BRICKMAKING ON SOUTHEASTERN VANCOUVER ISLAND: AN HISTORICAL ARCHAEOLOGICAL INVESTIGATION

by

JOAN TERESA PETERSON
B.A., University of Victoria, 1986

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Dr. Donald Mitchell, Supervisor

Dr. William Alkire

Dr. C. Forward

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University of Victoria

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Supervisor: Dr. Donald Mitchell

ABSTRACT

Archaeology consists of many sub-fields, three of which are addressed in this thesis. Historical archaeology, urban archaeology and industrial archaeology are all recent additions to the field. These terms narrow the focus and imply integration of two areas of study. However, in most cases only one portion is emphasized. This relegates the other data source to a supporting role instead of an equal partner.

To overcome this the participants in both fields need to understand the methodologies, techniques and values of each discipline to the other. The historical method is a relatively simple technique but one which is virtually ignored by archaeologists. In a similar manner, documents are treated only as information banks when in reality much can be learned from archival material treated as an archaeological artifact.

Brickmaking began on southeastern Vancouver Island less than 10 years after Fort Victoria was established. The manufacturing process, consisting of a variety of methods, changed very little over the centuries.
Development and organization of the industry in the study area paralleled the growth of the region. From simple estate production to nucleated complex, brickmaking rose and fell mirroring the economic state of the area. Ownership of the industry was almost exclusively British even though the yards were operated mainly by Chinese. This relationship is reflected in the larger society.

A culture can be viewed as a complex system composed of sub-systems each interacting with each other on various levels. Brickmaking can be viewed as a system from two perspectives. The manufacturing process itself is a closed system yet operation of the industry is closely tied to demand from the larger system of which it is part.

Although only one production site remains relatively intact, archaeological investigations of brickmaking are possible at all sites. A well designed research plan is necessary to realize the full potential of the sites and manage the archaeological resources.
Examiners:

Supervisor: Dr. Donald Mitchell

Dr. William Alkire

Dr. Charles Forward
ABSTRACT........................................................................................................ii
TABLE OF CONTENTS...................................................................................v
LIST OF TABLES.............................................................................................vii
LIST OF ILLUSTRATIONS................................................................................viii
ACKNOWLEDGEMENTS....................................................................................ix
INTRODUCTION................................................................................................1

CHAPTER 1: HISTORY AND ARCHAEOLOGY...............................................19
  1.1 Sources..................................................................................................23
  1.2 Criticism of sources..............................................................................29
  1.3 Synthesis................................................................................................35
  1.4 Conclusion..............................................................................................36

CHAPTER 2: ARCHAEOLOGY AND THE DOCUMENTARY RECORD................38
  2.1 Constitution of the data sources.........................................................39
  2.2 Documents as artifacts.......................................................................42
  2.3 Formation of the historical record......................................................43
  2.4 Classification schemes........................................................................45
  2.5 The historical record of brickmaking on southeastern Vancouver Island.47
  2.6 Conclusion..............................................................................................57

CHAPTER 3: ORGANIZATION AND LOCATION OF THE BRICK INDUSTRY........58
  3.1 The model..............................................................................................59
  3.2 Household Production.........................................................................60
  3.3 Estate brickworks..................................................................................64
  3.4 Small rural brickyards.........................................................................65
  3.5 Nucleated brickyard complex..............................................................67
  3.6 Special brickworks.................................................................................98
  3.7 Systemic approach to brickmaking......................................................113

CHAPTER 4: ETHNICITY IN THE BRICK INDUSTRY.................................131
  4.1 Model of Occupational Domains.......................................................132
  4.2 Ownership.............................................................................................135
  4.3 Operation and labour..........................................................................139
  4.4 Consumption........................................................................................141
  4.5 Ownership, labouring, consumption and status..................................144
  4.6 Brickmaking and society.....................................................................152
LIST OF TABLES

Table 1: Cluster firms..........................................70
Table 2: Brickyards of southeastern
          Vancouver Island..................................114
Table 3: Brickyard organization and location.......115
Table 4: Listed occupations of 19th century
          brickyard owners.................................137
Table 5: Ethnic involvement in brickmaking.........145
LIST OF ILLUSTRATIONS

Figure 3.1: Brickyard location 1851-1961 .............. 61
Figure 3.2: Brick production 1851-1870 .............. 63
Figure 3.3: General location of Mayfair cluster .... 71
Figure 3.4: Mayfair cluster 1886-1900 .............. 72
Figure 3.5: Mayfair cluster 1888 ....................... 73
Figure 3.6: Advertisements ......................... 76
Figure 3.7: A Bird's Eye View of Victoria 1889 ......... 81
Figure 3.8: Two Mayfair Cluster Brickyards ........ 84
Figure 3.9: Baker Brick Co. spatial layout ........ 87
Figure 3.10: Sidney cluster .......................... 90
Figure 3.11: Yards near the town of Sidney ......... 91
Figure 3.12: Yards near the town of Sidney: present street layout .................................. 92
Figure 3.13: Parson's Bridge (Atkins Road)
Brickyard 1880s ........................................ 100
Figure 3.14: Kempster Bros. 1885 ....................... 102
Figure 3.15: B.C. Pottery Co. Ltd ...................... 105
Figure 3.16: B.C. Pottery Co., plant layout ......... 108
Figure 3.17: B.C. Pottery 1908 ........................ 109
Figure 3.18: Silica Brick Lime Co. location ......... 111
Figure 3.19: Silica Brick Lime Co. Ltd 1907 ......... 112
Figure 3.20: Brickmaking location system .......... 117
Figure 3.21: City of Victoria brickyard locations ... 123
Figure 4.1: Brickmaking and society .................. 134
Figure 5.1: Mayfair cluster ........................... 164
Figure 5.2: Sidney cluster .............................. 165
Figure 5.3: Western yards .............................. 166
Figure 5.4: Model of brickmaking ...................... 179
Figure 1: 19th century brickmaking ................... 224
Figure 2: Wash mill ...................................... 227
Figure 3: Rolling mill or disintegrator ......... 229
Figure 4: Fug Mill ....................................... 230
Figure 5: Moulding equipment ......................... 233
Figure 6: Slop-moulding table ......................... 234
Figure 7: Slop-moulding yard layout .......... 234
Figure 8: Sand moulding table ......................... 237
Figure 9: Hack barrow .................................. 237
Figure 10: Sand-moulding yard layout ............. 239
Figure 11: Brickmaking machines ..................... 240
Figure 12: Re-Pressing equipment ................. 245
Figure 13: Scotch kiln ................................. 252
Figure 14: Beehive kiln construction ............... 253
Figure 15: Making tiles and fireclay products ...... 256
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INTRODUCTION

PROBLEM

Industrial activity cannot properly be isolated from the society within which it takes place, for the configuration of that society calls industrial production into being, constrains the particular forms it takes, and is itself affected by the organizational arrangements produced

(Wagstaff 1987:8).

The first non-native settlement of southeastern Vancouver Island was the Hudson’s Bay Company’s Fort Victoria established in 1843. In less than fifty years, the settlement grew from a small fort to the capital city of a new province and by the 1890s was highly industrialized and prosperous. Brickmaking, as a key industry providing a much desired product, developed and expanded along with the settlement (Gregson 1970; Pethick 1968).

An inseparable part of complex society, industry is linked with a wide variety of socioeconomic factors both internal and external to the society within which the activity takes place. The interrelationships between the brick industry and the developing society are too diverse for all to be explored in one project. Therefore, the research has focused primarily on the location and organization of the industry within the
study area. Preliminary investigations indicate the existence of at least three specific types of location and organization. The earliest manufacturing was associated with the Hudson's Bay Company and took place at or near the location where bricks were needed. Any excess products were sold locally (J. Adams 1987). The industry was well established by 1890 and brickmaking firms clustered in one location north of the city just outside the city limits. These pioneer firms appear to have been not only manufacturing brick but also acting as contractors supplying labor and material for construction. They were either family owned or partnerships. The companies established after 1890 were situated in isolated locations west of the city and in close proximity in North Saanich. These were corporations and there is no indication that they did any contracting. With the exception of one located on Sidney Island, all were situated along rail lines.

In order to understand these distinct differences in location and organization, the underlying social and/or economic conditions prevailing during the different periods need to be determined. This can be accomplished by answering a specific series of questions.

1. What environmental and economic determinants
affected the location of the individual firms?

2. How was each brickyard organized and operated?

3. How did available technology affect the location and organization of the yards?

4. How did growth of the study area from fortress to developed urban society affect the location and organization of the industry?

Understanding these differences provides a general view of industrial behaviour in a complex society over time. However, it is also desirable to know how the industry affects society in more specific ways. Therefore, a secondary research question focuses on the relationship between the industry and the two major ethnic groups associated with it, the British and the Chinese. As before, a series of questions directs the research.

1. Which group(s) owned and/or operated the yards?

2. Which group(s) supplied the labour?

3. Which group(s) used the finished product?

4. How are ownership, labouring and consumption related to the status of the ethnic groups in a complex society?

Approaching these questions from both historical and archaeological perspectives will provide not only a
much clearer understanding of the industry and its role in society but will also meet the goals of the separate disciplines. A description of the brickmaking industry in the study area will fill a gap in Canadian history. Location of industry and its spatial organization are major areas of study in archaeology. However, most archaeological work is generally oriented toward industry in simpler prehistoric societies rather than in complex modern ones. This analysis of an old industry in a modern period will provide information that should be of value to any time period. Classification schemes are used in both history and archaeology to bring order to the data, that is, documents and artifacts. In archaeology, artifact typologies can be analyzed to determine recognizable patterns and documents treated in the same way may also reveal underlying patterns. Furthermore, by using documents as artifacts they become an integral part of the archaeological record and, rather than supplement or support it, increase information available from it.
A SYSTEMIC APPROACH TO BRICKMAKING

If cultures are viewed as complex systems, as aggregations of things and events joined in interaction and interdependence to form integrated wholes, then the relationships among their parts are as important as the parts themselves (Gibbon 1984:6).

...industry does not operate in isolation but as part of a wider and more complex system in which the individual components behave in particular ways as the result of interactions between themselves and with the environment beyond (Grant 1987:101).

General systems theory is a complex body of work applicable to many disciplines. It holds the view that there are basic relationships common to almost all living and non-living systems. One of its goals is to identify general laws which govern the behaviour of the components of the individual systems and which are transferable to other systems (Plog 1975; van Gigch 1978). It is considered by van Gigch (1978) to be a new discipline, one which provides an alternate way of explaining the complex systems that make up today's world. In this form, general systems theory is seldom used in the individual disciplines. Instead, what is often referred to as systems theory is actually a systemic approach (Plog 1975; Watson, LeBlanc and Redman 1984). A systemic approach emphasizes the
holistic nature of a system and the interrelationships of its parts. Furthermore, it recognizes that many variables can exist at once, any or all of which may cause changes to the system and/or to its parts (Plog 1975; van Gijch 1978).

As an industry providing a basic building material, in particular one with some symbolic significance, brickmaking in the study area serves to illustrate the many relationships between the varying parts of the cultural system within which it operates. All systems have frontiers and boundaries and it is at these points that the processes which lead to cultural change and the patterns that result are more easily observed (Green and Perlman 1985). In addition, analysis of the industry from its inception to decline provides both synchronic and diachronic views of the processes that lead to specific archaeological patterns.

In a systemic approach a culture or society is viewed as a system composed of interconnected subsystems. Any change in one subsystem may necessitate a change in another and the more closely connected the subsystems, the greater the likelihood of corresponding changes (Clarke 1978). This input/output
behaviour is called feedback and may be negative or positive.

Negative feedback simply maintains the status quo of the system; it remains stable and unchanging (Watson, LeBlanc and Redman 1984). Furthermore, negative feedback often implies a closed system. A closed system allows no input from outside the system. Brickmaking as a manufacturing process is a closed system; everything it needs to maintain itself is contained within its boundaries. The raw material is prepared, moulded, fired and sold. Although the variables within the system may change (for example: new equipment, or different fuel source), the actual process itself does not change. To obtain the end result, a brick, all the steps must be followed in the proper order for the system to operate.

Brickmaking can also illustrate the results of positive feedback. With positive feedback, the status quo is not maintained. Changes in one subsystem lead to changes in others moving the whole system farther away from its original form (Watson, LeBlanc and Redman 1984). Brickmaking as an industry is part of the economic subsystem and as such is subject to the effects of changes in demand for its product. When demand drops too low, the industry ceases to be viable
and no longer operates. It is also subject to
availability of labour and raw materials, in
particular, fuel. The influence of variables external
to the brickmaking process, i.e. to the industry
itself, also serves to illustrate the concept of an
open system. Open systems allow for input from outside
their boundaries even though this may ultimately alter
the system (Watson, LeBlanc and Redman 1984).

Closely related to feedback are the concepts of
equilibrium and perturbation (change). If the negative
feedback mechanisms are operating properly, the system
remains in stable equilibrium. In other words, no
matter how large or small the change, the system will
return to normal (Watson, LeBlanc and Redman 1984). In
brickmaking, for example: if wood as a fuel becomes too
expensive or too scarce, an alternate will be found; if
too many bricks are produced for the local market,
exports are set up; if one source of labour becomes too
expensive, cheaper labour will be hired. The end
result, however, is still the same.

There are, however, limits beyond which the system
cannot survive in its original form. A system in
unstable equilibrium may be able to cope with small
changes but large perturbations set positive feedback
mechanisms in motion leading to irreversible situations and permanent alterations in the system (Watson, LeBlanc and Redman 1984). For example: Fort Victoria from 1843 to 1858 was a small, virtually self-sufficient colony generally content with itself. The sudden influx of gold seekers in the spring of 1858 was more than the small colony could cope with and within a few years the whole social and economic structure of the colony was irrevocably changed. Similarly, brickmaking was a viable industry only as long as there was a demand for its product.

The value of the systemic approach, particularly in archaeology and history, lies in its focus on interrelationships. While it is possible to analyze an entire social system, it is more practical to concentrate on specific parts of the system. This reduces the number of variables or feedback loops that must be dealt with and provides a more detailed view of important subsystems. Since all systems are composed of increasingly inclusive hierarchical units, the unit of analysis can range from an individual to an entire subsystem. For instance, brickmaking is only one small part of the larger economic subsystem which is in turn part of the total social system.

One common problem with the systemic approach lies
in the definition of the unit of analysis. What is, or is not, part of the system being investigated. No matter where the outside limits are determined to be, external variables which may affect the system are excluded leading to an incomplete analysis. A complex social system and its component parts is inherently an open system, defined by Juteson and Hampson (1985:16) as:

...one in which matter, energy and information are exchanged between elements inside and elements outside the system. These systems have semipermeable boundaries....

As Juteson and Hampson (1985) suggest, the choice of a system's boundaries is crucial in determining research procedures. A system can have several boundaries depending on the level of analysis desired. In addition to boundaries, which occur within the system, systems also have frontiers, areas where they join other systems. Frontiers are the outer limits of a particular system and are often some distance from the central part of the system. Focussing research on the frontier and boundary areas shifts the emphasis from a central place to areas where change is more likely to be visible. Furthermore, it recognizes the openness of systems and allows for external input which
may affect the system (Green and Perlman 1985; Juteson and Hampson 1985). Analysis of brickmaking on southeastern Vancouver Island takes place within these parameters.

RELEVANT LITERATURE

Brick manufacturing is one of the oldest industries in the world. Developed in the Near East in the Neolithic, its methods changed very little until the introduction of machinery during the Industrial Revolution. It was for centuries considered a degrading and menial industry (Dobson 1928) and consequently did not receive much attention in the academic community. With the rise of industrial archaeology in Great Britain during the 1950s and 1960s, many eighteenth and nineteenth century brickyards were located and listed along with other industrial sites (Hudson 1976). Short descriptive articles about individual brickyards often appear in local history magazines and industrial archaeology journals. Manufacturing methods are described in Dobson’s Treatise (first published in 1850) as well as in a variety of construction manuals and scientific journals. These are all important to the current study since it was British technology that was first used in
the colony on Vancouver Island.

The same technology was also used in former British colonies such as the United States and Australia. Birmingham (1983) has investigated the colonial brick industry in Australia; in the United States, Heite (1968) and McKee (1976) have dealt with early brickmaking. Canadian academic interest in brickyards seems to be confined to British Columbia where John Adams (1979, 1987) has published articles about the brick industry, in particular, the Clayburn Company near Vancouver and most recently, the early brickyards in Victoria.

For general background information on the society in which the industry was conducted, books by Pethick (1968, 1980), Gregson (1970) and Reksten (1987) are available sources. More specific information about the study area can be found in unpublished theses such as those by Floyd (1969), Lee (1969), Mackie (1984), Robertson (1981), Ruzicka (1973) and Sedgwick (1973).

