner.	Longton.	Atmospheric.		pre 1782.	(12)
Josiah Wedgwood.	Etruria.		Boulton & Watt.	1784.	
		10 h.p.	Ibid.	1793.	
		30 h.p.	Ibid.	1800.	(13)
Thomas Wolfe.	Stoke.		Cope.	1793.	(14)
Enoch Wood.	Fountain Place, Burslem.			c.1840.	(15)

2. : Report from the Commissioners. 1834. op.cit. Statement 56.
3. : Staffordshire Advertiser. 44. March 17th., 1838.
4. : Ibid. 54. November 25th., 1848.
5. : Victoria History. op.cit. p.100
6. : Ibid. p.242.
7. : Report from the Commissioners. 1834. op cit. Statement 58.
8. : Victoria History. op.cit. p.204.
9. : Report from the Commissioners. 1834. op.cit. Statement 61.
10. : Victoria History. op.cit. p.201.
11. : Boulton and Watt Mss.: Incoming Letters, Box 36. Letter. c.1782.
Ibid. Catalogue of Old Engines. Section A. p.56. 726.
Victoria History. op. cit. p.203.
12. : Boulton and Watt Mss.: Incoming Letters. op.cit.
13. : Boulton and Watt Mss.: Catalogue of Old Engines. op. cit. p.97, 218.
14. : Victoria History. op.cit. p.203.
S. Shaw. History of the Staffordshire Potteries. 1829. p.63.
5. : J. Ward. History of the Borough of Stoke-upon-Trent. p.260.

APPENDIX 7 :

LIST OF POTTERY JOBS RECORDED IN THE 1851 LONGTON CENSUS : (1)

Agent for the sale of china.
Artist.
China burnisher.
China painter.
China warehouseman.
Colour maker.
Cup handler.
Dipper.
Dish Maker.
Earthenware painter.
Figure maker.
Flat presser.
Gold grinder.
Head painter.
Lathe maker.
Oven man.
Oven boy.
Packer.
Plate blue layer.
Plate blue maker.
Potters.
Potter's china scourer.
Potter - heads the lathe.
Potter's jig turner.
Potter's mould runner.
Potter's paper cutter.
Potter's printer and transferer.
Potter's turner.
Pot placer.
Sagger maker.

1. : 1851 Census Returns for the Parish of Stoke-on-Trent, Longton,
The Rectory of Longton. Borough of Stoke-upon-Trent. Longton.

APPENDIX 8 :

LETTER JOSIAH WEDGWOOD TO THOMAS BENTLEY, JANUARY 24th, 1776,
RELATING TO THE MANUFACTURE AND COMPOSITION OF PORCELAIN. (1).

"To Mr. Bentley

Etruria 24 Jany 1776.

My Dear Friend

..I mentioned to you once, that notwithstanding Fritt Porcelain had been so much decried, I thought the best method of making it would be from a Fritt, and I am more fully convinced of it by almost every experient I made upon the subject.

There has been very imperfect Porcelains made with a Fritt of Sand, Salts, and Glass, from which the French Authors have drawn a hasty and I think, false conclusion - That all Porcelains composed of Fritt and Clay must be imperfect, and false Porcelains because, they say, the mixture would be converted into Glass by pushing the fire a little farther than the point they stop at to produce the ware they call Porcelain.

I believe this to be true of nearly all our compositions in England and France, except the Bristol, and I believe salts should not enter into a Fritt, as they accelerate a too rapid vitrification, and although I would prohibit the use of Salts in a Body, I would nevertheless compose a Fritt, and that of the simplest materials, such as I could be certain of obtaining at any time of the same qualities, and this Fritt when burnt should have the qualities of Felt Spar, or the white parts of the best Moor Stone.

If I can compose such a Fritt as the above from simple materials, I shall prefer it to any compound of Natures Mixing, for she never weights her materials, and I have never yet seen any of her Moor Stone or other compounds, which I could depend upon having twice alike, even from the same Quarries.

By Simple Materials, I do not mean anything absolutely so, as you will readily imagine. But there are certain substances which approach near enough to that character for that purpose. Such as Bone-ashes, Black Flints, Lime, Alabstre, Chalk and some others. I dare not rank 19 or Spath Fusible in this Class, but 74 may perhaps be admitted. Quartz, I am in doubt about, as there are certainly various kinds of it. But I am trying all the different specimens I can procure, and hope you will furnish me with one or two soon.

1. : A Finer and G. Savage, The Selected Letters of Josiah Wedgwood.
pp. 190-1.

When I have managed my Fritt, it is to make true Porcelain with a due proportion of Clay, and this Porcelain must have the quality of proceeding very slowly from one degree of vitrification to another, which is all that the best can boast of Infusibility.

The infusibility of the Oriental and Dresden Porcelain depends, perhaps, more upon the proportions in which the materials are compounded, than upon the Materials themselves, at least I am pretty certain of this, that different proportions of the same Materials will make fisible and infusible Porcelain.

I have given you my idea for the best plan for making perfect Porcelain with uniform success, and it is the plan I intend to proceed upon as time will permit, but I may probably make a white ware for Painting before the other plan is perfected into Manufacture.

As Moor Stone varies so much, being a compound, mixed at random perhaps by the waves and Tides of the Ocean, I despair of making it a Principal ingredient in a Porcelain Manufactory, and unless the Bristol People alter their principle I do not think it possible for them to succeed.

I will send you some Pitchers of 74 Porcelain and beg you will let Mr. Rhodes try his skill in glazing them

believe me ever yours most affectionately.

Jos. Wedgwood."

APPENDIX 9 :

JOHN BADDELEY'S ACCOUNT BOOK, 1755-9.

PURCHASES OF MATERIALS : (1)

1755 September 4th	Pd. Carriage of 2 Hhos. of China Clay sent from Liverpool.	18.6.
December 17th	Pd. Carriage for 4 Hhos Clay from Liverpool	1.10.0.
1756 February 26th	Pd. Taylor for Crates and plaister to Liverpool	1. 5.0.
September 4th	Pd. for Chalk	1.12.6.
October 4th	Pd. for Ton Chalk	1.10.6.
October 16th	Pd. for 1 Ton of Chalk (more) & Carriage	3. 0.6.
1757 June 20th	Pd. Josh Vanderkiste for Cullett.	3.14.8.
1758 March 30th	Od. Maddison for Sand	12. 0.0.
April 15th	Pd. Edmund Elsdon for Sand	7.12.4.
April 29th	Pd. Redirick Teush for Smalts.	7.10.10.
May 6th	Pd. Ward for freight of Sand	11.10.0.
July 30th	Pd. Esther Lyon for 200 Balls of Clay	5. 0.0.
August 6th	Pd. Carriage of Sand from Winsford	14.17.4.
	Pd. 12 Bags Do.	1.12.0.
	Pd. Carriage of Bone Ashes from Winsford	14. 3.6.
September 16th	Pd. Richd. Astbury for 2 Ton Clay	3. 0.0.
November 11th	Pd. Frederick Tuesh for Smalts	10. 8.0.
December 9th	Journey to Stourbridge to Buy Enamel	1.10.0.
December 9th	Pd. for 80lb. of Enamel	4. 0.0.
1759 January 6th	2 Doz Great Row Coals	6.0.
	6 Doz Birches Head Coals	1. 4.0.
	4 Doz Thruht Coals	14.0.
	1 Doz Cannell Row Coals	3.0.
January 13th	From Moses Keeling 6 Loads of Marl	12.0.
January 20th	2 Doz Great Row Coals	6.0.
	6 Doz Birches Head Coals	1. 4.0.
	8 Doz Thruhurst Coals	1. 8.0.
	1 Doz Cannell Row Coals	3.0.
	4 Load of Marl	8.0.
	Brinding 120 Pecks China	3. 0.0.
January 27th	8 Load Marl for Bags	16.0.
January 27th	A Charge of Glase	12.0.
February 3rd	Grinding 240 Pecks of China	6. 0.0.
February 17th	A Charge of Glase	12.0.
February 24th	240 Pecks of China	6. 0.0.
February 24th	Robt Bill for Carriage of Clay and Stones	2.15.7.
March 17th	4 Load Marl	8.0.

1. : SR0.: D1788. V94. Account book for purchases incurred by John Baddeley on behalf of Messrs. Reid and Co.

1759 March 24th	A Charge of Glase.	12.0.
March 31st	120 Pecks China	3. 0.0.
April 6th	Sand	5.0.
April 6th	3 Load of Marl & Carriage	15.0.
	2 Load of Red Marl	4.0.
April 14th	2 Load of Marl & Carriage	10.0.
April 14th	A Charge of Glase	12.0.
April 21st	60 Pecks China	1.10.0.
April 28th	2 Load of Marl and Carriage	10.0.
April 28th	240 Pecks China	6. 0.0.
May 5th	2 Load Marl & Carriage	10.0.
May 5th	A Charge of Glase	12.0.
May 12th	120 Pecks China	3. 0.0.
May 12th	120 Pecks of China	3. 0.0.
May 12th	Cook for Glass	12.18.5.
May 12th	Vanderkiste for Do.	10. 5.8.
May 12th	Morrifs for Do.	4. 9.8.
May 12th	Newdick & Nicholas for Ashes	3. 0.0.
May 19th	4 Load of Marl & carr.	1. 0.0.
May 19th	120 Pecks China	3. 0.0.
May 26th	60 Pecks China	1.10.0.
May 26th	A charge of Glase	12.0.
June 9th	Richd Astbury for 15ct. Clay	1. 2.6.
June 16th	4 Load Marl & Carriage	1. 0.0.
June 30th	300 Pecks China	7.10.0.
June 30th	A Charge of Glase	12.0.
July 7th	2 Load Marl & Carriage	10.0.
July 28th	For Bones	1.0.
July 28th	2 Load Marl & Carriage	10.0.
July 28th	A Charge of Glase	12.0.
August 4th	Cording	1. 0.0.
August 25th	120 Pecks China	3. 0.0.
August 25th	A Charge of Glase	12.0.
September 28th	For 10 load Sleek	6.0.
September 29th	A Charge of Glase	12.0.
September 29th	180 Pecks China	4.10.0.
September 29th	3 Load Marl and Carriage	15.0.
October 6th	Cording	10.0.
October 20th	60 Pecks China	1.10.0.
October 20th	A Charge of Glase	12.0.
October 27th	Cook for Broken China & Glass	11.10.0.
October 27th	Sanders for Smalts	6. 2.6.
October 27th	Vanderkiste for Cullett	8. 6.1.
October 27th	6 Load Marl & Carriage	1.10.0.
October 27th	4 Load Red Marl	16.0.
November 10th	A Charge of Glase	10.0.
November 24th	120 Pecks China	3. 0.0.
November 24th	Cording	10.0.
December 1st	A Charge of Glase	12.0.
December 8th	3 Load Marl & Carriage	15.0.
December 15th	2 Load Red Marl & Carriage	8.0.
December 22nd	A Charge of Glase	12.0.
December 29th	240 Pecks of China	6. 0.0.
December 29th	Charge of Glase	12.0.
December 29th	10 Doz Candles	3. 0.0.

APPENDIX 10 :

ABSTRACT OF PURCHASES BY CHAMBERLAIN OF RAW MATERIALS : 1789 - 92, 1799 (1)

Year :	Date :	Purchase :	Cost :
1789	September 9th	1 cask of cullett	-/6
	December 15th	Leaf gold	1/9
1790	January 5th	Leaf gold	3/-
	June 29th	Black lead	-/6
	August 20th	Hay for packing	4/-
	October 9th	Glaze	-/10
	October 23rd	Glaze	2/3
	December 18th	Gold from Evans of Birmingham, via. Embrey, Crop & Co., bankers	£26.2.0.
	December 21st	Light gold	£4.3.0.
1791	January 21st	Light gold	£5.5.0.
	January 22nd	Gold	-/8
	February 2nd	Grain gold	£17.8.0.
	March 14th	Light gold	£10.4.4.
	March 23rd	Light gold	-
	April 4th	Grain gold	£17.8.0.
	July 11th	Gold from Birmingham	-/8
	October 30th	Light gold	£9.17.8.
1792	January 2nd	Cornish stone	-/3
	January 3rd	Goodwin of Cornwall, 2 tons of Cornish Stone	-
	January 30th	Morris for clay	£15.
	February 24th	Light gold	£5.2.4.
	March 8th	Light gold	£11.6.0.
	April 4th	Leaf gold	1/10
	April 29th	Light gold	15/8
	May 30th	Packing hay	7/-
	June 6th	Gold	£8.8.6.
	July 14th	Light gold	£16.19.7.
	July 28th	Gold from Goodwin	£5.17.5.

1. : Chamberlain Mss.: 26. 1789-92 Cash and Order Book
Ibid. 1796-1806 Cash Book.

Year :	Date :	Purchase :	Cost :
	August 17th	Light gold from Goodwin	£4.13.6.
	August 23rd	Light gold	£14.17.6.
	August 30th	Light gold	£1.1.0.
	August 30th	Light gold	£2.1.6.
	September 8th	Lime	£2.2.0.
	September 17th	Light gold	£6.6.0.
	September 22nd	Lime	£1.11.6.
	September 23rd	Gold from Goodwin	£3.8.0.
	September 29th	Clay from Yates	£8.
1799	May 15th	Valentine Close (clay)	£5.
	May 17th	Valentine Close (clay)	£25.
	September 23rd	Daniel and Brown, Hanley (1)	£1.1.0.
	November 23rd	One ton, four bushells, - flint	£2.3.2.
	December 4th	Daniel and Brown, Hanley	£13.17.0.
	December 31st	Valentine Close, Hanley	£50.