Although brick material is found in many historic period site excavations, it is often ignored as an artifact. In addition, excavations of brickyards in North America are almost non-existent. Gurke's (1987) recent publication is a valuable sourcebook for historical archaeologists and contains a review of the
archaeological literature. Brickwork locations in Virginia have been excavated by Harrington (1950, 1967) and Heite (1968) and in Alaska by Dilliplane (1983).

Brickyards have been excavated in Britain in recent years. Two archaeologists in particular are associated with work on Roman brick production (Darvill & McWhirr 1982, 1984; McWhirr 1979) and their reports are useful for providing hypotheses of what might be found at later dated sites. Similarly, work on the medieval brick industry in Britain by Smith (1985) serves the same purpose. In addition, they provide a continuity, that, if integrated with excavations of nineteenth century brickyards in Britain and her colonies, would provide both a synchronic and diachronic view of a vital but ignored industry.

THESIS ORIENTATION

Past societies can only be studied through man's material remains, artifacts and the wide variety of means by which man has altered the earth's surface by relocating and reconstituting materials from it (Arnold 1986:32).

The study and reconstruction of past human behavior and how it affects, and is affected by, the environment is a broad goal of three related disciplines - history, archaeology and geography.
History focuses on the time dimension of human activity while geography concerns itself primarily with the spatial dimension. Archaeology, oriented toward both time and space, has the potential to provide an interface for all three areas. Apart from the dimensional aspects, the basic differences between the disciplines lie in their methodological and theoretical approaches to the data traditionally available to each for analysis (Bintliff 1986; Dymond 1974; Wagstaff 1987). Over the past few decades, traditional archaeology has given rise to several fields of study which should theoretically utilize the methods and techniques of at least two of the disciplines described above. The addition of another word to the basic term "archaeology" not only narrows the focus of the archaeological work but also implies an integration of methods and techniques. However, a problem is generally approached from the viewpoint of only one discipline which in effect provides only a partial solution (Arnold 1986; Deagan 1982; Dymond 1974).

The problems being addressed by this thesis are the concern of three of these dual term fields - historical archaeology, industrial archaeology and urban archaeology. The most common definition of historical archaeology is "...the study of human
behavior through material remains for which written history in some ways affects its interpretation" (Deagan 1982:153). This would seem to indicate that history serves to support or supplement the archaeological findings rather than play an equal and complementary role. Some integrated studies have been done within a cultural resource management framework (Deagan 1982). These include studies of plantation life (Otto 1984), frontier settlement patterns (Lewis 1984) and acculturation (Deagan 1983). A more recent work, edited by Spencer-Wood (1987), seeks to explain consumer behavior using both documentary and archaeological data to create a more comprehensive analysis.

Industrial archaeology, contrary to its name, generally relegates archaeology to a minor support role, if it is used at all, and relies mainly on written material. Its primary focus has been the locating and listing of remnants of the Industrial Revolution, particularly in Great Britain, and its main practitioners are often geographers and industrial historians with little or no archaeological training (Clark 1987; Grant 1987; Hudson 1976). Because of this emphasis, it has generally been ignored by mainstream
archaeologists, historians and geographers, yet, of all the dual term fields, it has the greatest potential to utilize the methods and theories of all three major disciplines. There is some indication that this indifferent attitude is changing. Industrial archaeology does not have to be confined to the period of the Industrial Revolution as several recent publications indicate. Work on Roman brick and tile production by Darvill and McWhirr (1982; 1984) and on various medieval industries (Crossley 1981; Smith 1985) imply increasing awareness of the potential of industrial archaeology.

Numerous studies of urban development and behavior have been conducted in history, geography and archaeology, although the latter generally focuses on non-industrial complex societies. However, over the past twenty years, with urban development proceeding at rapid speed, archaeologists have become increasingly aware of the valuable information available in modern urban areas. Urban archaeology consists of two components - archaeology in the city and archaeology of the city. The former is concerned with the special problems of doing archaeology in an urban setting while the latter applies archaeological methods to problems concerning the processes of urban development (Staski
1982; 1987). The articles in Dickens (1982) and Staski (1987) provide a general overview of the current state of the field. Urban archaeology as a field of study is generally confined to complex industrial cities, particularly those in North America. It is therefore, to a considerable degree, related to historical archaeology and many of the studies contained in Spencer-Wood (1987) were conducted in an urban setting.

The vast potential indicated by these terms, especially historical and industrial archaeology, is lost when the emphasis is placed on only one part. Application of all available methodologies to the problem is necessary to achieve integration. Only in this way can the data yield the most results and produce a more complete understanding of past behavior. A goal of this thesis is to create an integrated study of an industry in order to illustrate what can be accomplished by this approach to a problem.

ORGANIZATION OF THESIS

In historical archaeology, the emphasis is usually placed on archaeological method rather than historical. Since historical and archaeological data complement as well as support and supplement each other, the value of each discipline to the other is discussed in Chapter 1.
A wide variety of documents were used to reconstruct brickmaking in the study area and Chapter 2 deals with document analysis. Documents can be treated as a special class of data and analyzed with archaeological techniques thus increasing the information they yield. Brickmaking organization and location on southeastern Vancouver Island is covered in Chapter 3. An ethnoarchaeological model provides a framework for the development of the industry. A systemic approach, incorporating Weber’s theory of location of industries, is used to analyse the data. Ethnicity in brickmaking is the focus of Chapter 4 and the relationship between ownership, labouring and consumption and ethnic group status is discussed. Brickmaking and its relationship to society in general concludes the chapter. Although the acquisition of archaeological data through excavation, survey or sampling is not possible at this time, an archaeological resource management program is outlined in Chapter 5. Oriented toward the research questions, the program also includes recommendations dealing with the archaeological value of the sites. Appendix A contains a description of brickmaking procedures and serves as a basic reference for the thesis.
CHAPTER 1
HISTORY AND ARCHAEOLOGY

Digging in the documents and in the earth must be understood to be part of the same research and that one cannot do without the other

(Hume 1978:206).

History is a broad term with several distinct but related meanings: history as past actuality, history as record and history as technique (Garraghan 1946:3). The first of these concerns itself with what actually happened, what human events occurred where, when, how and why. It is objective since having happened it cannot be changed. In order to become part of history an event must be recorded and this part is very subjective. For events to be recorded they must be seen in some way to be significant, and while different groups or individuals may record different events, many occurrences will not be recorded at all. It can take a variety of forms both written and oral. The technique of history requires the ability to gather the facts, evaluate them and produce a synthesis (Garraghan 1946).

Parallels to this tripartite definition of history also exist in a broad interpretation of archaeology. The archaeological record consists of the remains of
past events and as such is objective. As with the recording of events, the reported archaeological record is subjective. Not all events leave remains and what is preserved is seldom random. Furthermore, just as the historical record is subject to individual variation, so the archaeological record is subject to the vagaries of preservation. Finally, archaeology is also a technique which involves discovering and verifying the artifacts followed by an interpretation of the findings.

In spite of these striking parallels, history and archaeology are often poles apart. This has its origins in the distinction between history and anthropology that developed during the sixteenth to eighteenth centuries as the European nations began to colonize the Americas, the Pacific and Africa. Anthropology was, in the beginning, a part of history, but with the discovery of indigenous peoples with radically different lifeways, anthropology emerged as a discipline to deal with these "others". History as a discipline largely confined itself to the political and military events of the nation-states, relying almost exclusively on written documents for its sources (Cohn 1981).
Archaeology also had its beginnings during the same period of exploration and discovery. People became aware of antiquities, especially ancient ruins and monuments, but it was not until the nineteenth century that excavation became routine. In Europe archaeology continued its tie with history in Classical studies. As interest in prehistory increased it was seen as more or less a continuum of European history despite the fact that no direct links could be established. This closeness between history and archaeology did not, however, continue in North America (Trigger 1978).

Archaeology began in North America as it had in Europe with an interest in antiquities and art objects. When ethnographies of native groups were constructed during the nineteenth century, archaeologists used the information to interpret artifacts. Problems with these interpretations eventually led to the development of the direct historical method. In areas which had been inhabited continuously, archaeologists could work backward from the present and construct culture histories. This approach continues today but is not held in high regard by many archaeologists. The rise of the new archaeology with its emphasis on deduction and scientific method found little room for history and
the relationship became very strained. It is still this way today although the situation is improving.

As historical archaeology began to increase in popularity, interest in the relationship between history and archaeology resumed. Because the focus of historical archaeology was Euro-American society for which documentation was available, history as record was used to supplement or support the archaeological record. It is only in the past decade or so that historical archaeologists have come to realize that data from both sources are complementary, that in order to conduct a thorough investigation both should be considered of equal value. To achieve this level of integration requires familiarity with both historical and archaeological methods. The problem is that many historical archaeologists are trained only as archaeologists not as historians as well. Many do not see the value of the historical method nor its applicability to archaeology. Historians, it must be noted, have a similar view toward archaeology.

Archaeology and history share the broad goal of increasing knowledge of the past, of explaining the past to the present through excavation and reconstruction of events. Whether these events
occurred in one specific place and time or within a broad area over several thousand years, the net result is an increase in information. The value of this information to the pool of knowledge depends a great deal on the historical method.

The historical method has its origins in the Greek and Roman historians and reached its current form by the nineteenth century. Garraghan (1946:33) defines it as

a systematic body of principles and rules designed to aid effectively in gathering the source materials of history, appraising them critically, and presenting a synthesis (generally in written form) of the results achieved.

As with the three part definition of history, the historical method is also composed of three distinct yet related steps. Each of these can be applied with varying degrees of modification to historical archaeology. While the steps are separate, they often overlap and are treated as one. For the purposes of this discussion, however, they will be treated individually.

1.1 SOURCES

The sources of history are three-fold: written, spoken, and that which is neither written nor spoken (Fish 1978:8).
1.1.1. "written"

The definition by Fish is equally applicable to historical archaeology. Written generally means documents but inscribed stones, dated buildings, annotated photographs, graffiti, stamped bricks, printing on a piece of pottery or anything that contains a statement of some sort can be considered a written source under a broad definition of writing. In turn, these can all be considered archaeological artifacts since the statements are on material objects, the traditional source of archaeological data (Dymond 1974). If only documents are considered as written sources, then a wealth of valuable information will be ignored. It is quite possible, that given the vast amount of documentation available for many areas, historians or archaeologists would not consider anything else. But written documentation, especially that produced by bureaucracies, is usually consciously and not randomly saved. This in effect produces a bias in the record since each society saves what it deems significant or appropriate. The survival of many alternate written statements is much closer to random and therefore less subject to bias. In this respect they may be of more value in the final interpretation
(Schiffer 1987).

Historic period sites can contain large amounts of pottery fragments, trade items, tin cans, bullets or a host of other manufactured items. Archaeologists trained in prehistoric techniques must be taught how and where to look for information about these items. Unlike prehistoric artifacts which are generally classified according to various subjective criteria, the information about many historic items is available somewhere. The trick is to find it and this is what the historian does (Hume 1978). Once this is accessed, an accurate dating of the artifact and the site from which it came is often possible. Another important factor to consider is the complex nature of historic period sites. It is vital, therefore, that the archaeologist know as much as possible about the society or period of history during which the site was formed and used until it became part of the archaeological record. Furthermore, if the site is in an urban area, later uses must be considered. Knowing where to find the sources needed to accomplish this is the first step.

1.1.2. "spoken"

Spoken sources are not traditionally considered archaeological data but they are useful in several
areas. There are two types of oral sources - oral tradition and oral history.

Oral tradition is most commonly found in non-literate societies but it does exist in literate societies where it is generally referred to as folklore. Oral traditions are messages transmitted by word of mouth over a long period of time. It is because of this characteristic that their usefulness becomes questionable. Messages are interpreted by their receivers in specific ways and may then be passed on in a slightly altered form. By the time it reaches the present, its origins are almost completely lost (Vansina 1986). The folklore of literate societies develops in a similar fashion. Because of its changeable character, most historians and archaeologists dismiss oral tradition and folklore as useless sources for their purposes. But this may be too drastic a conclusion. Since the oral traditions do have some basis in fact however remote, they do provide a source for hypotheses. In the historical archaeology of Euro-America, for example, the oral traditions and folklore of slaves and various ethnic groups can be used to direct research toward questions for which there is no apparent evidence. The traditions may
direct the researcher to a place he would not normally consider or to an unexpected interpretation of some event or site. Simply because the source is an oral tradition or folktale, should not be instant grounds for dismissal (Dorson 1971; Vansina 1986).

Oral history differs from oral tradition in several respects. Although it too is subject to the actions of memory, it is not passed on to succeeding generations by word of mouth. It is collected and recorded by someone communicating directly with the source person. Specific questions can be asked to clarify certain statements or to direct the topic under study. Oral history is still a message but it is under more control and after being recorded is passed on in written form. In addition, most oral history covers only the past century making verification of the facts through documentation relatively easy. This last point causes many people to dismiss oral history as a superfluous source. If the information is already recorded in valid documents it is reasoned, why bother duplicating it. But this attitude misses the point. It is unlikely that an oral version of an event coincides exactly with a written source. This is possibly the result of individual memory function. If, however, a large number of people offer similar
versions that differ from the recorded source, then it is evident that something else is going on and every effort should be taken to determine what this is (Allen and Montell 1981).

There can be a vast difference between what people say they did or saw and what actually happened. The evidence for the latter is in the ground while the former lies in oral tradition, oral history and written sources. Sorting the truth from the fiction is the task of both archaeologists and historians.

1.1.3. "that which is neither written nor spoken"

This final source encompasses a vast assortment of physical objects. Archaeological artifacts, art and architecture, landscapes, fashions, baseball cards and beer cans all provide information of some sort. Archaeologists and historians should not confine themselves to artifacts and documents for in doing so they neglect an entire class of information. Most of these non-traditional data have been studied by someone, somewhere and is available for interpretative purposes. Historians often turn to specialists in other fields for assistance but it is only in the past forty years or so that archaeologists have routinely
done so. While this is important in prehistoric studies for environmental reconstruction, it is even more vital for historical archaeology. Complex historic period sites can yield a staggering variety of artifacts and no archaeologist can be expected to be knowledgeable about all of them. Even if the archaeologist knows where to find information about the objects, the services of a specialist may be required for a more accurate and comprehensive interpretation.

In addition to providing a more complete picture of a site or event, these other sources serve to create a broader view of the society within which the active site functioned. They may point out ideologies, trends or cycles which would not be recoverable in any other way. All of these three sources, written, spoken and artifact, are actually the remains of past events and how they affected, or were affected by, different people at different times. How then, can we know which are valid and useful for interpretation and reconstruction and which are not? This is the task that comprises the second part of the historical method—criticism of the sources.

1.2 CRITICISM OF SOURCES

The most crucial element of the historical method is criticism or appraisal of the sources. Historical
criticism is defined as

the use or application of a body of rules and principles for testing the genuineness of historical sources, restoring them as far as possible to their original form, and determining their evidential value (Barraghan 1946:168).

It consists of two types, external and internal, both of which have applications in historical archaeology.

1.2.1. External

The aim of external criticism is to authenticate the evidence. It deals directly with the document and involves a series of steps or questions applied to each piece of evidence. The first step is to determine when and where it was written and by whom. Answers to these basic questions will show whether or not the document is a forgery. Several approaches may be used. Content analysis examines such things as language, especially anachronisms, handwriting and consistency with what is already known about the individual or culture. Documents of the same period can be compared and there are also physical tests (type of paper, ink etc.) that can determine authenticity. The source of the material is also important; is it a copy or an original? Has it been restored or altered? These questions often require the use of specialists in such fields as
linguistics, paleography, epigraphy and diplomatics (Garraghan 1946; Shafer 1974).

With some modification, the word artifact can be substituted for document in the preceding paragraph. In fact, external criticism, as described above, is often carried out during the analysis of material from the site, although many archaeologists may not be aware that this is what they are doing. Provenience determines when and where it was made or used as well as the group or even individual using or producing it. Historical evidence can be used to corroborate the conclusion. In archaeology, content analysis will focus mainly on consistency and the presence of anachronisms. Artifacts from different sites of the same period can be compared and there is a wide variety of physical tests that can be used on material remains. The source of the material used in the manufacture of the object is often of prime importance in archaeological analysis. It may also be necessary to use outside expertise to analyze artifacts. It is also possible to apply external criticism in a much broader sense to the site itself. This would be most useful at the very beginning when designing the research program. If, for example, the basic question when, where and by whom were applied to a site, it might suggest
excavation outside the designated site area, as in the case of an Indian settlement outside the environs of a military fort.

It is not likely that historical archaeologists would need to utilize external criticism when using written sources. The vast majority have, and continue to be, authenticated by historians and other specialists and are available in various archives and collections. But this does not mean that they should remain ignorant of it, for external criticism does have some practical value to archaeologists. It helps by forcing researchers to ask specific questions, to clarify interpretations, rather than accepting an artifact as a given simply because it was in a specific location in the site.

1.2.2. Internal criticism

Internal criticism is used to determine the credibility of the authenticated evidence. It is applied to the message contained in the document. It seeks to determine if the words used mean the same now as then, are they to be take literally or are they used ironically. This is usually done by studying the context within which it was written. Errors in interpretation and falsification by the author are also
possible and must be taken into consideration. A second step involves the accuracy of the observations recorded by the witness. Was he in a position to make valid observations? Is there bias? When did he report it? What was his intent? If satisfactory answers concerning the value of the source are reached, then the testimony is considered valid and can be used in the final synthesis (Garraghan 1946; Shafer 1974).

Internal criticism is normally applied to individual testimony but social systems also produce documents. Dibble (1963) calls these documents, created by groups and organizations, social bookkeeping. They cover a wide range of topics and form a large proportion of archival material. Their validity must be viewed in light of the social system that produced them and their accuracy depends on the steps required to complete them. The more people involved in reaching completion, the more chance there is for error. One last point concerns the value of false documents. While they do not constitute a legitimate data source for reconstruction purposes, the very fact that they are false can reveal information about the individual, event or society in question and they should not be neglected.
Unlike external criticism which is applied to physical objects, (documents or artifacts), internal criticism relates to the message contained in or on the object. This is conceptually more difficult to apply to archaeological artifacts but it can be done in a limited way. Testimony is produced by individuals and individuals produce artifacts. But artifacts do not contain the message, they are the message. They are the physical remains of an actual event and as such require a slightly different approach. If a single artifact is treated like a single piece of testimony, the complete message will not be revealed. About all that can be said is that the artifact in question was in use during a specific time. It can be described and its function suggested but conclusions about its meaning, intent or the presence of bias are not as easily arrived at. This is most difficult when there are only a few objects associated with a site. Artifactual messages can be released, however, when considered as a group. With proper analytic techniques, patterns in the archaeological record can be revealed. But, like social bookkeeping, these patterns must be considered within the context of the site and the social system that created them both. It is the patterns that will reveal biases, meanings and
intent and in doing so, release a more complete message.

The value of external and internal criticism to archaeology is problematic. Several of the steps comprising criticism are subjective and judgmental, dependent on the expertise of the critic. Historical archaeologists, in dealing with complex societies, can make use of criticism in some fashion. Many of the questions inherent in criticism are applied to artifacts as a matter of course by archaeologists during the final analysis of the material. However, familiarity with the technique of historical criticism will benefit archaeologists if only to suggest other approaches to the artifact analysis. Furthermore, if historical archaeologists are knowledgeable in the method, they will be able to apply it to any written material found on the site without having to call in an historian every time.

1.3 SYNTHESIS

The final step in the historical method is the synthesis of the source material into a cohesive interpretation of the past. The historian’s account is often literary in style, that of the archaeologist more ordered and scientific. But historical archaeologists
must take the data from two different sources, treat each part as complementary and equal, and then interpret and reconstruct a picture of the past. This synthesis should result in a more comprehensive picture than either taken alone. There is little to be said about synthesis since it is subject to individual variability. Each practitioner has his own distinct style and approach and this will influence the final result. The finished account seldom gives much indication of the amount of work that preceded it. It may, however, be the only form in which the information survives. With this in mind, historians, archaeologists or historical archaeologists should endeavor to make it as thorough and accurate as possible.

1.4 CONCLUSION

It is apparent that the historical method is a relatively simple technique, basically common sense: the ability to evaluate source material and then put it together in a final reconstruction. Because of this simplicity, it is sometimes said that there is no such thing as the historical method, that history is simply a matter of putting in the right footnotes and avoiding plagiarism (Rutman 1986). However, this attitude can lead to some very poor reconstructions. The historical
method, more than anything, involves discipline and diligence. Without a thorough knowledge of available sources and without the ability to determine which are valid and important, historical and archaeological investigations lose much of their value. If archaeologists, either prehistoric or historical, were familiar with the historical method it could only make their final analyses more accurate. It opens up new ways of asking questions and directing research, of determining value and significance, of shedding more light on the intangibles of archaeology such as ideology, attitudes and beliefs. It does not take very long to learn the technique but it does take time to become proficient. It is subjective, relying in part on personal opinions. But this is basically what all reconstructions of the past are, either historical or archaeological. As new information becomes available, earlier reconstructions are rewritten by others. This is all part of the process of history as record and of archaeology in general and will continue to be so as long as these disciplines are active.
CHAPTER 2

ARCHAEOLOGY AND THE DOCUMENTARY RECORD

Historical archaeologists are only analyzing one of the data sources available by definition to their field, the archaeological record. They do not treat the documentary record, the second data source, equally. Either they ignore it or at best allow the archaeological remains to structure their use of written sources (Schuyler 1988:38).

We have not developed a methodology specifically designed to take advantage of the multiple categories of evidence in historical archaeology, however, and this has certainly been a factor in the failure of the field to realize its full potential (Deagan 1988:10).

A basic archaeological goal is to seek an understanding of human behaviour. Unlike prehistoric archaeology, however, historical archaeology has the benefit of an additional data source to utilize in pursuit of this goal. The problem is that this source, the historical record, is seldom used to its full potential. Deagan (1988) sees the problem as one of methodology and Schuyler (1988:40) suggests that:

Historical archaeologists must simultaneously analyze both the archaeology and textural sources from an anthropological perspective.

Many may not see the necessity for the additional work that such an analysis requires. In some cases
this may be true; however, when undertaken, it provides access to information not available in other contexts. To realize Schuyler’s goal, and to understand the logic behind such an analysis, four factors need to be considered: the constitution of the data sources, the concept of a document as an artifact, the formation of the historical record, and classification schemes. Each of these is discussed below. Following this, the archival sources used in the preparation of this thesis are analyzed to illustrate what can be accomplished by an anthropological analysis.

2.1 CONSTITUTION OF THE DATA SOURCES

Archaeological and historical sources are generally considered to be two distinct data sources. However, when the definitions of source, as used by each discipline are considered, the line between the two becomes considerably less distinct. Garraghan (1946:103) defines historical sources as:

...human remains and such products of man’s activity as either were meant by their authors to communicate knowledge of historical facts or conditions, or by their nature are calculated to do so.

He further suggests that historical sources are simply remnants of past experiences. Fish (1978:8) also offers a broad definition of historical sources:
...the sources of history are three fold: written, spoken, and that which is neither written nor spoken.

Definitions concerning archaeological sources are equally broad. According to Dymond (1974:12) "archaeological evidence can be any object which has been associated with human life in the past." Watson, LeBlanc and Redman (1984:160) consider that

...relevant archaeological data consist of anything observable that pertains to the solving of a particular problem.

Taken at face value, these broad definitions are essentially identical. It follows, therefore, that the source materials for both disciplines are one and the same. Schuyler (1976:99) succinctly characterizes available sources as "the spoken word, the written word, observed behaviour and preserved behaviour." However, while the sources may be the same, the approaches used by the disciplines are very different. History focuses on analyzing and interpreting the written word and its primary data source is the document. Archaeology, however, concentrates on excavated material remains--artifacts--and bases its interpretations on patterns found in these remains.

In addition to pattern analysis, historical analogs are used in interpretation and hypotheses suggested by the
historical record are tested. Unlike historians, few of whom use archaeological data in their research, archaeologists appear more ready to use historical data in projects.

It seems apparent, however, that while historical archaeologists use the documentary record, it is not being used as well as it could. It may be used as a separate data source to support or refute archaeological findings or the documentary sample may be biased towards specific interpretations and/or problems (Deagan 1988). Misuse or underutilization of the documentary record reduces its potential to solve, or at least shed light on, some of the intangibles of archaeology.

These intangibles revolve around ideology and human behaviour. What seems to be overlooked by archaeologists is that documents are produced by individuals and social systems (Dibble 1963) and as such reflect the ideas, attitudes and beliefs of the authors towards both their own behaviour and the subject or event being written about (Schuyler 1976). Viewed in this light, documents can provide answers to a multitude of questions which the archaeological data alone cannot answer. For example: Why were the data found only in a particular class of document? Why are
some classes of document not represented at all? How do these documents relate to individuals; to society as a whole? What is the relationship between the documents and the event? Are the documents private or public? How does each class of document reflect the attitudes of individuals or groups? Why did these particular documents survive in the historical record?

Ignoring this valuable data source results in an incomplete reconstruction of the event in question. A partial solution lies in the concept of a document as an artifact.

2.2 DOCUMENTS AS ARTIFACTS

To conceive of a document as an artifact, the definitions of document and artifact need to be considered. Garraghan (1946:11-12) defines a document in three ways:

a. Anything whatever, written or unwritten, that lets in light on the human past, that informs or teaches us concerning it....

b. any original written record, public or private, official or unofficial, printed or unprinted....

c. any original written record of an official or public character.....

The first of these definitions is very broad and is synonymous with definitions of historical and archaeological sources. It therefore contains the concepts of both a document and an artifact. It is,
however, the second definition that is the most commonly used and which encompasses all written sources.

An artifact is defined by Dymond (1974:12) as "a product of human workmanship." Dunnell (1971:117) also offers a broad definition of an artifact:

...anything which exhibits any physical attributes that can be assumed to be the results of human activity.

Given these definitions of an artifact, it is not difficult to conceive of a document as a specific type of artifact. Documents are produced by people; even the characters and signs on the document can be considered artifacts (Dymond 1974). What is important to historians, however, is the message contained in the characters. It is when the message is disregarded and the document treated as a physical object that it becomes a specific kind of archaeological artifact.

Even though a document is an artifact, it is not found in the archaeological record but in the historical record. Understanding how the latter is formed is also necessary for a thorough analysis of documentary sources.

2.3 FORMATION OF THE HISTORICAL RECORD

Equally important to the conception of a document as an artifact, is an understanding of the processes
which form the historical record. As Schiffer (1987:7) points out:

...to make justifiable inferences the investigator must consider and take into account the factors that have introduced variability into the historical and archaeological records.

The formation of the archaeological record is not dealt with here since artifacts in the historical record are not in the archaeological record. After Schiffer (1987:3-4), to be in an "archaeological context" the artifact "interacts only with the natural environment." In contrast, much of the historical record is found in "systemic context" still "participating in a behavioral system." The factors or formation processes responsible for the historical record are cultural. It is human behaviour not an environmental process that results in the retention of artifacts by the social system. For artifacts such as documents, the cultural process is one of reuse, more specifically a conservatory process:

...a form of secondary use that involves a change in an artifact's use - and often its function - such that permanent preservation is intended (Schiffer 1987:32).

Artifacts thus preserved serve two general purposes: to enhance or symbolize an individual's social standing, as in the case of a private
collection, and to relay information about some past activity, the main purpose of museums and archives (Schiffer 1987:32-33). Unfortunately, the criteria used to determine which artifacts will be conserved by any given society are poorly understood and it is quite evident that the historical record is not representative of what could be conserved. For example, items in widespread use are seldom saved whereas institutions such as governments rarely discard very much (Schiffer 1987:35). Analyzing the documentation of a specific research project may help to understand the biases present in conservatory processes.

2.4 CLASSIFICATION SCHEMES

At the base of most archaeological analysis is comparison and in order to accomplish this, the data must be classified in some way. Classification schemes bring order to both archaeological and historical data. While it is possible to analyze a single item, a more meaningful interpretation results when items are grouped and comparisons made. Historians classify documents in a number of ways including origin, content, and aim of the author. These broad classifications can then be subdivided according to
need, for example, the type of source (Dibble 1963; Garraghan 1946). Most historical classification schemes are fairly general and are used mainly to aid external and internal criticism.

Archaeological classification schemes, however, can be quite complex. For artifacts such as pottery and stone tools, attributes of size, shape, and colour can be taken to the point of making each artifact unique, although this would serve no useful purpose. In fact, as W. Adams (1988) points out, classification may not be necessary at all, especially if the archaeologist’s questions do not require the artifacts to be classified.

When classification schemes are used in archaeology, they are generally in the form of typologies. Adams (1988:43) defines a typology as:

...a particular kind of classification: one that is made specifically for the purpose of sorting entities into mutually exclusive categories.

Historians have no real need to construct typologies of documents since each can be considered a unique item even if there are multiple copies. Since historians are mainly concerned with the content of the document, all documents can be considered as mutually exclusive; except for identical copies, no two documents contain
exactly the same information.

On the other hand, if the document is considered as an artifact and the content de-emphasized, then a typology can be devised. This would generate information not available from the message alone. Furthermore, a taxonomy, which arranges typologies into hierarchic structures, could also be developed after the typology was constructed. This could conceivably result in additional information.

These four factors: the relationship between the data sources, the concept of a document as an artifact, formation of the historical record and classification, all play a role in an anthropological analysis of documents. This is illustrated in the following section using documents pertaining to the brick industry in the study area.

2.5 THE HISTORICAL RECORD OF THE BRICK INDUSTRY OF SOUTHEASTERN VANCOUVER ISLAND.

Data used to reconstruct the brick industry come from a variety of written sources. Newspapers, city directories, several different government publications, advertisements, maps, annotated photographs, a diary, letters, journals, manuals and articles on brickmaking in general, and local history books. One oral history
was also consulted. Visibly absent are the business records of the individual brickmaking firms.

Two approaches to this documentation are possible: all the documents can be treated as a single artifact dealing with the industry in general, or each individual document can constitute an artifact of a particular brickmaking site or firm. Each approach generates a different set of questions relating to different aspects of the industry.

Although part of the historical record, extant brick buildings can also be considered artifacts of the brick industry. While the buildings themselves are normally the focus of architectural historians, if the proper questions are asked, the buildings can provide information applicable to historical archaeology.

2.5.1 Documents as a single artifact.

Consideration of all the documentation for a research project as a single artifact suggests several questions: what type of documents provided the data? Was any type more common? What types were absent? Why? Answers to these provide information on attitudes toward various aspects the industry.

In treating the material as an artifact group, the classification class is document. Since each of the
documents already has a name applied to it that is part of everyday language, no further classification is necessary. Historians classify documents as either primary, those written at the time of the event, or secondary, those written at a later date about the event.

In the current study, the data used to reconstruct the industry came from primary sources; secondary sources, such as brickmaking manuals and local history books, aided in the interpretation and explanation of specific portions of the industry’s history. One exception to this is the oral history used to reconstruct a major portion of the Sidney cluster.

The most common primary source was newspapers closely followed by various records from all levels of government. These two sources provided the majority of data for the 1870s to early 1900s. Data for the period prior to 1870 were scant, coming primarily from letters (Hudson’s Bay Company, Douglas to Barclay), a diary (Melrose), the Craigflower farm daily journals, and early numbers of local newspapers. City directories provided information on locations and occupations for both periods. Military and fire insurance maps were most useful for the post 1870 period. Absent from the primary sources were the business records of the
individual firms.

The type of information provided by each source is related in part to the role of the document in the society. Newspapers report on events that they learn of and that their editors deem newsworthy or of interest to the majority of their readers. The opening of several brickmaking firms was covered in some detail, giving plant descriptions, general locations, costs and expected production. Also reported were the financial problems or financial successes of several firms. The amount of space given to the event in part indicates an evaluation of importance. Space ranges from two lines in a gossip column to a double column feature report. What is missing from the newspaper reports are details concerning plant layout, organization and operation, and accurate locations. This type of information is found in more restricted documents.

Public records produced by different levels of government provide information missing from daily newspapers. City tax records give accurate lot locations for individual firms while provincial departmental reports give more details on operation and organization. Maps produced by the federal military
department and by national insurance companies give locations and plant layouts for some firms. The three federal reports on Chinese immigration are quite lengthy and contain much information on individual attitudes and beliefs about another ethnic group. All of these public records were intended for specific audiences in either government or business.

The absence of the business records of the brickmaking firms is indicative of both societal attitudes and level of economic organization. Business during the nineteenth century was conducted in private, in some cases simply by a handshake. Records were destroyed rather than preserved, as would be the case today. Business dealings were the concern of the owners only and, unless others were affected, were not publicized. Furthermore, there was no interest in business history among historians of the day and therefore no incentive, even indirect, to preserve business documents (Hives 1986).

In the beginning, the economy of the study area was under the control of the Hudson’s Bay Company, a monopoly with vast interests throughout Canada. It was essential, therefore, that the company establish and maintain communications within its territories. Many of these records are still extant. However, as the
company gradually lost control of the area, other traders established themselves and mercantilism became the driving force of growth. Intense competition resulted in the development of industrial capitalism in which some producers owned their means of production (Johnston 1984), for example: the small, privately owned brickyards of the 1850s to mid-1870s. Production occurred only when markets were available and since the business was owner operated, records would not likely be retained for very long. Continued growth led to full blown capitalism in which outside investors provided the capital to operate the business. Corporations were established with profits going to individual investors. This meant that records had to be kept in order to provide investors with details on the disbursement of their funds. Furthermore, government regulations were established requiring business records to be retained for specific periods of time (Johnston 1984). Brickmaking was no exception to this rule but as companies folded or were bought out by other firms, the records simply disappeared.