1. : Daniel and Brown were partners in a colour manufacturing business, preparing colours and enamels for general sale and as part of the Spode factory, Stoke. This partnership was dissolved in 1806, Brown maintaining the Hanley works, Daniel working with Spode.
L. Whiter, Spode. pp.38-9

APPENDIX 11 :

TRANSCRIPT OF EVIDENCE GIVEN BY THOMAS GODDARD BEFORE THE 1842
ENQUIRY : (1)

"The scouring of china, being a very injurious employment, claims peculiar attention. The ware, in the clay state, is placed, during the process of firing, in pulverized flint, from which it is afterwards cleaned by what is termed "scouring". The "scourers", chiefly young women, necessarily inhale, the room being literally filled with dust, the fine particles of flint, which produce similar effects to what is provincially denominated, in the Sheffield trade, "the grinder's rot"; something might be done, perhaps to lessen this evil, if judicious precautionary measures were adopted. I have suggested the use of a wet sponge, so adapted to the mouth and nostrils that the air of respiration must necessarily pass through it. This would effectually prevent any solid body, however impalpable might be its state, from being inspired; but, at present, whether arising from the novelty of the plan, the trifling trouble which its adoption would occasion, or from the individuals for whose benefit it is intended being careless of the impending danger, I have not been able to get the experiment tried.

"Slip-making", or preparing the clay, is another unwholesome occupation. "The clay" is prepared by boiling the composition to a proper consistence on kilns, and during the process of evaporation, the room is filled with dense aqueous vapour. The men engaged in this branch suffer severely from winter cough and chronic bronchitis; but few of them, if they survive, are able to perform much labour after the age of 60. "Glazing the ware" is another branch which also injures health, and frequently shortens life. All glazes contain more or less carbonate of lead, which renders, "dipping", or "glazing" a pernicious occupation. Men employed in this department are subject to colic, epilepsy, and paralysis of the fore-arms, which incapacitates them from labour. As the "dippers", however, only require the first and second fingers, with the thumb of each hand, to be denuded while dipping, to enable them to finger the ware, something might probably be done to diminish the risk of paralysis; and with this view I have recommended the use of long-sleeved gloves, impermeable to water, which would limit the portion of skin exposed to the action of the glaze within very narrow bounds, and thereby lessen the danger from absorption. But, as in the case of the "china scourers", I have not been able to give effect to the suggestion."

THOMAS GODDARD.

APPENDIX 12 :

DESCRIPTION OF DRAWING HOT OVENS : (1)

"This practice of drawing hot ovens is very common. At some places it is as regular as the coming day. Now, in this case, the employer is to be blamed; for he thinks of making so many ovens a week; it may be six glost ovens, while at the same time, there are but two ovens of this class on the bank, and he knows that too. Now, Sir, it will appear to you, as well as to others, that if there must be these many ovens fired a week, there must be one set in, whilst the other is firing, consequently that which is set in today must be fired up to-morrow about noon. The regular time for firing is from 18 to 20 hours; but this depends on the state and good management of the men through the night. To such an extreme has it been carried, that I have known ovens to be fired up at six o'clock the following morning. Now, Sir, I think you will be able to infer from what has been said, that such ovens are not fit for any human being to put his head into; Nevertheless the ovens must be drawn, or else the individual who refused must lose his situation. Therefore, he has to cover his hands with flannel, or with something that will not hold heat. His head and shoulders must be covered likewise; and in this condition he has to go and draw these ovens. Sometimes they are so hot that he cannot enter; if he attempt to do so, his breath in some instances, will be almost taken away by the influence of heat in connection with damp. A man while drawing an oven in this state, has to suffer extreme torment; his ears begin to smart, and just under his finger-nails there is such an uncommon pain which he cannot describe. This is not all, for he feels at times as if his nostrils were bleeding, and as though his eyesight has almost gone from him on account of his being in such a hot place; and then, in connection with what has been said, there is the perspiration which he loses in thus drawing these heated ovens This is one way to shorten the days of ovenmen."

1. : The Petters' Examiner and Workmans' Advocate. Letter to the paper by Enoch Bradshaw, March 16th., 1844.

APPENDIX 13 :

LIST OF MANUFACTURERS PURCHASING COAL FROM MEIRHEATH AND PRIORFIELD
COLLIERIES, 1810-13. : (1)

Isaac Ainsworth	Sampson Bridgwood
Bailey & Batkin	Samuel Bridgwood
Bailey & Co.	John Bromley
William Bailey	Thomas Bromley
Joseph Ball	Brough & Co.
J. Ball & Co.	Thomas Cartwright
Richard Barker	Ann Chetham
Beardmore & Carr	Jesse Cyples
Beardmore & Co.	Lidia Cyples
Thomas Bond	William Dawson
Booth & Co.	James Deakin
John Bott	Drewery & Sons
John Bourne	George Elkin
Joseph Bradshaw	Ford & Hull
Joseph Burrows	George Forrister
John Bridgwood	Thomas Forrister
John Bridgwood, senior	Robert Garner
John Bridgwood, junior	John Giles
Kitty Bridgwood	Samuel Ginders
S. Bridgwood	Gittins & Co.

John Goodwin
Hancocks & Co.
Harley & Co.
Harley & Seckerson
Harowhin & Brough
Harowhin & Co.
Harvey & Sons
John Hewitt
Hewitt & Co.
Hewitt & Son
Peter Hughes
Hull & Co.
James Hull
Richard Johnson
Richard Locker
Lockett & Co.
George Lockett
Jacob Marsh
Mason & Son
Matthews & Ball
Matthers & Co.
Meakin & Co.
Thomas Minton
Charles Myatt
William Myatt
Walter Newbon
William Nutt
John Palmer

Joseph Pegg
Platt & Bridgwood
Platt & Co.
Felix Pratt
Pratt & Garner
John Pratt
Thomas Repton
Thomas Ridge
Thomas Shaw
Shelley & Co.
Shelley Pye & Co.
Sheridan & Co.
Sheridan & Hyatt
John Sheridan
Singleton & Co.
John Smith
Josiah Spode
Samuel Spode
Ralph Steel
Richard Steel
Thomas Stirrup
William Turner
W. Unett
Richard Walklate
Jane Wardle
George Weston
Richard Woolley
William Wright

APPENDIX 14 :

THE DEVELOPMENT OF THE GLADSTONE POTTERY, LONGTON :

The first reference to a pottery on the Gladstone site comes in a release dated June 3rd, 1789, between Thomas Shelley of Lane End, potter and John Thawley of Bowers, near Trentham, yeoman and four other parties, Shelley and Thawley being executors of the late Michael Shelley, potter. (1) Michael Shelley had bought part of the Longton Manorial holdings, which had been offered for sale in the early 1780's and in his will (2) had devised that the pottery should be sold by the executors to the tenant - William Ward, for £900. The pottery was evidently conceived as a part of a larger holding and the purchase sum included a house at Blurton and four closes of land. Ward sold back to Thomas Shelley the property in 1791 (3) but the transaction was made in two parts, with the Shelley family regaining the title to their original holding; but with the pottery subdivided into two units, a division to remain until the present day.

On the death of Thomas Shelley the estate was broken up and the potteries were considered in the 1815 Deed of Partition. (4) The two works were to later become the Gladstone, Park and Park Place Potteries and from the plan attached to the deed (5), it is possible to determine the exact delineation of the future Gladstone Pottery buildings. The total holding had five kilns and Sheridan and Hyatt, occupying the Gladstone unit, possessed one of these kilns, together with a small range of buildings set back from the house on High Street, which in themselves formed a courtyard. The site area was given as 3,516 square yards.