Of all the companies involved in brickmaking, the only records so far found belong to the Hudson's Bay Company in the form of letters between two high ranking
officials. The personal diary of an employee of Craigflower farm has survived as well as the farm's daily journals. City directories from 1863 on have also been preserved. Together with the newspapers, which contain advertisements, and government records, some of which have annotated photographs, this composes all of the documentation so far located on the brick industry. But why have these particular documents survived and not others?

The reason no business records survive has already been explained. Newspaper offices retain copies of the various numbers for research; governments rarely discard any material since it may be needed for legal purposes and is, in any case, a matter of public record. The business conducted at city council meetings was routinely published in the newspaper. The survival of private material is more subject to bias. The reasons why an individual preserves personal letters or diaries can vary considerable. In the case of the Hudson's Bay Company, letter reports were obligatory to and from highly placed individuals in the Company. Douglas strongly encouraged their use, a fact which likely played a role in their preservation. Diaries and journals may serve to enhance an individual's or a family's status since they provide a
link with the past. As such, these materials provide
insight into individual attitudes otherwise
unattainable.

In the final analysis, the societal attitude
toward the brick industry in the nineteenth century
seems to have been one of general disinterest. It was
a mundane, commonplace industry that only became
newsworthy when it was established or when it was in
trouble. Very little is known about the people who
owned and operated the yards or about the effect of the
industry on individuals. The primary data which
survived are, on the whole, impersonal and focus on
material aspects of the industry. The comments of an
old brickmaker from Victoria aptly sum up the general
attitude:

While brick manufacturing was an important
industry for the supplying of brick for
downtown Victoria, who would think of
writing an history of this most decrepit
and ugly area (Don Smith 1985).

2.5.2 Documents as individual artifacts

Treating documents as individual artifacts
requires greater effort but results in more specific
information about individual firms. In general, this
concerns the rank or status of the firm in the industry
and/or society. One might assume that the firm with
the most documentation was the most important. However, this might not be the case. Factors such as missing information, reporting bias and personal bias often distort the historical record and must be taken into account.

In order to complete a statistically relevant analysis of the written material, all available data needs to be included. In the case of the brick industry, all of the documentation, particularly that in newspapers, has not been located. Therefore, a typology is not constructed at this time. It is, however, recommended as part of the archaeological resource management program and the necessary steps are outlined in Chapter five.

2.5.3 Brick buildings as artifacts

As the final products of a manufacturing process, brick buildings can be treated as artifacts of that process. If there had been no demand for the product, there would have been no industry. Of interest to historical archaeologists are questions concerning construction methods, architectural style and building use.

Construction methods include bricklaying styles, solid brick versus veneer only, type of brick required.
For example, for a long period lime mortar was used in bricklaying. When buildings were demolished, the mortar was easy to clean off and the bricks were reused (Don Smith 1985). How much of this occurred is not known but lateral cycling is a factor in the formation of the historical record (Schiffer 1987).

Architectural style is also an important factor. If the building required specially shaped or coloured brick, were they available locally? Did the local yards produce the type and quality of brick demanded by the architects and builders? The evidence suggests that this was not always the case since brick was imported from the Vancouver area for several large buildings in Victoria (Adams 1979).

Building use is discussed in Chapter five and, as will be seen, can reveal much about human behaviour. Although only extant buildings are used in the analysis, it is possible to include earlier buildings since information about many of them exists in archival sources. Descriptions and locations of buildings were often published in the newspapers at the time of construction and annotated photographs of some buildings exist. Elimination of them from the analysis adds a bias to the result. Like documents, extant
brick buildings have been preserved in the historical record for various reasons. These reasons should be determined as far as possible in order to eliminate some of the bias and to create a more accurate database for analysis.

2.6 CONCLUSION

Analyzing archival sources from an anthropological perspective as Schuyler (1988:40) suggests is time consuming but the end result is worth the extra effort. Patterns of behaviour not found in other contexts can be revealed by treating the historical data as equal to the archaeological data.

Although a complete analysis has not been carried out on the documentation used in this thesis, preliminary work suggests that it would be worthwhile. Much of its value lies in revealing the attitudes and beliefs of individuals and society about themselves and about brickmaking. Archival sources are not simply words on paper, they are the surviving artifacts of a society's ideology and should be treated by archaeologists the same as archaeological artifacts. In this way their full potential will be realized and a more complete reconstruction of the event being studied is possible.
CHAPTER 3

ORGANIZATION AND LOCATION OF THE BRICK INDUSTRY

A fine tenacious blue clay suitable for the manufacture of bricks,... is diffused over the southern end of the island, often close to the surface and ready for manufacture on a large scale for colonial use or exportation

(Rattray 1862:91).

Brick manufacturing on southeastern Vancouver Island has been variously organized since its beginning in 1851-52. In order to understand why this occurred, questions concerning the type of ownership, operating methods, and location need to be answered. Development of the industry is also closely tied to the socio-economic growth of the area. The use of an ethnoarchaeological model, developed by Peacock (1979) to assist in understanding Roman brick production, provides a framework for the development of the industry in the area.

Common red brick was not the only product manufactured by the major firms. Structural clay products also included decorative brick, hollow brick, terra-cotta ware, firebrick, and tiles. Even the specialized silica brick was manufactured. Rather than fill the body of the work with definitions and/or explanations, Appendix A outlines the procedures for
making all types of brick and structural clay products found in the study area.

Several of the larger firms also acted as contractors and were essentially an entire construction firm providing material and labour for a building from start to finish. Brickmaking continued in the region until 1961 when the last yard closed. This diverse industry provided jobs for hundreds of people at its peak. Understanding its organization, location and development is a key to understanding its role in society at large. Newspaper references are cited in abbreviated form; full citations appear in the bibliography.

3.1 THE MODEL

Using data from the 19th century to the present, Peacock (1979:6) identified a number of different modes of production each of which seems favoured by a particular set of social and economic circumstances.

Brick production has changed very little since it began several thousand years ago and Peacock's aim was to provide a model for the organization of Roman brickmaking in England. However, if his model is applied to a single location, such as a colony, it provides an ideal framework to illustrate the
development of the industry in a complex society. He defined and outlined five basic types of organization:

1. Household Production
2. Small Rural Brickyard
3. Nucleated Brickyard Complex
4. Estate Brickworks
5. Municipal Brickworks.

With the exception of number five, the municipal brickworks, all the categories are found in the study area. Since these categories were constructed with data from several countries, the appearance of most of them in one location provides a striking example of industrial development over a period of less than 75 years.

Not all of the firms identified in the study area can be placed in one of the four remaining categories. Therefore, an additional classification covering specialized production has been added. Each of the categories is described together with the firms which fall under its definition. The general locations of all the firms considered in this study are shown on Figure 3.1. Detailed maps are also provided for individual categories.

3.2 Household Production

This is the simplest type of organization in which all the brick and/or tile is used by the individual brickmaker. Peacock (1979:6) describes it as a rare
LOCATIONS

1. Early HBC and private yards
2. Craigflower farm
3. Mayfair cluster
4. B.C. Pottery Co.
5. Parson's Bridge
   Silica Brick & Lime Co.
6. Sidney cluster

Figure 3.1: Brickyard locations 1851-1961
adapted from Floyd 1969:48
situation but there is some indication that it did occur in this area (Figure 3.2). Virgin (1978) writes that farmers in the Saanich District were making their own drain tile and they may also have been making their own brick (Reading 1978). It also seems likely that farmers were making brick in the Sooke area [west of the study area] in the late 1850s (Adams 1987). Although the evidence supporting household production is very limited, it quite probably occurred on an as needed basis in areas distant from the main settlement. Suitable clay is found throughout the region (Clapp 1913) and enough brick for a chimney could be made in less than one month. Some knowledge of clay working is required so unless the farmers knew how to make brick and tile, they would have to hire someone who did. In the latter case, itinerant brickmakers were common in Europe throughout the 17th-18th centuries travelling from village to village and assisting in small scale production (Woodforde 1978). Given the influx of people to the area during the gold rush of 1858, it is conceivable that a few brickmakers were among the new arrivals. Even before this, the Hudson's Bay Company brought out brickmakers and bricklayers (Bowsfield 1979) so the necessary skills were available to the settlers.
Land Holdings

1. Fort Victoria (HBC)
2. Government reserves
3. HBC farms
4. PSAC farms
5. Private

(x) areas of household production

x small rural brickyards

Figure 3.2: Brick Production 1851-1870
adapted from Floyd 1969:48
Household production would generally be the first category to appear in a colony until large scale production was established or unless imported brick was readily available. Closely related to household production is the estate brickworks.

3.3 Estate Brickworks

Large private estates in 18th and 19th century Europe often had their own brickworks. While most of the brick produced was destined for use on the estate, excess products were sold locally (Woodforde 1976). The basic difference between household and estate production is one of quantity. In the case of southeastern Vancouver Island, estate production appeared before household production. The Hudson’s Bay Company, as one of the largest landowners in the region (Figure 3.2), can be classed as an estate. It owned and operated several large farms and by 1850 James Douglas was requesting brickmakers for the colony (Bowsfield 1979). The first, George Mason, arrived in 1851 and brick production started the next year (Adams 1987).

Brick was also being made in 1853 at Craigflower Farm (Melrose 1853), one of four farms developed by the Puget Sound Agricultural Company, a subsidiary of the Hudson’s Bay Company (Kluckner 1986). Brickmaking at
this time was completely by hand; not until 1855 was any type of machinery in use. Evidence suggests that this was a manually operated moulding machine of some sort (Adams 1987). An expert brickmaker could make 3000-5000 bricks per day under ideal conditions (Bevan 1876; Gurcke 1987). The use of a machine would substantially increase the output and provide excess for sale.

George Mason worked for the Hudson's Bay Company for the five years of his indenture after which he established his own brickworks. By 1857, estate production either by the Hudson's Bay Company or any of the farms of the Puget Sound Agricultural Company appears to have ceased (Adams 1987). This coincides with the non-renewal of indentures by many Hudson's Bay Company and Puget Sound Agricultural Company employees and the first appearance of small privately owned brickyards.

3.4 Small Rural Brickyards

Peacock (1979:6) defines the small rural brickyard as employing about six men and distributing the brick over a radius of 5-10 miles with occasional rare exotic orders travelling 50 or even 100 miles.

The first commercial, privately owned brickyards
established in the late 1850s and 1860s fall into this category. These pioneer brickyards, operated by George Mason and Robert Porter, Arthur Porter and the Fox brothers (Adams 1987) as well as other nameless yards, emerged at a turning point in the development of the colony.

Beginning in April of 1858, the first of the gold seekers heading for the Fraser arrived in town. Prior to this the population of the fort and its environs was less than 500. Up to 25,000 people descended on the town in the first year, a situation the area was not equipped to handle (Gregson 1970; Reksten 1986). It did, however, provide a ready market for bricks as demand for living and working space reached epic proportions. Between 1861 and 1862, fifty-six brick buildings were constructed and five brickmaking firms were kept busy (Macfie 1865). To keep up with the demand at least 200,000 bricks were imported from the U.S. and Britain in 1859 (Adams 1987). Bricks were also being exported, although not in large quantities; from 1858-1864 only 85,000 left Victoria, most bound for Washington State although some did go to Alaska (Gurcke 1987; Macfie 1865).

These early yards (Figure 3.2) were located north of the city (Arthur Porter, Fox Bros.) and east of the
city in the vicinity of Beacon Hill Park and later Rockland Avenue (George Mason & Robert Porter). The location of other seasonal yards is open to conjecture (Adams 1987).

By the mid 1860s the boom was over and the area went into a depression. It was just beginning to recover from the slump in 1870 when it went into another which lasted until 1880 (Gregson 1970). Brickmaking continued sporadically during this period although the 1870s saw the establishment of two firms which remained prominent for many years. These two yards adjoined each other on Saanich Road (RBC, Aug.1, 1884) north of the city where other yards had operated earlier. It was now the only area where brick was manufactured; land in the eastern area was all residential. These two yards and possibly unknown smaller ones formed the beginning of the nucleated brickyard complex.

3.5 Nucleated Brickyard Complex

According to Peacock (1979:7) a nucleated brickyard complex is one in which several small concerns are clustered in one particular place. He notes that this is a rare situation since such a grouping is
only viable if one of three conditions holds, viz.
1. that adequate clays are only available in one area;
2. that there are good efficient communications enabling the produce to be widely distributed without making the cost prohibitive; or
3. that the works are located in an area of high population and hence demand.

Of particular interest in the study area is the establishment of two such complexes, the first begun in the 1850s by Arthur Porter and others and the second established in the early 1900s on the Saanich Peninsula around Sidney. The first of Peacock's conditions applies only to the extent of accessibility. Adequate clay existed all over the region (Clapp 1913) but it was most easily obtained in these locations. His remaining conditions also apply to both situations; Victoria made brick was considered of high quality and was exported to the mainland, to the United States and to Alaska. Wagons, rail cars, scows and steamers hauled it wherever necessary. The entire area was growing rapidly and building material was in high demand. The one exception to his definition concerns the size of the yards. Peacock (1979:7) refers to "small concerns;" however, most of yards in the clusters were quite large, employing anywhere from 25-70 men at peak production times. To find large firms
clustered indicates the importance of the industry to the region's economy.

Firms located in these two clusters are listed in Table 1. More information about these yards, their methods and exact locations is available and each is described. I have called the complex north of the city the Mayfair cluster and the other the Sidney cluster.

THE MAYFAIR CLUSTER

The Mayfair cluster is named after the shopping mall that now occupies the sites of several brickyards. The general location of the brickfields in relation to central Victoria is shown in Figure 3.3. More detailed locations of individual firms are outlined in Figure 3.4. The 19th century subdivisions are superimposed on the current street layout in Figure 3.5. A description of the clay deposit in this area (BCMM Report 1908: 180-188) illustrates the accessibility and quality of the raw material:

...it is of unknown depth, the work so far done...having been confined to the utilization of a layer of clay some six to eight feet in thickness, lying on the surface and requiring very little stripping....The clay deposit carries with it nearly sufficient sand to admit of an admixture being made, carrying the proper proportion of sand and clay to make good brick, some slight addition from a local sand-bed being required.
<table>
<thead>
<tr>
<th>Cluster Cluster</th>
<th>Name</th>
<th>Years of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mayfair Cluster</strong></td>
<td>Coughlan &amp; Mason</td>
<td>1875(?) - 1896/97</td>
</tr>
<tr>
<td></td>
<td>Maurice Humber</td>
<td>1877 - 1927</td>
</tr>
<tr>
<td></td>
<td>Elford &amp; Smith</td>
<td>1886 - 1934(?)</td>
</tr>
<tr>
<td></td>
<td>Baker Bros. Brick</td>
<td>1890 - 1961</td>
</tr>
<tr>
<td></td>
<td>McGregor &amp; Jeeves</td>
<td>1895 - 1899</td>
</tr>
<tr>
<td></td>
<td>Jennings Bros.</td>
<td>(1893) 1899 - 1907/08</td>
</tr>
<tr>
<td><strong>Sidney Cluster</strong></td>
<td>Sidney Brick &amp; Tile Co.</td>
<td>1907 - 1927(?)</td>
</tr>
<tr>
<td></td>
<td>Sidney Island Brick &amp;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tile Co. Ltd.</td>
<td>1908-15; 1921-1924</td>
</tr>
<tr>
<td></td>
<td>Bazan Bay Brick &amp; Tile Co.</td>
<td>1911 - 1959</td>
</tr>
</tbody>
</table>
Figure 3.3: General Location of Mayfair Cluster
Canada, War Dept. 1887
Figure 3.4: Mayfair Cluster 1886-1900
from Hibben 1886; Waite 1893
Victoria Assessment Rolls 1892-1902
Current street layout with 19th century lot subdivisions

Figure 3.5: Mayfair Cluster 1988
adapted from Westport Publishing Co. 1988
3.5.1 Coughlan & Mason

George Mason arrived in Victoria in 1851 as an indentured Hudson's Bay Company brickmaker (Adams 1987). He continued to make bricks after his indenture was completed and in 1875 was turning out 16,000 bricks a day at his yard (Col., July 7, 1875). It was around this time that he went into partnership with John Coughlan. Their yard was located on the west side of Saanich Road (Figure 3.4). The plant itself occupied five acres of land and by 1884 was steam operated, the first in the area. There were six pug mills connected to a steam engine by 380' of shafting. These mills produced a mud mix of uniform consistency necessary for the smooth operation of the moulding machines. In 1883, 24 men were employed and the annual output was 3 million bricks (RBC, Aug. 1, 1883). Less than ten years later the yard occupied 17 acres including the clay banks. The plant consisted of "presses, drying sheds, kilns and other buildings" and employed 30 men. Output was over 3 million and even this was not enough to meet the demand (NWR, July/Aug., 1891). The Victoria Assessment Rolls (1892-1902) list a total of 12 acres to Coughlan & Mason. Lots 16-21 between Garbally and Elizabeth (Figure 3.4) contain almost 5 acres and are the most likely site of the plant. This concurs with
directory addresses. The remaining lots listed are probably clay banks. The company ceased production in 1896/97 when John Coughlan moved to New Westminster and established a brickmaking firm there (Adams 1979).

Physical descriptions of the location (RBC, Aug.1, 1883) indicate that the yard had "a gentle slope and southern exposure", ideal for the rapid drying of the brick before burning. An unlimited supply of "very superior clay" was easily accessible. Scove kilns were used to burn the common red brick; tile and special brick was burned in permanent kilns. Advertisements for the firm indicate a diverse range of building products (Figure 3.6). In addition, they were the only agents for, and manufacturers of, a patented streetlight (NVR July/Aug., 1891) which was used in various locations including the new Parliament buildings (B.C. Sessional Papers 1895).

3.5.2 Maurice Humber: Pioneer Brick Yard

Maurice Humber arrived in Victoria sometime during the 1860s. He initially worked as a bricklayer, plasterer and stucco worker. He was also a contractor and established his own brickyard in 1877 (VT Oct.19, 1908). The initial location of Humber's yard is unclear, although there are indications he took over
Elford & Smith,
BRICKMAKERS AND CONTRACTORS

ALL KINDS OF MOULDED BRICKS FOR SALE.

Queen City Steam Brick and Tile Works,
Brickyard: Saanich Road, VICTORIA, B. C.
P. O. BOX 284.

1900

M. HUMBER,
Brick-maker, Builder & General Contractor

Plain and Ornamental Plasterer, Cementing, Etc.

CENTRE-FLOWERS AND BRICKS OF ALL KINDS

CONSTANTLY ON HAND.

Brick yard shipped to all parts of the Province on shortest notice.

POST OFFICE BOX 200. TELEPHONE CALL 527.

WORKS: Pioneer Brick Yard, Saanich Road. RESIDENCE: Topaze Avenue.

Williams 1882-83

COUGHLAN & MASON,

Asphaltum Roofers,

Building Material, Lime, Bricks,
Drain Pipes, Vitrified Sewer Pipes,
CEMENT, ETC.,

W.I.G.S. WORKS, DUNMOORE ROAD.
OFFICE: GOVERNMENT STREET.
VICTORIA, B. C.

Williams 1882-83

Figure 3.6: Advertisements
Arthur Porter's operation on Saanich Road (Adams 1986, 1987). The clay pit for this yard covered lots 44-49 (Figure 3.4), an area of about 6.5 acres. In 1883/4, Humber's yards adjoined Coughlan & Mason's on Saanich Road (RBC Aug.1,1883) and, while directories of 1882-1884 list it on Saanich Road at Topaz, newspaper articles of 1885 suggest it was located on Gorge Road. One of his advertisements from this period simply gives Saanich Road as the location (Figure 3.6).

In 1884, using horse power and a workforce of 25, he produced 2 million bricks, most used locally in buildings for which he was contractor. He was also making plans to increase the size of his yard (Col., Jan.1, 1885). In February of 1885 (Col., Feb.27, 1885) he "received an extensive piece of clay land on Gorge Road and will enlarge his already extensive brick kiln and yard." He was using this new yard by mid-July to burn a kiln of 500,000 bricks (Col., July 16, 1885) and in August (Col., Aug.6, 1885) he "connected pipe between the main and the meter for water to buildings on Gorge Road." Still using only horse power, he produced 3 million bricks in 1885, which required 300 cords of wood to burn; 45-50 men were employed with a monthly payroll of $2000 (Col., Jan.1, 1886). A few months later, citing increasing demand and progress,
Humber replaced his horses with a new steam-powered brickmaking machine (Col., March 1, 1886). Whether he actually had two yards or only extended his original one is unknown. Whatever the case, he was definitely located on the east side of Saanich Road at Topaz by 1892. His yard (Figure 3.4) covered 14 leased acres on the north side of the avenue and just over 4 acres on the south side (Victoria Assessment Rolls 1892-1902).

He did not, however, remain fully mechanized. In 1909 (BCMM Report 1908:184) the yard is described as "enjoying the distinction of still manufacturing by hand". The pug mills (6 or 7) were operated with both horses and a 10 hp engine. Clay was hand dug and the soft mud moulded by hand, hand carried to the drying yard and then stacked and burned in scove kilns. Annual production was 3.5 million bricks. The clay pits were located near or in present day Topaz Park (Figure 3.5) (Humber 1985; Don Smith 1985). In 1908 the firm employed 40 men (all white), produced 50,000 bricks a day and successfully burnt the largest kiln on record, 1.5 million bricks. This required 104 fires and 500 cords of wood. Maurice Humber died in 1902 but the yard was continued by his son Russ (VT Oct.19, 1908). It ceased operations in 1927.
Coughlan & Mason and Humber are the only brickmaking firms listed in directories for the 1870s and early 1880s. The Canadian census of 1881 provides the following information about two yards:

- # of employees - over 16 years ..8
  - under 16 years...1
- Yearly wages - $1100
- Total value of raw material $300
- Total value of articles produced $4000.

If this information is accurate and if it applies to the two yards just described, it would appear that Coughlan & Mason was not yet mechanized and that business was rather slow. This would fit with the general economic picture of the period from 1872-1880 which Gregson (1970:48) describes as "the most dismal in Victoria's economic history." By 1883, as brickyard production indicates, this depression was over and the vast building boom, which lasted until 1914, was about to begin. At least four more firms came into existence during the last half of the 1880s, most located somewhere in or near the Mayfair cluster. These were Kempster Bros., which will be discussed in a later section; Kelly & Haines, and Moore (Col., Jan.1, 1889), about which very little is known and Elford & Smith which is described below.
3.5.3 Elford & Smith: Queen City Brick Yard: Victoria Brick Co. Ltd.

Contractors J.P. Elford and William Smith started their yard in 1886 on Garbally road (VT, Dec. 4, 1968) with a capital of $50,000 (Boam 1912). Although the exact location is not known, a yard depicted on an 1889 engraving approximates their position (Figure 3.7) and could be their first yard. The illustration shows scove kilns or stacks of bricks, several buildings and what appears to be a pit in the centre. This fits with later descriptions of the site which describe bricks made by the slop method with the mud mixed in a pit and the bricks moulded by hand (VT, Dec. 4, 1968). The yard production in 1888 was 1.8 million and they employed 20 men; monthly wages totaled $650 (Col., Jan. 1, 1889). They operated here for at least 3 years, moving sometime between 1889 and 1991 to a 21-acre site (Victoria Assessment Rolls 1892-1902) northeast of Humber's yard on Topaz (Figure 3.4). This was reduced to 10 acres by 1912 (Boam 1912).

In 1894 they ran into problems with the Victoria & Sidney Railway. Railway construction was halted for six months while the dispute was settled. The V&SRR had a right of way through the brickyard and the problem lay in compensation. Money was not the major
concern but rather access to the clay beds. In the end, the V&SRR agreed to put a trestle over a major portion of the distance to allow use of the clay beds on both sides of the rail lines. Some 950 feet of trestle had to be built over the brickyard to bring the tracks to street level again at Hillside Ave. (Hearn and Wilkie 1971).

Their plant was fully mechanized by 1896 and had a daily capacity of 45,000 bricks (Col., April 6, 1896). The plant burned down in April 1908 and was replaced with new up-to-date equipment and fireproof buildings (Col., April 20, 1908). In 1909 (BCMM Report 1908:184) the yard was described as being "located on a portion of the clay bed from which the surface clay has been removed". Equipment in 1909 included a disintegrator, pug mills and a soft-mud machine with an output of 40,000 bricks a day. Clay was hand dug from a bank with a 12 foot face and transported by horse and cart to the disintegrator. Moulded bricks were taken to the drying yard on hack barrows where they were stacked on racks to air dry. Most of the brick was burned in a coal-fired updraft kiln with a capacity of 300,000. Scove kilns were used only as a supplement. They also manufactured drain tile, about 12,000 a day, and had an annual output of 3.5 million bricks. Their 1908/09 yard
is illustrated in Figure 3.8.

Elford & Smith were well known as contractors, specialists in brick and stone construction (Col., April 6, 1896). In August 1901 they went public, selling 253 shares at $100 each (B.C. Gazette Aug.6, 1901). Their new corporate name was the Victoria Brick Co. Ltd. The company changed hands several times during the 1900s. In the 1920s it was owned by Luney & Parfitt Bros., a large contracting firm; the new owners retained the old name (Don Smith 1985). It ceased operations sometime after 1934.

3.5.3.1 Water Problems

An adequate supply of fresh water is crucial to the successful operation of a brickyard. It is apparent that all of the yards that operated around the middle of the 1880s had problems with this (Col., July/Aug., 1885). At this time, all of the yards were outside of the city limits (Figure 3.4). However, the city water supply came right past the brickyards down Saanich road from Elk Lake (Lee 1969). Several of the brickyards connected pipes to the main in defiance of city regulations. When city engineers shut the water off, John Coughlan simply turned it on again. The city petitioned to shut off the water permanently if the
Figure 3.8: Two Mayfair Cluster Brickyards - 1908
B.C.M.M. Report 1908:200
rules were not followed (Col., July 9, 1885). Petitions for water service went back and forth between brickyard owners and the city water committee (Col., Aug.6, Aug 20, 1885) and by the end of the year the matter seems to have been resolved in favour of the yards. Further applications in 1886 allowed connection under the same conditions arrived at in 1885 (Col., April 15, May 6, 13, 1886). Prior to connection to the city water supply, water came from wells drilled in the yards.

3.5.4 Baker Bros. Brick

James Baker established his brickyard in 1890 (Col., April 6, 1896) north of Elford & Smith at the corner of Saanich Road and Tolmie Avenue (Figure 3.4). It was situated on just over 13 acres (Victoria Assessment Rolls 1892-1902) near the centre of the clay deposit (BCMM Report 1908:184). Two years after opening, they produced 5 million bricks some of which were re-pressed face bricks of high quality (Col Jan.1, 1893). In 1896 the yard was well equipped and the plant steam operated with an output of 50,000 bricks a day (Col., April 6, 1896). By 1909 the operation was similar to that of Elford & Smith (BCMM Report 1908:184). Baker, however used small tram cars rather than wheelbarrows to transport brick to the drying
yard. All the brick was burned in scove kilns containing 400,000-800,000 each. By this time repressed brick was no longer being made. Drain tile was burned in a downdraft beehive kiln with a capacity of 10,000-20,000. The yard is illustrated in Figure 3.8; a fire insurance map (Figure 3.9) shows the layout of the plant as it was from the 1930s on. The three large beehive kilns were for drain tile while the small one was used for flowerpots (Don Smith 1985).

George Graham, (Col., October 10, 1953) superintendent of the company in 1953, described its operation in the 1950s:

...There are three different kinds of clay and we blend them together....The clay is dug by power shovels and transported by truck to storage sheds where it is stored for winter use. Clay for brick and tile is crushed in two sets of rollers, then tempered in a pug-mill....Clay for flowerpots is first screened then poured into outdoor settling-basins, before being wet down again and sent through a machine....Pots, tile and brick are placed in beehive kilns built of brick. Then they are baked for five days....Heat comes from wood fires. Each baking uses up 34 cords of wood. Heat from the kilns is piped through tunnels into the drying room....The flat Roman blocks are the only bricks made here now. The plant produces...some 16,000 pieces of drain tile, 6000 pieces of hollow fireproof building tile and 10,000 flowerpots every day.

Baker Bros. was purchased by Luney & Parfitt in the 1920s after the latter had acquired Victoria Brick
Figure 3.9: Baker Brick Co.: Spatial Layout 1925-1950
E.C. Underwriters Assoc. 1950 (1925)
Co. Ltd. It was sold again in the 1940s to Evans, Coleman and Johnson Bros. Ltd. who now carry on business as Ocean Cement. Dwindling clay supplies, competition from cheaper cement products and a lucrative offer for the acreage saw the last brick company in the study area end its operations in 1960/61.

3.5.5 McGregor & Jeeves; Jennings Bros.

Little is known about these firms except for their names and location. McGregor & Jeeves operated a small brickyard on almost six acres south of Baker's (Victoria Assessment Rolls 1892-1902). They seem to have been a small contracting firm, probably taking advantage of the building boom of the 1890s. They were in business as brickmakers from 1895-1899.

In 1899, their location was taken over by Jennings Bros., brickmakers who worked for Elford & Smith prior to 1892 (Williams Directory 1892). They had a yard somewhere in the area in 1893 but may not have been able to sustain it (Col., Jan.1, 1893). They continued in the location next to Baker's until 1907/08 (Figure 3.4).

Throughout the late 1880s and 1890s, the Mayfair cluster provided employment for hundreds of men. The Canadian census of 1891 provides the following
information about the Brick and Tile Industry in Victoria. The data are for five firms, four of which have been described; the fifth is unknown.

fixed capital ..........55,000 in land
                   9600 in buildings
                   23,200 in machinery and tools

working capital.......44,010
employees..................135 men, 2 boys
wages......................39,250
value of raw material.....5500
value of finished material..122,000

The increase in the industry in ten years is quite substantial and reflects the booming economy and rapid growth of Victoria.

THE SIDNEY CLUSTER

With no more land available in Victoria for the brick industry but with demand still high, new firms were established in the Sidney area of the Saanich Peninsula in the first decade of the 20th century. Although not as densely concentrated, they are close enough to constitute a nucleated complex. There were at least three firms in this area. Their general location is shown in Figure 3.10. Two of the yards are located on a more detailed map in Figure 3.11, while Figure 3.12 shows the present street layout of the same area.
Figure 3.10: Sidney Cluster, from Clapp 1913.
Figure 3.11: Yards near the town of Sidney
Island Blueprint 1921
Figure 3.12:
Yards near the town of Sidney: Present street layout

Sidney Brick & Tile
Chinese Yard?
Brickyard Road (1921)
Bazan Bay Brick & Tile

Westport Publishing Co. Ltd. 1988
3.5.6 Sidney Island Brick & Tile Co. Ltd.

This company was incorporated in October 1908 (B.C. Gazette Oct. 23, 1908) by George Courtney, who owned Sidney Island, J.L. Skene, a contractor involved in building the Empress Hotel and Ben Greer, a towboat owner (Col., April 3, 1973). Modern machinery was installed and all kinds of brick, including pressed brick, produced (VT. Sept. 19, 1908). Maximum output was 55,000 bricks a day and at peak production 70 men were employed. The operation of the yard was somewhat different from others in the region. Using a system of cable-drawn hoppers, clay was hauled up a runway and dumped into a pug mill. From here it went into a stiff-mud machine. However, gravel in the clay caused the wires to snap quite frequently resulting in much lost time while repairs were made. The green bricks were loaded onto small iron carts which ran through a tunnel drier. Scove kilns were used to burn the brick. At first 22 Japanese and a few whites provided the labour; later the work force was mainly Chinese (Col., April 3, 1973). Despite using modern methods, the plant does not appear to have been too successful. It was incorporated as a limited company in 1914 (B.C. Gazette Sept. 19, 1914); however, George Courtney had to sell the island in 1915 to pay off brickyard debts.
and the plant closed for several years.

J.L. Skene re-opened the brick yard in 1921/22 in conjunction with the Pacific Crating Co. (VT, May 31, 1921; Feb.9, 1922). Its capacity was 70,000 bricks a day. The new plant consisted of a tunnel kiln with 1200' of track and 230 cars. Waste heat from the box and crate factory was used to operate the brickyard. Since no outside drying was required the plant could operate all year instead of 3-4 months like most others. It appears to have operated for about 2-3 years before finally closing. The site is presently located within the boundaries of a provincial marine park.

3.5.7 Sidney Brick & Tile Co.

In 1907 in response to a rapidly increasing market for brick, Russ Humber, who operated his father’s yard in Victoria, purchased 40 acres of the best clay lands with water frontage in Sidney. He anticipated the building of a modern plant, relocating his Victoria business to Sidney in order to save on shipping costs (Col., April 30, 1907). Five carloads of machinery from Chicago arrived and when set up, the plant was capable of producing 48,000 bricks a day. In the beginning 35 men were employed but more were expected to be hired and a boarding house was built to house them (Col., May
15, 1908). Whether or not he closed his Victoria yard at this time has not been determined since directories continue to list it at Topaz Avenue.