1. : Gladstone Pottery Mss.: 3. Release. June 3rd., 1789.
2. : Ibid. Will dated May 27th., 1788.
3. : Ibid. 4. Lease, March 1st., 1791.
4. : Ibid. 8. Partition, August 25th., 1815. See Appendix 15.
5. : Ibid.

The deed conveyed the unit to William Brett of Stone, described as gentleman although having interests in flint milling and on 21st August in the same year, John Hendley Sheridan contracted with Brett for the absolute purchase of the pottery for £1,010. finalised in 1818. (1)

Sheridan was an influential potter, having an active interest in the Association of the Manufacturers of Porcelain and Earthenware and the Association of potters (2) and being an elected committee member of the body constituted to oppose the introduction of duties on manufactory windows. (3) His ownership of the Gladstone site lasted from 1818 until 1857, during which time it was leased to several tenants. A plan drawn up by Gilbert McDougall, a Newcastle-under-Lyme architect, in 1840, shows the site occupied by William Gerrard, who was then working three kilns. (4) The pottery had undergone a considerable expansion since 1815, with infill against the neighbouring factory buildings. The expansion was however to leave undeveloped the spare ground to the south of the main buildings and left the house facing the High Street still as a dwelling. Although the same plan was used as the basis of delineating the property boundaries in the 1857 sale of the pottery to Thomas Cooper - the sitting tenant, the property had been extended through the purchase of 200 square yards of land fronting Chadwick Street and a house on the same, in 1855, for £50. (5) When Sheridan agreed to sell the pottery to Cooper, he had already modernised the property, demolishing the house at the front of the site and erecting the present office block. Cooper was to mortgage the property on the day immediately following his own purchase, presumably to pay the £2,150 owed to Sheridan for its purchase, and in this document the new buildings were described as being unfinished and unoccupied. (6)

1. : Gladstone Pottery Mss.: 9. Lease, March 23rd., 1818.
2. : Staffordshire Advertiser. 18. January 11th., 1812.
Ibid. March 28th., 1812.
3. : Ibid. 21. March 18th., 1815.
4. : Gladstone Pottery Mss.: 14. Plan, October 15th., 1840.
5. : Ibid. 16. Conveyance, February 20th., 1855. Ibid. 18. Conveyance, February 6th., 1857.
6. : Ibid. Ibid. 20. Mortgage, February 7th., 1857.

Certainly, the reconstruction had been completed to ground floor level by 1856, when it was recorded, together with details of the adjacent buildings, on the Ordnance Survey at 1/500 scale, for Longton. (1) The pottery then used four kilns, two biscuit and two gloss and was described as producing china and parian figures. Access to the main buildings was by means of an archway set into the front block continuing the planning tradition established in the eighteenth century and to be maintained until the present day. The pottery was to change hands over the succeeding years, but was to alter little until the early twentieth century when additions were made to part of the property. (2)

1. : SRO. : D593/H/8/92. Ordnance Survey for Longton, 1:500. 1856.
2. : Ordnance Survey for Longton, 1:500. 1878.

APPENDIX 15:

PLANS AND ELEVATIONS OF THE GLADSTONE POTTERY, LONGTON : (1)

The drawings are appended in the document wallet proved at the rear of this thesis.

1. : Drawings are personal surveys prepared from original manuscripts or cartographic material.

APPENDIX 16 :

ARCHITECTS AND BUILDERS INVOLVED IN THE DEVELOPMENT OF POTTERIES :

ARCHITECTS :

NAME :	POTTERY :	CLIENT :	OTHER CONTRACTS :	DATE :
A.W. Armstrong	Worcester, (Diglis)	W.H. Kerr		1853 (1)
	Belleck, N.I.	McBirney		1856 (2)
W. Boulton	Earthenware, (Lane End)	J. Stanley		1845 (3)
G. Coxon	Phoenix Works (Hanley)	J. Clementson		1846 (4)
			Tunstall B. Soc.	1850 (5)
Gardner	Etruria Works	J. Wedgwood		1767 (6)
		J. Heathcote	Longton Hall	1777 (7)
E. Jones	Colonial Wks. (Stoke)	Winkle & Wood		1888 (8)
G. McDougall	Gladstone Wks. (Longton)	J.H. Sheridan		1840 (9)
			27 houses, (Stoke)	1840 (10)
J. Pickford	Etruria Wks.	J. Wedgwood		1767 (11)
		ibid.	Etruria Hall	1767 (12)
		ibid.	Newport St rooms (London)	1768 (13)
		T. Bentley	Bank House, (Etruria)	1767 (14)
		Lord Hamilton	Sandon House	1770 (15)
		J. Gandon	Nottingham County Hall	1770 (16)
		St. Marys pc	St. Mary's Chapel (Birmingham)	1773 (17)
Scrivener	China Works (Burslem)	T. Hughes		1876 (18)
T. Stanley	Hill Works (Burslem)	S. Alcock		1839 (19)
R.S. Wilkinson	Lambeth Pottery	Sir H. Doulton		1876 (20)
A. Wood	Cleveland Wks. (Shelton)			1880 (21)

BUILDERS:

NAME :	POTTERY :	CLIENT :	DATE :
W. Brookes	Kiln builder		1842 (22)
C.Cope	Colonial Wks. (Stoke)	Winkle & Wood	1888 (23)
E. Gibson	Cleveland Wks. (Shelton)		1880 (24)

1. : S. McCrum, The Belleek Pottery. pp. 7-9
2. : Ibid.
3. : Staffordshire Advertiser. 51. July 5th., 1845.
4. : Ibid. 55. June 2nd., 1849
5. : Ibid. 56. May 11th., 1850.
6. : Colvin, Dictionary of British Architects. p. 454
7. : The Victoria History of the County of Stafford. 8. p.229.
8. : Site observations.
9. : Gladstone Pottery Mss.: 14. Plan, 1840.
10. : Staffordshire Advertiser. 46. February 8th., 1840.
11. : Colvin, op.cit. p.454.
12. : Ibid.
13. : Ibid.
14. : Ibid.
15. : Ibid.
16. : Ibid.
17. : Ibid.
18. : Staffordshire Times, July 22nd., 1876.
19. : City of Stoke-on-Trent Museum Archaeological Society Report. 2. 1966.
Samuel Alcocks Hill Pottery, Burslem. p.30.
20. : H. Hobhouse, Lost London. p.161.
21. : Site observations.
22. : Staffordshire Advertiser. 48. May 28th., 1842.
23. : Site observations.
24. : Ibid.

APPENDIX 17 :

ABSTRACT OF TENANCY AND HIRING AGREEMENTS FOR THOMAS WHIELDON'S
EMPLOYEES : (1)

- William Cope : February 14th 1749. Hired for handling, vining
and casting ware.
Wages : 7/0d. per week with 10/6d., earnest (2)
November 12th 1750. To rent a house at £2.2.
per year. (3)
- Robert Garner : February 28th 1749. Hired.
Wages : 6/6d. per week with 10/6d. earnest - 1/0d.
paid and the rest to be made up. (4)
May 1st 1752. To rent a house at Fenton Hall
for £2.2. per year.
September 29th 1752. Paid half year rental of
£1.1.
May 14th 1753. Paid half year rental of £1.1. (5)
- Samuel Jackson : January 11th 1751. Hired for throwing saggars
and firing.
Wages : 8/0d. per week with £2.2. earnest (6)
May 1st 1752. To rent a house at Fenton Hall,
for £2.2. per year.
November 27th 1752. Paid half year rental of
£1.1.
May 20th 1753. Paid half year rental of £1.1.
(7)

1. : Thomas Whieldon's Account and Memorandum Book.
2. : Ibid. p.70.
3. : Ibid. p.39.
4. : Ibid. p.70.
5. : Ibid. p.44.
6. : Ibid. p.73.
7. : Ibid. p.45.

William Kent : March 24th 1749. Hired.
Wages : 7/0d. per week with 2/6d. earnest. (1)
March 25th 1750. To rent half of Fenton Hall
at £2. per year.
June 22nd 1751. Paid half year rental of £1. (2)

William Marsh : January 27th 1749. Hired.
Wages : 6/9d. per week with 10/6d. earnest.
June 21st 1753. Hired.
Wages : 7/0d. per week with 10/6d. earnest and an
old coat worth 5/0d. (3)
March 25th 1750. To rent half of Fenton Hall
at £2. per year.
June 22nd 1751. Paid half year rental of £1.
January 27th 1752. Paid 10/0d.
June 3rd 1752. Paid at Lady Day half year
rental of £1.
February 26th 1754. To rent "ye house next to
Robert Garner", at £2.10. per year. To enter
May Day next.
September 29th 1754. Paid half year rental of £1.
May 25th 1755. Paid in part 10/6d.
June 29th 1755. Paid for total year 9/6d. (4)

1. : Thomas Whieldon's Account and Memorandum Book. p.70.
2. : Ibid. p.38.
3. : Ibid. pp., 50, 70.
4. : Ibid. p.38.

APPENDIX 18 :

ABSTRACT OF FACTORY AND HOUSING PROVISION : 1847 LONGTON ANNUAL
SMALL RATE : (1)

Owner :	Houses :	Location :	Total :	Potteries :	Location :
W. Bailey	1	Stafford St.	3	1	Stafford St.
	2	Gold St.		1	High St.
K. Bridgwood	1	Church St.	2		
	1	Market Place			
S. Bridgwood	4	Market St.	4	1	High St.
J./T. Carey	5	Sutherland Rd.	5		
J. Carey	1	Boulton's Row	18	2	Anchor Lane
	12	Anchor Lane		1	Caroline St.
	5	Anchor Lane			
L. Cyples	3	Market St.	3	1	High St.
R. Cyples	7	Sutherland Rd.	7		
J. Deakin	8	Anchor Lane	8		
G. Elkin	1	Gold St.	10		
	2	Longton Rd.			
	5	City Rd.			
	2	Orchard Place			
T. Goddard	3	Caroline St.	7	1 (2)	Commerce St.
	4	Caroline St.			
T./J. Lockett	1	Caroline St.	5	1	Chancery Lane
	1	King St.		1	King St.
	3	Market St.			
J. Mayer	10	Mayer's Pass.	10		
E. Walklate	3	High St.	3	1	High St.
R. Walklate	5	High St.	17		
	12	High St.			

1. : SRO.: D593/H/3/58.

2. : W. Mankowitz and R. Haggard, op.cit. p.97.

APPENDIX 19 :

ABSTRACT OF POTTERY OWNERSHIP IN LONGTON, 1841 AND 1847 : (1)

SUMMARY TABLE OF POTTERY OWNERSHIP :

	1842	1847
Manufacturers owing one pottery and working it	: 3	5
Manufacturers owning several potteries and working them	: 1	3
Manufacturers owning several potteries and renting several potteries and working them all	: 1	4
Manufacturers owning one pottery and letting it out	: -	22
Manufacturers owning several potteries, working one pottery and letting the rest.	: -	5
Manufacturers leasing one pottery only	: 6	4
Manufacturers leasing several potteries	: 2	20

TRANSCRIPT OF POTTERY OWNERSHIP AND RATEABLE VALUES :

Owner :	Building :	Occupancy :	Rateable Value :
Allerton, Brough & Green	Pottery, High Street,	o/o	£266.8.0.
	ibid.	o/o	£50.
	ibid.	o/o	£36.
Lewis Lovatt	ibid. Mill St.	t. Procter.	£70
Ayshfordise.			
William Badkin	ibid. New St.	t. Broadhurst & Green	£111
	ibid. Waterloo	o/o	£10.1.0.
Bailey	ibid. Stafford St.	t. Elkin & Newbon	£100.

1. : Appendix to the Second Report of the Commissioners. 1842. op.cit.
 SRO.: D593/H/13/3/58. 1847 Stoke Parish Rates for Longton.

Owner :	Building :	Occupancy :	Rateable Value :
Elizabeth Bailey	Pottery, Church St.	t. Hilditch & Hopwood	£80
William Bailey	ibid. Stafford St.	o/o	£160
	ibid. High St.	o/o	£94
John & Joseph Barker	ibid.	t. Copestake	£50
Bradshaw	ibid.	t. Webberley & Shubotham	£50
Sampson Bridgwood	ibid.	o/o	£42.
	Anchor Pottery	o/o	-
Late John Carey	Pottery, Caroline St.	t. Yale, Barker & Barker	
	ibid. Anchor Lane	t. John Ashwell & Co.	£90
	ibid.	t. Yale, Barker & Barker	£80
Late T. & J. Carey	Mill, Anchor Lane	o/o	£234
Jonathon L. Chetham	Pottery, Commerce St.	o/o	£170
Thomas Cope	ibid. Chancery Lane	t. Everard & Glover	£25.1.0.
Lydia Cyples	ibid. High St.	t. Cyples & Barker	£85
Charles & John Harvey	ibid. Stafford St.	o/o	£226
Charles & Henry Harvey	Mill	o/o	£160
	ibid.	t. Goddard	£26.17.3.
R. Heathcote	Daisey Bank Pottery	t. R. Ray	£116
	Mill	t. James Glover	£71.1.3.
	Gom's Mill	t. S. & S. Bridgwood	£84.11.0.
Samual Hughes	Pottery, High St.	t. Richard Cyples	£80.
	ibid.	t. Hamilton & Moore	£60
William Jarvis	ibid. Gold St.	o/o	£22.1.0.
John & Thomas Lockett	ibid. Chancery Lane	o/o	£140
	ibid. Kings St.	o/o	£19.19.0.
Jacob Marsh	Boundary Works, King St.	t. T. Walker	£160
Henry Martin	Pottery, Chancery Lane	t. Everard & Glover	£13.19.0.
Thomas & William Martin	ibid.	o/o	£70
Richard Newbold	ibid. Waterloo	t. James Deakin.	£120
Sarah Nutt	ibid. Stafford St.	t. Thomas Shirley	£45
John Plant	ibid. High St.	t. Cope & Edwards	£70
John Procter	ibid. Furnace Lane	o/o	£24
Thomas Pye	ibid. Church St.	t. James Seabridge	£57
Seckerson	ibid. High Street	t. Allerton, Brough & Green	£50
John Shaw	ibid. Victoria Place	t. James Hulme	£70