There are several references to a Chinese brickyard in Sidney (Clapp 1913; Reading 1978; Ries and Keele 1912). Oral descriptions of the yard place the clay pit at a place called Charlie's Pond, after the Chinese man who worked there. This is now apparently a duck pond in the Ray Creek Area near Greenglade School. It is also described as being in or near the Maryland Drive subdivision not far from the coast (Reading 1978). These present day locations are indicated on Figure 3.12. Since the Humber yard is in the same general location as that given for the Chinese yard, the assumption is that Humber's yard, the Sidney Brick & Tile Co. Ltd. was operated mainly by Chinese. However, the method described for making the brick does not accord with the plant equipment. The description is by a brickmaker who worked at the Bazan Bay Brickyard in the 1920s, Reg Reading (1978):

...they had a slop mould, very soft, the clay had to be very soft because they only had one horse on it [the pug mill]...then it used to be pressed right down into the mould, the same as a soft mud machine... the Chinamen would take them after they were dumped out onto the pallet, they would take them out barefoot out into the yard and put them on the ground [to dry]....
Whether there were actually two yards or only one is difficult to determine. It is not known how long the company operated but Humber went out of business in 1927/28.

3.5.8 Bazan Bay Brick & Tile Co. Ltd.

James Reading, an English brickmaker, arrived in the Sidney area in 1907 and worked at the Sidney Island Brick Co. for several years. He soon purchased some 12-20 acres on what is now McTavish Road. Although the details are not completely clear, there seem to have been two or even three brickyards within a few hundred feet of each other (Reading 1978). The B.C. Gazette (1911) lists two incorporations for a company (or companies) called Bazan Bay Brick & Tile. The first, May 10, involved leasing lands and an agreement between M. Wise, E. Wise, E. Warner and J. Mann. The second was incorporated on October 25, possibly by James Reading. This information concurs with that given by Reg Reading (son of James) in a 1978 interview. One of the yards was "down by the beach", the other by the road above. The beach location is now the site of a sewage treatment plant.

Somewhat different operating methods were used at each yard. Reading refers to the yards as "bottom" (on the beach) and "top" (by the road). The bottom yard was
in operation first. A steam operated disintegrator was used to prepare the clay, taken straight from the bank, for the wire-cut stiff-mud machine. The top yard seems to have used a horse operated pug mill and/or brick machine. The clay was prepared the night before. A team of horses was needed to operate the stiff-mud machine which had a vertical auger. The clay came out of the machine in a long rectangular block which was cut into six bricks at a time. The dried brick was burned in scove kilns, drain tile in a beehive kiln.

The bottom yard operated for about two years and then Wise & Warner sold it to the Island Investment Co. This company put in another brick yard over on the north side of Bazan Bay road but it operated for only one year (1914). It is unclear whether the bottom yard continued to operate at the same time. The brick machine imported from the U.S. made a product slightly smaller than standard, an error which was not discovered until the season's output was sold. The 3 million bricks sold for only $3.00 per 1000 well below the normal going price. The Island Investment Co. went out of the brick business. There was now only one brickyard, the top one by the road.

James Reading bought a soft-mud machine to replace
the problem-plagued stiff-mud machine and continued to operate the brickyard throughout World War I and the Depression with his sons. The Bazan Bay Brick Co. was sold sometime after this to a Vancouver firm, Champion & White, who shipped all the brick on scows to Vancouver (Reading 1978). Brick production ceased in 1959.

Unlike firms in the earlier Mayfair cluster, those in the Sidney cluster were not involved in contracting. All were businesses producing for retail only.

3.6 SPECIAL BRICKWORKS

Several brickyards in the study area do not fall into any of the previous categories. These include two brickyards which were apparently opened to provide brick for the federal graving dock in Esquimalt; B.C. Pottery Co. Ltd., which manufactured firebrick and other clay ware, and the Silica Brick & Lime Co. Ltd., which produced the sand-lime brick.

3.6.1 The Graving Dock: Atkins Road brickyard and Kempster Bros.

The Esquimalt graving dock was begun by the provincial government under an agreement with the federal government. The project took nearly ten years to complete and was plagued with supply problems (B.C. Sessional Reports 1880-1890). Among these was an
adequate supply of brick. The first solution was to open a brickyard at Parson's Bridge (Figure 3.13). W. Bennett, the Resident Engineer, described the site in his annual report to the provincial government (B.C. Sessional Report 1881:367):

The bricks are made near Parsons Bridge, at the head of Esquimalt Harbour; suitable clay and sand is found there in abundance, and water is obtained from Thetis Lake by means of a flume. The yard room for drying brick is not nearly large enough, and one brick moulder only can be employed for lack of drying space; and as one man can, on an average, mould but 750,000 bricks in a season this inadequacy of accommodation, and the want of brickmaking machinery, is a serious matter, taking into consideration the total number of bricks required for the work, which will, at the least amount to 3 1/2 millions.

The inadequacy of the yard was proven in 1882 as only 105,000 bricks were delivered to the dock site causing considerable delays in the work (B.C. Session Report 1882).

The second solution was to seek tenders for supplying brick. Humber bid on the contract at $12.50 /1000 but it went to a lower bid, $10.00/1000 (B.C. Sessional Report 1882). In February 1885, the Kempster brothers entered into a contract with the graving dock contractors Larkin, Connolly & Co. to supply brick for the dock and purchased 25 acres at $200 an acre on Gorge road (Col., Feb. 27, 1885). Vague descriptions
of the yard's location place it "above the bridge" (Col., Feb. 27, 1885) and "beyond the Gorge bridge" (Col., Jan. 1, 1886). All that can be said is that it was on the Gorge Road (Col., Jan. 1, 1886) side of Victoria Arm somewhere west of the Gorge bridge (Figure 3.14). Their brickyard was described in the Colonist on June 18, 1885 (p.3):

Messrs. Kempster Bros. have set their machine for moulding bricks by steam. Some 60 hands are busily engaged, the capacity of the works being 60,000 bricks daily. The clay is thrown into a sort of hopper and presently comes out in the shape of well moulded bricks which are borne away on trays and trucks and placed on racks where they are sun and weather dried before being placed in the kiln for burning. The brickmaking machine and pumps for raising and supplying water to the works are run by a 30 hp engine...

It soon became apparent, however, that the Kempster brothers, who came from Chicago, were not good businessmen. They lacked capital, accepting contracts without the means to fulfill them. The situation was covered by the Colonist throughout the summer. Their primary contract was to supply brick for the graving dock and, in accepting others, they neglected their initial obligations. Larkin, Connolly & Co., who held the mortgage on the brickyard machinery, took possession of the yard in order to produce brick for the graving dock (Col., July 7, 1885). The whole matter ended up in court a few days later (Col., July
10, 1885) and was resolved but without ending the Kempster's financial problems. Office furniture as well as a buggy and two horses were seized by the sheriff and brickyard employees were not paid (Col., July 17, 18, 1885). The Colonist commented on their affairs (July 17, 1885:3):

Matters look dismal for the firm and unless financial relief should arrive soon from Chicago, there is a prevalent belief that they must succumb.

It appears that this did happen although the brickyard continued to operate for the rest of the season and to ship brick to the graving dock (Col., Jan. 1, 1886). The brick supply problems did not, however, entirely cease; in March 1886, two scows each loaded with 10,000 bricks sank on the way to the graving dock (Col., March 21, 1886). No other information has been found and how long the yard continued is not known.

Testimony from the court case (Col., July 10, 1885) revealed some facts about the brick industry not found elsewhere. Brick was transported to the dock site where it was sorted and the soft brick (improperly burned) was removed. Some loads were completely rejected. This rejected brick was then sold locally at a presumably lower price ($7.25 - $9.75/1000). It was apparently good enough for factory buildings. It also
seems that brick machinery was manufactured locally. The Kempster’s had made arrangements with Wilson Bros. (Victoria Foundry) to build two machines but never received them.

Exactly who owned these two yards is somewhat unclear although it appears that the first one, at Parson’s Bridge, was probably owned by the contractors. Whether it continued to operate after 1882/3 is not known but the site does appear in later geological reports (Clapp 1913; Ries and Keele 1912). Kempster Bros. appears to be some sort of partnership between the contractors and the Kempsters with one providing the land and capital, the other the machinery.

3.6.2 B.C. Pottery Co. Ltd.

B.C. Pottery was started as a private company by Keller & Burris in the fall of 1889. It was located on the Esquimalt & Nanaimo Railway line just outside the city limits (Figure 3.15). The initial plant was described in the Colonist (Nov. 23, 1889) as consisting of two large frame buildings and one large brick kiln. There was a two storey workshop (60’x40’) with an engine room in the rear and a drying room (75’x25’) with slatted floors. Beneath these floors lay 2000’ of steam pipe to provide heat for drying. Clay was taken
Figure 3.15: B.C. Pottery Co. Ltd.
Island Blueprint 1913
from a 30' pit and carried to a disintegrator by means of a belt elevator. From there it went into the pug mill and moulding machine. Products to be made were tiles and various types of pots.

Just over one month later the pottery was completely destroyed by fire, most of the machinery still in crates (Col., Dec. 31, 1889). By the middle of April 1890 the plant had been rebuilt and was in operation, the engines and machines installed by the local firm Albion Iron Works (Col., April 17, 1890). It seems likely that, given the loss of the previous year plus the cost of rebuilding, Keller & Burris ran into financial difficulties. Whatever the reason, on Sept 9, 1890, they went public, establishing the B.C. Pottery & Terra Cotta Co. Ltd., selling 1000 shares at $60 each (B.C. Gazette 1890).

This company also had financial problems and was liquidated June 28, 1895. Outstanding debts included two mortgage indentures from 1891 as well as an overdue and unpaid promissory note total value given as just over $19,000 (Col., June 28, 1895). In October 1895, the property was taken over by J. Hunter and C. Vernon. It was still in production and was soon to be improved (Col., Oct. 1, 1895). The B.C. Pottery Co. Ltd. was incorporated on Nov.29, 1895 to acquire the business
carried on by Vernon and Hunter. The capital stock was $150,000 (15,000 shares @ $10) and the trustees were C. Vernon, J. Hunter and James Dunsmuir (B.C. Gazette 1895; Col., Dec. 6, 1895).

Among the early commissions of the new plant were contracts to supply firebrick to the British Navy on the Pacific coast and for coke ovens at Union Collieries (Cummings and McCommon 1952). The plant was described in a special edition of the Colonist in 1896 (April 6). It occupied four acres and manufactured:

- salt glazed vitrified sewer pipes and connections,
- double strength culvert pipes, agricultural drain tile, inverts, paving brick, flooring tiles, flue and stove linings and all kinds of firebrick and fireclay goods, chimney pots, flower pots, terracotta to architects designs etc.

A fire insurance map of 1903 shows the layout of the plant (Figure 3.16). Fireclay came from the Wellington Colliery Company's mines at Nanaimo and was added to the more fusible glacial clay found behind the plant. It was first ground up and screened then mixed with the glacial clay in wet pans. From there it went into the various moulding machines. Products were dried with waste heat from the kiln and exhaust steam from the engine. There were seven beehive kilns as well as a smaller test kiln (BCMM Report 1908). The complex is illustrated in Figure 3.17.
Figure 3.17: B.C. Pottery Co. Ltd. - 1908

B.C. POTTERY CO'S WORKS VICTORIA
B.C. Pottery Co. Ltd. burned down in September 1913, a loss of $100,000-150,000; all that remained were six kilns (Col., Sept. 23, 1913). The pottery was rebuilt larger although its output decreased (BCMM Report 1913-18) and it ceased operations in 1929 (Cummings and McCommon 1952).

3.6.3 Silica Brick & Lime Co. Ltd.

The Silica Brick & Lime Co. Ltd. was incorporated Nov. 8, 1906, with a capital stock of $150,000 (B.C. Gazette 1906). It was the second plant of its type in Canada, the first built a few years earlier in Winnipeg (VT, Sept. 19, 1907). The plant was situated about 1/2 mile west of Parson's Bridge (Figure 3.18) in the centre of an isolated bed of limestone and sand bank (Clapp 1913; Col., June 28, 1907). It is illustrated in Figure 3.19. The entire plant, buildings and equipment cost upwards of $50,000 (VT, June 28, 1907). The machinery arrived in five box cars from Toronto. Setup and management of the plant was by G. Bradbury, a large shareholder in the Winnipeg operation. Its daily capacity was 20,000 bricks and 200 barrels of lime. There was also a company-built house for the workers (Col., April 30, 1907). Between the plant and the E&NRR spur line, a large platform was constructed for brick storage (Col., June 28, 1907). In the first year
Figure 3.19  SILICA BRICK & LIME CO'S PLANT, NEAR VICTORIA.  B.C.M.M. Report 1907
of operation (1907) over 1.1 million bricks were produced priced at $15/1000; in 1908 the output was 3 million selling at $12/1000. By 1912 the company had undergone a name change to the Victoria & Vancouver Lime & Brick Co. Ltd. (BCMM Report 1908-12). It ceased operations sometime during 1916/17.

3.7 A SYSTEMIC APPROACH TO BRICKYARD LOCATION AND ORGANIZATION.

Brickmaking is a seasonal industry generally operating from April to October. There is no doubt that firms other than those described existed but apart from their names, no information has been found concerning their operation or location. Despite the missing information, it is possible to reconstruct the development of the industry in the area. Data relating to ownership, and operating methods are summerized in Table 2. The location and growth of the industry can be divided into three stages, each related to specific periods of settlement expansion and to patterns in ownership and operation. These are outlined in Table 3.
<table>
<thead>
<tr>
<th>Name</th>
<th>Years</th>
<th>Ownership</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBC (Mason)</td>
<td>1851-56/57</td>
<td>private</td>
<td>estate</td>
</tr>
<tr>
<td>PSAC</td>
<td>1853-56</td>
<td>private</td>
<td>estate</td>
</tr>
<tr>
<td>Mason &amp; Porter</td>
<td>1856-6(?)</td>
<td>private</td>
<td>rural</td>
</tr>
<tr>
<td>Arthur Porter</td>
<td>1858-7(?)</td>
<td>private</td>
<td>rural</td>
</tr>
<tr>
<td>Fox Bros.</td>
<td>1858-6(?)</td>
<td>private</td>
<td>rural</td>
</tr>
<tr>
<td>Coughlan &amp; Mason</td>
<td>1875-96/97</td>
<td>private</td>
<td>complex</td>
</tr>
<tr>
<td>M. Humber</td>
<td>1877-1927</td>
<td>private</td>
<td>complex</td>
</tr>
<tr>
<td>Parson’s Bridge</td>
<td>1881-?</td>
<td>private</td>
<td>special</td>
</tr>
<tr>
<td>Kempster Bros.</td>
<td>1885-86</td>
<td>private</td>
<td>special</td>
</tr>
<tr>
<td>Elford &amp; Smith</td>
<td>1886-1930</td>
<td>private-&gt;</td>
<td>complex</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Baker Bros.</td>
<td>1890-1961</td>
<td>private-&gt;</td>
<td>complex</td>
</tr>
<tr>
<td></td>
<td></td>
<td>corporate</td>
<td></td>
</tr>
<tr>
<td>B.C. Pottery</td>
<td>1890-1927</td>
<td>corporate</td>
<td>special</td>
</tr>
<tr>
<td>McGregor &amp; Jeeves</td>
<td>1895-99</td>
<td>private</td>
<td>complex</td>
</tr>
<tr>
<td>Jennings Bros.</td>
<td>1899-1908</td>
<td>private</td>
<td>complex</td>
</tr>
<tr>
<td>Silica Brick &amp; Lime Co.</td>
<td>1907-1918</td>
<td>corporate</td>
<td>special</td>
</tr>
<tr>
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<td>1908-27(?)</td>
<td>corporate</td>
<td>complex</td>
</tr>
<tr>
<td>Sidney Island Brick &amp; Tile</td>
<td>1909-24</td>
<td>corporate</td>
<td>complex</td>
</tr>
<tr>
<td>Bazan Bay Brick</td>
<td>1913-59</td>
<td>corporate</td>
<td>complex</td>
</tr>
<tr>
<td>PERIOD</td>
<td>ORGANIZATION</td>
<td>LOCATION</td>
<td></td>
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<td>-------------------</td>
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<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>Initial 1843-1880</td>
<td>estate rural</td>
<td>estate &gt;1.5 miles</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>east of Fort</td>
<td></td>
</tr>
<tr>
<td></td>
<td>complex</td>
<td>&gt;1.5 miles north of city</td>
<td></td>
</tr>
<tr>
<td>Expansion 1881-1917</td>
<td>complex</td>
<td>&gt;2 miles north of city</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;10 miles north of city</td>
<td></td>
</tr>
<tr>
<td></td>
<td>special</td>
<td>west of city limits, varying distances</td>
<td></td>
</tr>
<tr>
<td>Consolidation and Closure 1917-1961</td>
<td>complex</td>
<td>&gt;2 miles north of city</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;10 miles north of city</td>
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</tr>
</tbody>
</table>
No industry can operate in isolation. It comes into existence when there is a demand for its product and ceases operations when its market disappears. The interrelationships between brickmaking and the economic sub-system of which it is part and between the larger cultural system and its subsystems are illustrated in Figure 3.20. Extractive industries, such as brickmaking, normally locate at, or very close to, their source of primary raw material, in this case clay. Prior to the analysis of the periods outlined in Table 3, Weber’s theory of location of industries is briefly outlined (Friedrich 1929; Grant 1987).

3.7.1 Weber’s location theory

Alfred Weber’s location theory has been referred to as a least-cost theory primarily oriented around costs of transport and labour. The ideal location is one which minimizes either or both of these depending on the type of industry concerned. Weber’s theory also applies only to manufacturing industries (Friedrich 1929). It makes a number of basic simplistic assumptions and represents ideal situations, not reality. Furthermore, it neglects such variables as demand and mobility of labour. These are the major criticisms about the theory, first formulated in 1909.
X - ideal least cost location of brickyard

Figure 3.20: Brickmaking Location System
Despite these criticisms, however, Weber’s theory is still of value and has become known as the foundation of classical location theory (Grant 1987).

Weber (Friedrich 1929:25) outlines four steps in the manufacturing or industrial process: securing the location, securing the materials of production, the manufacturing process itself and shipment of finished goods. All four steps involve costs of varying kinds. Therefore, the location that allows for the least total costs is the most advantageous. Agglomeration of industries occurs when production becomes concentrated in one particular place. It is an advantage in lowering costs and may take the form of either enlarging the plant or concentrating several plants in one location. Deglomeration occurs when decentralization of an industry also results in lower costs. It often follows a rise in land prices brought about by the increased demand for land in agglomeration (Friedrich 1929).

From a systemic point of view, the cost factors involved in Weber’s location theory can be viewed as feedback loops or variables. Of the four steps outlined above, the manufacturing process itself has been described as a closed system. The remaining steps, however, are more subject to external influences
and thus constitute components of an open system. Taken all together, the entire industrial process can be viewed as an open system with specific boundaries beyond which it is not viable. The choice of location, then, can be seen as the result of a series of decisions designed to maintain a stable system at the least cost. Using these cost variables, brickmaking locations can be viewed systematically through time to determine their relationship with society in general. The historical background of the three temporal periods summarized in Table 3 is briefly sketched prior to analysis of brickyard location in each period.

3.7.2 Initial Period: 1843-1881

Settlement of the study area began in 1843 with the construction of the Hudson’s Bay Company’s trading post, Fort Victoria. In early 1849, the British government granted the Hudson’s Bay Company control of all Vancouver Island; in return, the Company agreed to establish a permanent colony by bringing out settlers and selling land (Pethick 1968). Most of the prime agricultural land within a five mile radius of the fort was controlled either by the Company or its subsidiary the Puget Sound Agricultural Company and by 1852/53 several large farms were in operation (Floyd 1969).
The gold rush in 1858 led to an influx of people of different social and ethnic backgrounds inevitably leading to permanent changes in the social and economic structure of the small colony. A series of economic boom periods and recessions characterize the rest of the period. Victoria was incorporated as a city in 1863 and became the capital of the province in 1871.

During the initial period, brickyards were located west of the Fort on a Puget Sound Agricultural Company farm (Craigflower) and east of the Fort on either Hudson’s Bay Company farm land or government reserve land (Adams 1987). These were estate owned and operated and confined within the boundaries of estate property. Estate production ceased around 1856/57. Shortly after this a privately owned company was established about one mile southeast of the Fort. A few years later it moved to another location east of the Fort where it operated for a short period before moving again. At around the same time, 1856/57, at least two more independently owned yards were established about one mile north of the Fort on property leased from John Work (Adams 1987).

The choice of locations in this initial period was probably the result of several cost factors: accessibility of raw materials (clay, water and
timber), available transport, available labour and market for the product. James Douglas, the founder of Fort Victoria, was aware of the potential of the clay resources prior to the establishment of any brickmaking (Bowsfield 1979) and later geological reports (Clapp 1913) show abundant clay deposits throughout the area, some very close to the surface. Early geographical surveys showing topography (Forward 1976) indicate that the early yards were probably located on plains near large stands of timber. Water was obtained from wells. Transport was only by wagon over rough trails and partial roads or by water. Prior to 1856/57, labour was provided primarily by indentured Hudson’s Bay Company and Puget Sound Agricultural Company employees.

It also appears that the optimum distance for the independent yards was approximately one mile from the Fort in either a north or eastern direction, most likely due to transport costs. In both cases, however, the yards can be considered on the frontiers of the settlement. They were outside the boundaries of the townsite in largely agricultural areas yet were close enough to reach the market easily on the available roads but not close enough to bother the residents with their noxious fumes.
The movement of the eastern yard to the northern location constitutes the beginning of agglomeration of the industry. Movement was due to a combination of costs, primarily land and transport. Although the eastern location, like the northern, was outside the city limits established in 1863, it appears that the land in the east was more valuable and was subdivided into rural residential estates. Residence in the northern area was still sparse and most of the district was composed of small farms. The city boundaries were extended again in 1873 but the brickyards remained outside. The northern location had easily accessible clay, was on a major road and was relatively close to docks just inside the city limits. Thus transport costs could be kept down, land outside the control of the city was cheaper and a major source of labour, the Chinese community, was closer. Excluding estate yards, the brickworks of the initial period are mapped in Figure 3.21.

From a systemic viewpoint, locations of brickyards during this period were unstable. Although the manufacturing process itself was a stable closed system, the whole industrial process was subject to perturbations setting positive feedback mechanisms in operation. Estate production ceased when the
Figure 3.21: City of Victoria Brickyard Locations
adapted from Context: OCP 1986
indentured labourers left the Company. Having no other source of experienced labour available at such a cheap cost, brickmaking ceased to be viable for the estates. Although other variables may have influenced the closure, labour appears to be the most prominent. The niche left by the absence of estate production was filled by small rural yards operated initially by former Hudson’s Bay Company employees as well as independent settlers. An increase in land values set in motion the movement of the eastern yard to the more cost efficient northern location where other yards were already located. This agglomeration of brickyards was a focal point of the industry for decades to come.

3.7.3 Expansion: 1881-1917

The economic recession was finally over and the study area was entering a period of growth that would last almost thirty years. The brick industry expanded taking advantage of increased markets both local and in the Vancouver area on the mainland.

At the beginning of this period, brickmaking was also established northwest of the city, again outside city limits. The brickyard at Parson’s Bridge (1880/81) was the first of four established in this direction over a period of thirty years. These yards, however, were constructed for special purposes. The
yard at Parson’s Bridge produced brick for the federal drydock in Esquimalt harbour. Close to the water, the brick was moved by scow directly to the drydock, a considerable saving in transport time and cost. When the one was unable to supply enough brick, a second was established above the Gorge bridge.

Railways played an important role during this period. The Esquimalt & Nanaimo Railway west of the city was completed in 1886 and two special brick manufacturing firms were established along its route. In 1890, the B.C. Pottery Company began production. It was not primarily a brickyard but it did produce the only firebrick in the region. Later, in 1907, sand-lime brick was being produced about a half mile west of Parson’s Bridge. The construction of the Victoria & Sidney Railroad in the 1890s encouraged the development of new firms in the Sidney area more than ten miles north of Victoria. Three firms were established within the final ten years of the period in essentially rural areas near the town of Sidney.

The City of Victoria extended its boundaries one final time in 1891, this time including the northern brickyard complex within its limits. Although still primarily rural, residences, especially on the western
side of Saanich road, were encroaching on the brickyard complex. Houses were also appearing on the southeastern reaches of the complex and soon after the turn of the century, the eastern reaches of the complex were close to residential subdivisions. By the end of the century, brickmaking was confined to the eastern side of Saanich road between Tolmie Avenue to the north and Topaz Avenue to the south. Its western boundary was basically present day Blanshard Street.

Brickyard location in the expansion period follows a distinctive pattern. In the nineteenth century the core production area of common red brick remained the northern complex at the edge of the city. Production of speciality goods—firebrick and silica brick—took place west of the city in unorganized territory with cheaper land costs. Firebrick was made only after the railway was completed enabling the special clay to be shipped from coal mines north of the study area. Silica brick, a late nineteenth century development, requiring an extensive plant, adequate raw materials and an efficient transport system, was not produced until 1907. The two companies producing red brick were not cost effective and did not survive long. The first, at Parson’s Bridge, did not have enough land and its annual output was too small. The second, Kempster
Brothers, was financially mismanaged and folded within a year or two of opening.

The opening of the first yard in the Sidney area in 1908 represents the beginning of another agglomeration of the industry. Although the individual plants were not as densely packed as those in Victoria, they were close enough to constitute an agglomeration. The first yard in the Sidney area was opened by Russ Humber who also operated his family's brickyard in the Victoria concentration. However, it is uncertain how long the yard operated in the Sidney area or whether it was a new plant or only a second plant of the same company. All the yards were located on waterfront property making it easy to load brick directly onto scows. Clay deposits were large and close to the surface and new technology was available to run yards year round if desired. Furthermore, the yards were closer to Vancouver, now the major market for brick. Given the market conditions of the time, this was the location of least cost.

Another explanation for the Sidney locations lies in the operation of systems. Victoria was reaching its maximum growth as residential subdivisions began to fill. There was simply no more land available for
brickyards which required several acres to be efficient. Municipalities surrounding Victoria also continued to grow as population expanded. Sidney, located at the northern end of the Saanich Peninsula, can be seen as the centre of a new settlement system. As such, it would benefit from the establishment of new industries. In a sense, the Sidney area represented a frontier settlement of Victoria. In the early 1900s, optimism about the economy was high and Victoria had reached its peak as the major city in British Columbia. This was not to last, however, as events in the larger world system brought further changes to the local system and to the brick industry.

3.7.4 Consolidation and Closure: 1917-1961

By 1914 Vancouver had surpassed Victoria as the major city in B.C. and the building boom of the previous decade was over. No longer the economic centre of the province, Victoria changed its image. Tourist promotion, begun at the end of the nineteenth century, increased, taking advantage of the slower pace of the region. Promoted as a "bit of Old England", the area became a major tourist destination and retirement choice (Lines 1972). With the loss of local markets, brick was exported primarily to Vancouver. Brickyards in Victoria were sold and consolidated or closed
completely. Those in the Sidney area operated sporadically until the late 1920s when all but one closed permanently. The specialized firms west of Victoria also succumbed to loss of markets and were gone by the beginning of the Depression. When World War II began only two yards were still producing brick in the region: Bazan Bay Brick Co. near Sidney and Baker Brick Co. in Victoria. By the early 1960s both of these were gone.

A combination of World Wars, depression, new and cheaper building materials and technologies as well as different societal attitudes had brought an end to an industry that contributed a great deal to a growing city. That role is aptly summarized in the B.C. Minister of Mines Report (1909:183):

...partly owing to its being the oldest point of settlement, but more particularly to a larger supply of cheap labour and to the climatic conditions of a dry summer and prevailing winds, which, together, greatly facilitate and hasten the drying of the green brick, which otherwise would have to be dried by artificial means, at an increased cost of production. That these advantages are real, is evidenced by the fact that today the Victoria brickyards, although not over well equipped or run on modern lines, do supply a considerable percentage of the brick being used in Vancouver, despite the fact that these bricks must be hauled for two miles on wagon before being loaded on the scows on which they are towed across the Straits....

This chapter has provided a general view of the
relationship between industrial growth, organization and location and urban development. However, in order to gain a better understanding of this complex relationship, more specific questions need to be asked. This can be accomplished by looking at the ethnic makeup of the industry. This is the focus of the next chapter.
CHAPTER 4

ETHNICITY IN THE BRICK INDUSTRY

...manufacturers prefer them [Chinese] to other labourers, because they are good labourers - steady, regular and methodical and they have no blue Mondays, and in fact they have no difficulty with them as they have with white labourers (Report 1879:37).

In the development of complex societies specific ethnic groups often become identified with particular occupations. Brickmaking is an example, for in the study area the ethnic composition was primarily restricted to British and Chinese, each with a markedly different status. A clearer understanding of their interdependent roles and statuses in the brick industry and in society as a whole is possible by asking who owned the brickyards, who operated them, who provided the labour and who used the brick.

In order to understand and describe an historical society, Horowitz (1978) designed a model of occupational domains, each consisting of a hierarchical taxonomy. Of particular interest in this situation are his "workingman" and "businessman" domains. The divisions within each domain carry with them certain expectations of responsibility, wealth, level of education and social status. While these divisions are
clearly delineated in the operation of the brickyard, they are less apparent when examining brick consumption. Data from three reports to the federal government on Chinese immigration are cited as Report and the year published. Full citations appear in the bibliography.

4.1 MODEL OF OCCUPATIONAL DOMAINS

Horowitz (1978:18) designed his model based on the premise that

the rules of social organization in culture are largely manifest in the meaning and organization of social terms in language.

The occupation of an individual places him within a social stratum. This position in the hierarchy has relevance to others in the society. The occupational term not only names an activity, it also implies a range of responsibilities and other characteristics. Horowitz (1978) constructed a series of categorical domains each consisting of a hierarchical taxonomy of related terms. The categories he used--farmer, farm help, mechanic, workingman, gentleman, businessman and professional man--covered the entire range of 19th century occupations. Three of these domains were found in the brick industry: mechanic, workingman, (of which mechanic is also a part), and businessman. Each is
briefly outlined below.

4.1.1 "Workingman" domain

The taxonomy for this domain consists of four terms (Horowitz 1978:68): "manufacturer, mechanic or artisan, operative or attendant, laborer or workman". Each term represents a different level of responsibility and skill in the manufacturing process.

The manufacturer has the most responsibility and the highest status and ideally should know every step involved in the operation. He owns the factory or yard and makes all the major decisions. The mechanic or artisan is a highly trained individual responsible for much of the actual production work. Although both the manufacturer and mechanic are distinct levels, under some circumstances the line between the two is easily blurred. This also occurs between mechanic and operative. The operative, who is often very skilled, is only responsible for one or two steps in the whole production. Despite this, he is often called a mechanic. The final level never crosses the line. The labourer or workman is unskilled, is the lowest paid and has responsibility only to the point of getting the job done.

4.1.2 "Mechanic" domain

The mechanic or artisan traditionally progresses
through three stages, each one increasing his responsibility, skill and independence (Horowitz 1978:71). As a teenager, he begins his apprenticeship which could last up to seven years. He has very little control over his life during this stage. The next step is journeyman, a period during which he may do contract work for a firm. He is still dependent on an employer but is more independent and, while earning money, is increasing skills. At some point in this stage, when he has enough money and expertise, he becomes a master, able to run his own business and be self-sufficient. Each of these levels increases the individual's status although because manual labour is involved, the status is not necessarily very high in society as a whole.

4.1.3 "Businessman" domain

The businessman category can be applied to many men but it essentially refers to those primarily engaged in commerce, trade or speculation (Horowitz 1978:101). These men differ from workingmen in one major characteristic, they are non-producers, that is, they do no manual labour. This feature alone increases their social status. There are two major categories in the businessman taxonomy—"capitalist (speculator) and merchant (dealer)". The latter is sub-divided into
"shopkeeper (retailer or vendor) and agent (wholesale merchant, minor speculator, trader)."

The capitalist, who often provides money for new ventures, is the most powerful and commands the highest status in the domain. He may not be, however, very popular since some capitalists are seen to be unscrupulous and irresponsible, putting personal profits before benefit to the community. The same claim can be levied against merchants but not to the same degree. The shopkeeper is a fixed entity in a community and alienation of his clientele would not be in his best interests. The agent, on the other hand, is more open to these charges since he travels a great deal in search of contracts (Horowitz 1978).

By utilizing these categories to understand the ethnic relations present in the brick industry, the distinctions between the groups, and the changes that they undergo both within the industry and in the community become evident. The occupations given for each person are those found in various city directories and provincial voters lists of the 19th century. Ethnic origin has been determined either from documentation or from the surname.
5.2 OWNERSHIP

The documented owners of the various yards were primarily British, although at least two Americans are known to have been involved for a short period. The owners of the 19th century yards together with their listed occupations are shown in Table 4.