Owner :	Building :	Occupancy :	Rateable Value :
Sarah Shaw	Potter, Stafford St.	t. Thomas Wynne	£87
William Shelley	ibid. High St.	t. James Warren	£40
trustees	ibid. Railway	t. James Floyd	£80
John Hendley	Gladstone Pottery	t. H. Beardmore	£70
Sheridan	Pottery, Union Sq.	t. James Colclough	£63
		& Son	£100.1.0.
Charles Smith	ibid. High St.	t. J. & T. Lockett	
Sparrow &	ibid. Church St.	t. Hillditch &	£90
Nickisson		Hopwood	£100
Jacob Stanley	ibid. High St.	t. James Meakin	£180
Ralph Steele	ibid. Stafford St.	t. John Goodwin	£130
	ibid.	t. Bradbury, Anderson	
		& Bettany	
Thomas Stirrup	ibid. Chancery Lane	t. Everard, Glover	£80
trustees	ibid.	t. Everard & Co.	£40
	ibid. Stafford St.	t. James Deakin	£96
	ibid. Gold St.	t. Shubotham, Webberly	£56.11.0.
		Hallam	
William Stirrup	ibid. Stafford St.	t. James Floyd	£14
Elizabeth Walklate	ibid. High St.	t. Sampson Beardmore	£86
Waller	ibid. Gore St.	o/o	£63
	ibid. High St.	o/o	£100
George Young	ibid. Russell St.	o/o	£38
	ibid. Commerce St.	t. Goddard & Co.	£125
	ibid. High St.	t. Allerton, Brough	
		& Green	£30

APPENDIX 20:

VALUATION OF MYATT'S POTTERY, LONGTON, 1822 : (1)

House with Back yard walls & pump	: £437.12.0.	
Walling, Palisades Entrance gate Posts	: £43.17.0.	
Stables Saddle House & Pyvins	: £160	
Garden walls & Privy	: £37.12.0.	£679.1.0.
Manufactory Counting House with small Building	: £50	
Two Slip houses	: £75	
Two Hovels	: £88	
Dipping House & places under and above	: £130	
Throwing House &c & with share adjoining	: £139	
Ware House &c &c with shoring adjoining	: £189	
Turning House with cellar under & well	: £100	
Land - 6383 square yards of Land belonging. 2/9	: £877.13.3.	£1,648.13.3.
Mill with Killin and shoring adjoining	: £400	
Machinery with sufficient pans	: £327	
Two Cottages	: £50	
Land about 8,000 yards of Lane together with land of water and all its advantages	: £673	£1,450.
Pool Land occupied by Pool. 2,350 yards at 2/0	: £235	£235.
		£4,012.14.3.
Potters utensils	: £132.0.3.	

1. : SRO. : D593/M/3/3/7. Colliery Papers, Valuation, February 25th., 1822.

APPENDIX 21 :

VALUATION OF CHAMBERLAIN POTTERY AND CONTENTS, 1795 : (1)

Biscuit Room	:	Firsts	:	£637.10.0.
		Seconds	:	£30
		Fixtures	:	£16.4.6.
Painting Room	:	Firsts	:	£123.5.0.
		Fixtures	:	£44.11.3.
		Materials	:	£2.2.2.
Small burnishing Room	:	Firsts	:	£9.18.11.
		Fixtures	:	£3.3.0.
Burnt ware Room	:	Firsts	:	£168.1.5.
		Fixtures	:	£11.1.0.
Enamel Kiln	:	Firsts	:	£35.18.6.
		Fixtures	:	£5.5.0.
		Materials	:	£1.10.0.
Miscellaneous	:	Firsts	:	£77.5.6.
		Fixtures	:	£2.2.9.
Glassed warehouse	:	Firsts	:	£201.16.3.
Shop	:	Firsts	:	£1,512.18.0.
		Fixtures	:	£105.12.3.
		Materials	:	£50.17.3.
Coach house	:	Seconds	:	£110.
		Materials	:	£76.2.6.
		Fixtures	:	£5.18.6.
Manufactory Yard	:	Materials	:	£275.7.0.
		Fixtures	:	£26.9.6.
Slip House	:	Materials	:	£30.8.4.
		Fixtures	:	£66.3.4.
Sagger House	:	Materials	:	£8.15.0.
		Fixtures	:	£40.19.9.

Potters Room	:	Firsts	:	£11.4.0.
		Fixtures	:	£266.9.9.
		Materials	:	£1.10.0.
Kings Stove	:	Firsts	:	£6.
		Fixtures	:	£164.14.4.
		Materials	:	£8.3.0.
Biscuit Kiln	:	Fixtures	:	£7.12.0.
Bakers Stove	:	Firsts	:	£0.6.0.
		Fixtures	:	£14.4.3.
		Materials	:	£1.4.0.

BUILDINGS :

Gates and fence	:	£20.	0.	10.
Slip house	:	£15.		
Mill and sagger house	:	£50.		
Slip kiln house	:	£16.		
Enamel kiln house	:	£70.		
Pottery and painting house	:	£200.		
Glaze kiln room and stove	:	£250.		
Biscuit room and stove,				
White biscuit warehouse	:	£400.		
Floor over glaze room	:	£6.		
Repairs - four tenements	:	£18.		
Front gates and sign	:	£8.	10.	0.
Burnishing room fixtures	:	£3.	15.	0.
Biscuit and glaze kilns	:	£90.		
Bell and belfry	:	£6.		
Lamp	:	£0.	15.	0.
TOTAL	:	£1,170.		
Land	:	£400.		

Miscellaneous Stock. Firsts	:	£4.	14.	3.
Miscellaneous fixtures.	:	£10.	10.	0.
Burners stock from Caughley	:	£231.	17.	7.
Shop in High Street	:	£200.		
Enamel kiln and gold shop	:	£95.	5.	6.
TOTAL VALUATION OF BUILDINGS	:	£3,665.	5.	6.

APPENDIX 22 :

INSURANCE VALUATIONS FOR THE BOW, WARMSTRY HOUSE AND WILLIAM BANKS
POTTERIES : (1)

Insurance valuation for the Bow factory, Sun Insurance Company, July 7th 1749.

On a House Elaboratory and Warehouse / Timber / not Exceeding One Hundred Pounds	100
Utensils and Stock therein only not Exceeding Six Hundred Pounds	600
One House only adjoining Brick in Mr. Frys Occupation not Exceeding Three Hundred Pounds	300
Household Goods therein only the Property of Mr. Fry not Exceeding Two Hundred Pounds	200
On the Workhouses in one Building 173 feet long Brick not Exceeding Twelve Hundred Pounds	1,200
On Utensils and Stock therein only not Exceeding Three Hundred Pounds	300
On the Workhouse and Millhouse under one Roof / Timber / situate West not Exceeding Three Hundred Pounds	300
Utensils and Stock therein not only Exceeding Three Hundred Pounds	300
On the Kiln House being one Range of Building Brick and Timber not Exceeding Six Hundred Pounds	600
Utensils and Stock therein only not Exceeding One Hundred Pounds	100
	£4,000

1. : Guildhall Mss.: Sun Insurance Mss.: 11936/87. 116996. July 7th., 1749.
 Ibid. 11936/118. February 19th., 1757.
 Ibid. 11936/150. November 12th., 1763.

Insurance valuation for Warmstry House factory, Sun Insurance Company, February 19th 1757.

On their large House...now made use for manufacturing the Worcester Porcelaine Ware, not exceeding Seven Hundred pounds	700
On a Workshop and two Workshops over it only not exceeding One Hundred Pounds	100
On three Kilnhouses only not exceeding	120
On a Stove for Moulds & a Room under only not exceeding	10
On a Stove for Glaze not exceeding	10
Two Slip Stoves for drying Clay not exceeding Twenty Pounds all adjoining	20
And on two Silnhouses & one Sliphouse near the aforesaid Buildings not exceeding	20
(All Brick & Tiled)	
	<hr/>
	£1,000

Insurance valuation for William Banks pottery, Stoke, Sun Insurance Company November 12th 1763.

On two Brick Hovels only not exceeding Thirty pounds on each	60
Two other small Brick Hovels only not exceeding fifteen Pounds on each	30
Marle house only not exceeding Five Pounds	5
Barn only not exceeding Fifteen Pounds	15
Workhouse and Chamber only over to make dishes in not Exceeding 25	25
On another Workhouse & Chamber only over not Exceeding Thirty Pounds	30
Cratemakers Shop only not Exceeding	15
Plaining House only not Exceeding	20
On one other Plaining House only not Exceeding	30
Sagger house and Lath house only not Exceeding Thirty Pounds on each	60
Long Lathouse only not Exceeding	40
One Accounting house only not Exceeding	15
Throwing house only not Exceeding	20
Slip House only not Exceeding	30
Slip Kiln only not Exceeding	10
Slip Kiln only not Exceeding	15
Slip house and Siln only on the left not Exceeding	10
Painting house only not Exceeding	10
Smoak house only not Exceeding	10
Large Smoak house only not Exceeding	30
Smoak house only to make Plates in not Exceeding	20
	<hr/>
	£500

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All printed sources are presumed to have been published in London, unless otherwise stated. All NRA numbers refer to National Register of Archives catalogue references and not to repositories.

The following abbreviations have been used throughout the bibliography:

Barlaston	Josiah Wedgwood and Sons Ltd.: Wedgwood Mss.
BM	British Museum.
B & W	Boulton and Watt Mss.
CRO	Staffordshire County Record Office.
LJRO	Lichfield Joint Record Office.
NRA	National Register of Archives.
V & A	Victoria and Albert Museum.
VCH	Victoria County History of Staffordshire.
WSL	William Salt Library, Stafford.

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1684	234		
1722	448		
1722	452	Thomas Billin	Refined earthenware
1726	487	Thomas Benson	Grinding of flint
1729	510	Samuel Bell	Red marble ware
1732	536	Thomas Benson	Improvements in flint grinding
1733	541	Ralph Shawe	Salt-glazed chocolate and whiteware
1743	Prov.	Thomas Briand	Transparent earthenware
1743	Prov.	William Steers	Transparent earthenware
1744	610	Heylyn and Frye	Manufacture of china
1749	649	Thomas Frye	Manufacture of china
1764	821	Williamson and Spackman	China
1766	849	Count de Lauraguais	China
1768	898	William Cookworthy	China made with Cornish clay
1769	939	Josiah Wedgwood	Encaustic decoration
1783	1374	Joseph Cartledge	Glazing earthenware
1784	1418	Joseph Cartledge	Glazing earthenware
1785	1475	Thomas de la Mayne	Porcelain buttons
1796	2137	Ralph Wedgwood	Making earthenware
1796	2138	Ralph Wedgwood	Making glass
1796	2139	Ralph Wedgwood	Stoves
1800	2367	W. and J. Turner	Fine Stoneware
1807	3009	James Spershott	Improvements in body
1810	3341	William Docksey	Preparation of glazing materials
1810	3304	Peter Warburton	Metallic decoration of wares
1813	3724	C.J. Mason	Improvements in earthenware
1828	5626	R.G. Jones	Ornamenting china
1831	6162	John Potts	Engravings for decorations
1835	6817	Godwin Embrey	Ornamenting china
1839	8124	Herbert Minton	Porcelain

1839	8319	John Wood	Decoration of china
1840	8338	John Ridgway	Moulds
1840	8339	John Ridgway	Machinery to produce china
1845	10968	Skinner and Whalley	Pottery bodies
1845	11005	Thomas Findler	Edge runner mills
1846	11313	G.H. Fourdrinier	Frame sieve
1847	11912	John Ridgway	Paste Box machine
1848	12097	Alfred Reynolds	Ornamenting china
1849	12789	Browne and Veale	Grinding flint
1850	13288	J.H. Baddeley	Ornamental earthenware
1851	13608	Herbert Minton	Tile Machinery
1851	13763	William Hodge	Earthenware manufacture
1852	14080	John Ridgway	Ornamenting wares
1854	1933	Mayer and Bush	Grinding flint
1855	97	M.D. Hollins	Slip kiln design and firing
1855	208	Mayer and Bush	Grinding flint
1856	1288	Needham and Kite	Filter press
1857	997	John Harland	Purifying clay
1864	1024	G.J. Worssam	Separation of solids in slip
1864	1576	R. Cockran	Treating clay
1865	805	J. Wright	Centrifugal de-watering of slip
1867	1605	William Orr	Drying potter's clay
1867	1707	William Orr	Separation process
1867	1939	Thomas Borglase	Ore grinding
1867	2065	Henry Fletcher	Rotary kiln drying
1867	2975	C.D. Abel	Pulverization of materials
1867	3319	William Boulton	Endless rope power transmission
1867	3577	W.H. Kerr	Calcination of materials
1873	2026	J.J. & L.R. Bodmer	De-watering of clay
1874	1119	William Boulton	Improved blunger
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2. ARCHIVE SOURCES

i. Estate Papers, Deeds, and other Non-Pottery Company Records

Birmingham Reference Library

- c. 1790-1810 Boulton and Watt Mss.: Portfolios of engine drawings and specifications for North Staffordshire potters: includes Josiah Wedgwood, Josiah Spode, and Thomas Wolfe. (B. & W.)

Guildhall Library

- c. 1750 Sun Insurance Company records: Insurance valuations for potteries. (Guildhall Mss.: 11936)

Horace Barks Reference Library

- C. 17-C. 20 Horace Barks Collection: Miscellaneous collection of deeds, estate papers, also notices, and plans. (HBL.EM.26)

Lichfield Joint Record Office

- C.17-C. 19 Diocese of Lichfield and Coventry. Calendar of Wills proved in the Bishop's Consistory Court. (LJRO: B/C/11)

Staffordshire County Record Office

- C.17 - C.19 Aqualate Mss.: Total coverage of estate business, includes pottery rentals and papers relating to J. Baddeley of Shelton. (CRO.D1788)
- C.17 - C.19 Heathcote Mss.: Total coverage of estate business, includes pottery and coal rentals. (CRO.DW.788.29-30)
- C.17 - C.19 Duke of Sutherland Mss.: Total coverage of estate business, including land tenure, water and coal rentals, and sales for Lane End. (CRO.D593)
- C.19 Duchy of Lancaster Mss.: Miscellaneous papers. (CRO.D100)
- C.19 Heaton Mss.: Miscellaneous collection of sale plans and estate particulars. (CRO.D1176)

City of Stoke-on-Trent Museum and Art Gallery

- C.18 - C.19 Miscellaneous collection of deeds, notebooks and papers relating to North Staffordshire potters and pottery towns.

University of Keele Library

C.17 - C.19 Sneyd Mss.: Total coverage of estate business, including references to Staffordshire potters.

William Salt Library

C.17 - C.19 Salt Mss.: Miscellaneous collection of deeds, leases, sale notices and plans. (WSL. Salt Mss.)
C.18 - C.19 Hand-Morgan Mss.: Miscellaneous collection of estate and legal papers, including Newhall Pottery and Maer Estate (bought by Josiah Wedgwood) (WSL.D1798)

ii. Local Administrative Records

Staffordshire County Council: Planning and Development Department

C.18 - C.20 Miscellaneous collection of Mss., photostats, documents and photographs

Staffordshire County Council: County Records Office

1780-1831 Land Tax Returns

Lichfield Diocesan Registry

1836-51 Tithe apportionments and redemptions

iii. Company Records

Messrs. Alcock: Burslem

c.1830-5 Miscellaneous letters and notices (WSL.Misc.)

Allied English Potteries Ltd.: Burslem (archives), Ash Hall (head office)

C.18 - C.19 Miscellaneous records relating to constituent companies

Frank Beardmore and Co. Ltd.: Sutherland Pottery, Fenton

1903-14 Miscellaneous printed catalogues for art wares: c/o Gladstone Pottery Museum.

Blurton Tiliery: Blurton

1848-55 Manufacture and delivery books, plans. (NRA. 10699)

Coalport China: Coalport and Stoke-on-Trent

1800-64	Pattern books nos. 1-24: at head office, Longton
1859	Painters' wage book: at head office, Longton
N.D.	Pattern Book: c/o G.A. Godden, FRSA

Cornwall China Clay Co.

1849-70 Sales and shipment ledgers. (NRA.5235)

Henry Daniel: Stoke-on-Trent

c.1805 Various papers relating to Henry Daniel,
 enameller to Josiah Spode II: c/o
 William Algar

Davenport: Longport and Burslem

C.17 - C.19 Miscellaneous collection of family
deeds (CRO)

Gladstone Pottery: High Street, Longton

1783-1958 Accumulation of eighty-one legal documents relating to the site, including plans, leases, mortgages, and company registration: c/o The Staffordshire Pottery Industry Preservation Trust, Gladstone Pottery, Longton.

W.H. Goss: Stoke-on-Trent

c.1900-54 Group of thirteen recipe, experiment,
and design books: c/o the Goss family.

Grainger: Worcester

1807-1887 27 deeds and miscellaneous papers.
 (c/o Ryland Martineau, Solicitors,
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Herculaneum Pottery: Liverpool

1806-22 Resolution book for the Herculaneum
Pottery Committee. (Liverpool P.R.O.:
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1808-25 Tomkinson Papers, the personal documents
of Joseph Tomkinson, factory manager,
including price books, cash book,
recipes and notes. (Liverpool P.R.O.)

Longton Hall; Longton

c. 1750	Miscellaneous indentures. (V & A.)
1753-7	Two indentures. (NRA.13466)
1757-86	Four wills relating to company partners. (Somerset House, PCC. Folios 74, 363, 410, 607)

1771 Will of William Jenkinson. (Somerset House, PCC. Trevor Folio 410)
1780 Letter concerning the company by Pocock. (BM. Add. Mss. 15800)

Minton Ltd.: Stoke-on-Trent

c. 1796-1857 Miscellaneous ledgers, journals, pattern books and cash books: at company head office

New Hall: Shelton

c. 1790 Miscellaneous collection of manuscripts concerning the company. (WSL. 1798)

Benjamin Plant: Lane End

c. 1784-1818 Common Place Book. (c/o R.H. Plant Ltd., Longton)

Rockingham Pottery: Swinton, Yorkshire

c. 1805-42 Correspondence between the pottery and the Earl Fitzwilliam (Sheffield City Library: Wentworth Woodhouse Muniments. F. 106(c) and G.47)

Royal Doulton: Lambeth and Burslem

1818-19 Account book: at company head office
1835 Ledger: at company head office
1842-9 Account books: at company head office

Spode China (W.T. Copeland & Sons): Stoke-on-Trent

C.18 - C.20 917 miscellaneous ledgers, pattern books, plans and advertising media: at company head office and University of Keele

Turner and Abbott: Lane End

1780 Redemption for City of London Freeman. (Guildhall Library, MS. 4337/5)
c. 1793 Pattern books: c/o Mrs. Constance

Josiah Wedgwood & Sons Ltd.: Burslem, Etruria and Barlaston

C.17 - C.20 Comprehensive accumulation of ledgers, pattern books, plans, and documents: at company head office and University of Keele
1766 Letter and list for table services for Duke of Portland. (NRA.7628)
1770 Account to James West. (NRA.4349)
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1805-35 Abner Wedgwood Recipe Book, no. 11. (c/o Allied English Potteries Ltd.)

Thomas Whieldon: Fenton

1749-53

Hiring notebook: at City of Stoke-on-Trent Museum

Wood Family: Burslem

C.18 - C.19

Miscellaneous papers relating to the
Wood family and potteries. (CRO)

Worcester Royal Porcelain Company Ltd.: Worcester

C.18 - C.19

Miscellaneous collection of ledgers,
pattern books and correspondence
relating to all constituent factories:
Warmstry House, Grainger and Chamberlain.

1785-91

John Flight's diary (c/o Mr. H. Sandon)

3. MAPS

- C.18 - C.19 Duke of Sutherland Estate plans,
includes land tenure and Lane End
pottery layouts.
(CRO.D593/H)
- C.18 - C.19 Miscellaneous legal document collection,
includes pottery plans and sale notices.
(HBL.EM.26)
- c.1750 Enoch Wood map of Burslem: 1 in.: 100 yds.
(WSL.Salt. 74/41/142a)
- 1760 James Brindley Grand Trunk Canal map.
(NBL.SM.6a)
- 1800 Wedgwood and Byerly Etruria colour mill
plan. (B. & W. p.218)
- 1802 J. Allbut & Son map of the Potteries:
2 in.: 1 mile. (CRO.D145/1 & 2)
- 1810 Josiah Spode Stoke flint mill plan.
(B. & W. P.430)
- 1826 Charles Heaton survey of the Etruria
Estate: Barlaston
- 1832 Hargreaves map of the Potteries: 1 in.:
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- 1836 to date Ordnance Survey: 1 in., 6 in., 25 in.,
50 in.,: 1 mile 1/500
- 1837 Tithe index sheet for the Potteries:
1 in.: 1 mile. (HBL.SM.14F)
- c. 1840 Etruria Factory plan: 1 in.: 80 ft.
(VCH.2 pl.4)
- 1850 Stoke-on-Trent Board of Health plan.
(WSL.Salt.54/44)
- 1857 Duke of Sutherland Estate plan and
Ordnance Survey for Longton: 1/500.
(CRO.D593/H/8/98)
- 1863 Malabar plan. of Tunstall: 1 in.:
110 yds. (CRO.D1176/389)

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