Brickmaking began as estate production by the Hudson’s Bay Company, essentially a corporation of businessmen. Its local representatives, therefore, as founders of the colony and major landholders in the area, can be considered upper class businessmen. In contrast, brickmakers, indentured to the Company for up to five years were only workingmen. When their indentures were completed, these men, along with other new arrivals, began the first privately owned, commercial yards in the area.

The owners of the yards established during the 1850s and 1860s were always called brickmaker. However, in the depressed economy of the 1860s both George Mason and Archibald Fox ran other businesses (the former a saloon, the latter a barbershop) and manufactured bricks when it was economically feasible. Apart from these instances, there is nothing to suggest that the owners from this period did anything else. Brickmaking was their full or part-time occupation.
<table>
<thead>
<tr>
<th>NAME</th>
<th>OCCUPATION</th>
<th>PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>George Mason</td>
<td>Brickmaker</td>
<td>1850s -&gt;90s</td>
</tr>
<tr>
<td>Robert Porter</td>
<td>Brickmaker</td>
<td>1850s -&gt;70s</td>
</tr>
<tr>
<td>Arthur Porter</td>
<td>Brickmaker</td>
<td>1850s -&gt;70s</td>
</tr>
<tr>
<td>James Porter</td>
<td>Brickmaker</td>
<td>1850s -&gt;70s</td>
</tr>
<tr>
<td>George Balls</td>
<td>Brickmaker</td>
<td>1850s -&gt;60s</td>
</tr>
<tr>
<td>Archibald Fox</td>
<td>Brickmaker</td>
<td>1860s -&gt;80s</td>
</tr>
<tr>
<td>F. Fox</td>
<td>Brickmaker</td>
<td>1860s -&gt;80s</td>
</tr>
<tr>
<td>Maurice Humber</td>
<td>Brickyard Proprietor</td>
<td>1870s -&gt;1900s</td>
</tr>
<tr>
<td></td>
<td>Bricklayer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>John Coughlan</td>
<td>Brickyard Proprietor</td>
<td>1870s -&gt;90s</td>
</tr>
<tr>
<td></td>
<td>Brickmaker</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>Frank P. Elford</td>
<td>Brickmaker</td>
<td>1880s -&gt;1900s</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>William Smith</td>
<td>Bricklayer</td>
<td>1880s -&gt;1900s</td>
</tr>
<tr>
<td></td>
<td>Brickmaker</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>James Baker</td>
<td>Contractor</td>
<td>1890s -&gt;1900s</td>
</tr>
<tr>
<td></td>
<td>Teamster</td>
<td></td>
</tr>
<tr>
<td>Samuel Jennings</td>
<td>Brickmaker</td>
<td>1890s -&gt;1900s</td>
</tr>
<tr>
<td>John Jennings</td>
<td>Brickmaker</td>
<td>1890s -&gt;1900s</td>
</tr>
<tr>
<td>George Jeeves</td>
<td>Bricklayer</td>
<td>1890s</td>
</tr>
<tr>
<td>M. McGregor</td>
<td>Bricklayer</td>
<td>1890s</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td></td>
</tr>
</tbody>
</table>
(Adams 1987). In the "workingman" domain these men belong in the highest level--the "manufacturer". They were most likely masters of their trade in Great Britain. Demand for their skills in the new settlement provided an opportunity to own their own yards.

At least two yards were established during the 1870s. In contrast to the previous group, these men, M. Humber and J. Coughlan, were not always called brickmakers. They were brickyard proprietors or contractors. Humber also appeared as a bricklayer, his original occupation. George Mason, the junior partner in Coughlan & Mason (NWR July/Aug. 1891), retained his label of brickmaker and most likely provided the expertise necessary to run the yard. Arthur Porter also kept the title of brickmaker and may have assisted Humber when he began his brickyard. Both Humber and Coughlan can be classified as primarily "businessmen" rather than "manufacturer". They maintained offices separate from their brickyards which were more diversified and employed more men than the pioneer firms. They also played a larger role in the community: both served as aldermen during the 1880s.

The 1880s saw the establishment of at least two more yards. F. Elford was a contractor and W. Smith a bricklayer and contractor, although they sometimes
referred to themselves as brickmakers. Christopher and Thomas Kempster were the only known Americans. Although they did not appear in any directories they would fall into the "businessman" domain under the capitalist category (Col., July 10, 1885).

Of the owners operating in the 1890s, only the Jennings were known as brickmakers. They worked for Elford & Smith for some time before and/or after establishing their own yard. It is possible that the brothers began as apprentices, progressing through the various stages until they reached the master level and could operate their own business. James Baker was known as a contractor and a teamster and had other business interests in addition to his brickyard (Col., April 6, 1896). McGregor was a contractor and a bricklayer and his partner Jeeves, a bricklayer.

Most of the owners of the brickyards were British; there is no evidence to suggest that any Chinese owned a brickyard. There is, however, ample evidence to support their increasing role in the operation of the brickyards.

4.3 Operation and Labour

In the beginning the industry was operated exclusively by British labour. By 1902, 85-90% of the
labour was provided by Chinese (Report 1902). The Chinese became involved in brickmaking during the 1860s and were well established in the industry by 1878. At this time the Chinese population of Victoria was 1767; of these there were 60 brickmakers and 25 bricklayers. Discounting women, children under 12 and new arrivals (total 506), (Ma 1979; Report 1879) almost 7% of the Chinese male population was involved in the brick industry either in the yards or in construction.

When the Chinese first began to work in the industry they did unskilled work at the "labourer or workman" level of the workingman domain. Their wages were less that those paid to the British ($1.50 vs $2.00 a day). British workers were moulders, drivers and foremen, at the "mechanic" and "operative" levels in the taxonomy. They were listed as brickmakers in directories and/or voters lists, further evidence of the increased status of the owners. By the 1890s some Chinese had become moulders, heading their own gangs; British men were employed as foremen and teamsters (Report 1902). William Bull, a foreman at Humber's yard, outlined the wage structure and occupations of the ethnic groups in the industry at the turn of the century:
There are four brick yards in Victoria and vicinity; fourteen white men are employed and seventy-one Chinese. The white men are paid from $2 to $2.50 a day; eight Chinese are paid $2.50 a day as moulders; twenty-four are paid $1.60 a day. They carry bricks and put the clay in the mill and temper it. Thirty-nine are paid $1.50 a day; they wheel in the brick and put clay in the car....The white men drive horses and carts etc.


Despite the fact that the Chinese practically ran the yards, their status did not improve. It was the British who owned the yards and British who were in charge of the yards.

4.4 CONSUMPTION

Brick construction symbolizes permanence, prosperity, pride, stability and status (Adams 1987; Seggar & Franklin 1979). It is not a universal building material however, especially in an area with abundant timber. Brick is generally more expensive than timber resulting in an association with wealth and its accompanying high status. This attitude is revealed by Macfie (1865:78) in his description of early Victoria:

Large and substantial stone and brick warehouses, well stocked with goods, line the upper part of the harbour on the town side. Between 1861 and 1862 alone fifty-six brick buildings were erected, and since that period very rapid progress has been made in edifices of that character....Long
massive blocks of building in Wharf, Store and Government Streets, furnish every indication of prosperity and permanence.

There were also brick residences, schools, public buildings and a synagogue erected during this early period (1858-1866) (Macfie 1865). Although Chinese merchants from San Francisco purchased property in Victoria throughout the gold rush period (Wynne 1964), they did not construct any brick buildings.

For the rest of the 1860s into the 1870s, brick construction was relatively slow. Extant buildings from this period include private schools, hotels, commercial structures and public buildings. The first federal building was erected in 1874 (This Old Town, 1983). As in the previous period, consumption is non-Chinese.

From the 1880s to 1914, the entire study area experienced rapid growth and development. The majority of extant brick buildings were constructed during this period. These include numerous commercial buildings, hotels, schools, churches, various public buildings and houses (This Old House 1979; This Old Town 1983).

The 1880s saw the beginnings of Chinese consumption of brick as large brick blocks, owned by Chinese merchants, were constructed. This development
was not popular with everyone. A list of building improvements for 1884 (Resources of British Columbia 1884:7) notes that Chinatown:

...has been ominously active in this line during the past season, the bulk of the buildings being of solid and lasting character....

The value of the work done in Chinatown was $85,900, 13% of the total value listed for the city in 1884 ($656,150). Chinese consumption of brick was confined to the Chinatown area where many of the buildings consisted of commercial enterprises on the ground floor with residential tenements above. Under the auspices of the various community associations, they were owned by the merchant elite (Li 1988).

These tenements, many of which were small and crowded, provided housing for a large number of Chinese in the city. In contrast to the Chinese, most British residents lived in individual houses of wood construction. Only the wealthy upper class and some middle class built brick dwellings. Most of the large mansions of the wealthy no longer exist but at least fifteen of the smaller houses of the middle class are still standing (This Old House 1979). Of these, one third are associated with people in the brick industry, either owners (Humber & Baker) or workers (brickmakers
or bricklayers).

4.5 OWNERSHIP, LABOURING, CONSUMPTION AND STATUS

The relationship between ethnic group status and ownership, labouring and consumption can be viewed as three separate yet interdependent periods each with its own distinct pattern. These are summarized in Table 5 and described below.

4.5.1 Inception: 1851-1858

In the initial developmental period, there was only one ethnic group involved in brickmaking, the British. Ownership was in the hands of the Hudson's Bay Company and its subsidiary and production was primarily for local use in chimneys and ovens. Surplus brick was exported. Towards the end of the period, as the indentured brickmakers gained their independence, the Hudson's Bay Company ceased production and the first privately owned commercial brickyards began operations.

The colony was not very large and the output of these early yards was more than enough for local use. As a result, the Victoria firms exported brick throughout the Pacific Northwest. The owners of these pioneer firms were all workingmen, primarily manufacturers rather than businessmen. Social
## Table 5

### Ethnic Involvement in Brickmaking

<table>
<thead>
<tr>
<th>Period</th>
<th>Ownership</th>
<th>Labour</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>British: 1</td>
<td>Whites: 2</td>
<td>Whites: 3</td>
</tr>
<tr>
<td></td>
<td>upper class</td>
<td>all positions</td>
<td>local --</td>
</tr>
<tr>
<td></td>
<td>workingman</td>
<td></td>
<td>no complete buildings:</td>
</tr>
<tr>
<td>Inception 1851-1858</td>
<td>British:</td>
<td></td>
<td>chimneys ovens.</td>
</tr>
<tr>
<td></td>
<td>workingman</td>
<td></td>
<td>export --</td>
</tr>
<tr>
<td></td>
<td>businessman</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transition 1858-1880</td>
<td>British:</td>
<td>Whites:</td>
<td>Whites:</td>
</tr>
<tr>
<td></td>
<td>workingman</td>
<td>mechanic</td>
<td>local --</td>
</tr>
<tr>
<td></td>
<td>businessman</td>
<td>operative</td>
<td>commercial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>labourer</td>
<td>public housing (upper class)</td>
</tr>
<tr>
<td></td>
<td>(workingman)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completion 1880-1914</td>
<td>Chinese:</td>
<td></td>
<td>Chinese</td>
</tr>
<tr>
<td></td>
<td>labourer</td>
<td></td>
<td>local --</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>commercial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>public housing (middle class)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>British:</td>
<td>Whites:</td>
<td>Chinese</td>
</tr>
<tr>
<td></td>
<td>businessman</td>
<td>mechanic</td>
<td>local --</td>
</tr>
<tr>
<td></td>
<td>(workingman)</td>
<td>operative</td>
<td>commercial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>labourer</td>
<td>public housing (all classes)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Notes:

1. British refers to those who originated from Great Britain, i.e. England, Scotland, Ireland and Wales.

2. Whites refers to any non-Chinese white ethnic group. Data on labour supplied by ethnic groups other than Chinese are not available.

3. Whites refers to the larger society and includes all ethnic groups except Chinese.
organization in the area at this time was based on the hierarchy present in the Hudson’s Bay Company, basically an upper non-working class consisting of Hudson’s Bay personnel and a lower working class (Robertson 1981). The brickmakers belonged to the latter group. The gold rush of the late 1850s permanently altered social structure of the colony.

4.5.2 Transition: 1858-1880

The people who arrived with the gold rush came from diverse social backgrounds and provided the basis for an emergent middle class (Robertson 1981). However, social structure changes slowly and throughout the transition period the pioneer owners remained in the workingman class. According to the social structure already in place, the owners were perceived by society and themselves as workingmen. The prevalent British attitude toward brickmaking saw it as dirty and degrading; brickmakers were considered rough, defiant men who loved to drink, characteristics that did nothing to improve their status in society (Bevan 1876).

Towards the end of the transition, however, new owners were seen more as businessmen than as workingmen. They did more than just make bricks, they acted as contractors also. This activity alone would
elevate them above the workingman level since it involved non-manual labour. In addition, as businessmen, they became part of the emerging middle class which was beginning to dominate all levels of society.

Labour during this period was provided by both British and Chinese. By the end of the transition period, Chinese were highly visible in brickmaking but only at unskilled levels as the following comments reveal:

...labouring men, when they become small contractors, are the very first people to employ Chinese labour. They employ Chinamen to mix mortar, and to carry brick or stone, and in the erection of buildings, masons and small contractors employ them

(Report 1879:26).

They are employed about every building, but generally as mixers of mortar, hodmen, wheelbarrow men; not as masons, or bricklayers or carpenters

(Report 1885:71).

The Chinese who come here are a servile class. They are a class far below the lowest mechanic or white labourer....The Chinese... occupy a subordinate position...you never see a Chinaman acting as a master carpenter or a master bricklayer

(Report 1902:27).

Their status was not very high, as the final comment above indicates. During this period anti-Chinese
sentiment increased and Chinatown began to slowly consolidate. By 1878 there were fourteen merchants established in the enclave and a total population of 2370 (Sedgewick 1973). The merchants had a high status within the community and played a major role in its development. Benevolent associations, started by the merchants, led to the establishment of a stable community, provided support for the Chinese people and acted as intermediaries between British and Chinese (Sedgewick 1973).

Consumption of brick during this period remained British. The majority of buildings related to the economic structure of the society. Victoria was a free port at this time, oriented toward shipping and provisioning miners. The need was for storage, retail space and transient accommodation. The loss of free port status in 1866 together with the end of the gold rush led to a shift in the economic structure of the area. The orientation turned inward to local consumption (Sedgewick 1973). Public buildings, schools and housing for the upper class were all constructed at this time.

4.5.3 Completion: 1880-1914

With the increasing power of the merchants and the establishment of Victoria as a commercial centre, the
social structure completed its change in the last decades of the 19th century. By the end of the 1880s, businessmen dominated all levels of politics, were socially prominent and had a high status in society (Robertson 1981). The owners of the larger brickyards were included in this change. John Coughlan, Maurice Humber and James Baker all served as city aldermen during the 1880s and 1890s. Yards established in the early 20th century were all corporations, clearly businesses owned by businessmen.

Antagonism toward the Chinese in the brick industry intensified during the 1880s leading to demands to the owners to discharge all the Chinese. Humber agreed to do this provided other owners followed suit (Col., Jan.12, 1886). At some point he did discharge the Chinese and hire British workers but problems with these led him to reverse his decision (Report 1902). He claimed to have lost $1600 in the exercise, a figure disputed by another owner, J. Coughlan (Col., Jan.12, 1886).

While cost was the major factor in the use of Chinese labour, labour practices of the two groups lay at the base. Non-Chinese desiring work simply went to the brickyard and applied directly to the owner or
foreman. Chinese workers, however, were employed through a contractor, usually a Chinese merchant. The merchant contracted with the brickyard to produce a specified number of bricks at a set price. He provided the men to do the work; the brickyard provided housing, often just shacks. The contract benefited both parties; the brickyard was supplied with experienced gangs to produce the brick while the merchant got commissions for putting together the crews and on supplies which the men had to purchase from him (Report 1902).

The majority of the British would neither work with the Chinese gangs nor live in the same conditions, although at least one British brickmaker lived in a cabin at Coughlan & Mason's yard. To employ British only would have raised the cost of bricks $1.00/1000 (Report 1902). Given the cost factor plus the abundance of cheap labour, it is easy to see why the Chinese quickly gained and maintained a prominent position in the operation of the yards.

No matter what position a Chinese held at the brickyard, however, he was always seen as having a much lower status than any other worker. There is no evidence to suggest that any Chinese rose to a level higher than operative. Just as no Chinese owned a
brickyard, neither did any run a brickyard. They did, however, use the bricks that they made, a fact which caused consternation to many British residents.

It is in the final period that the development of a separate Chinese community becomes most evident. Because of its permanent nature, brick is symbolic of stability and status (Adams 1987). The rise in status of British businessmen and their role in the development of society was paralleled in the Chinese community. Chinese businessmen, under the auspices of benevolent associations, built permanent structures such as a school and hospital for the Chinese people.

The use of brick indicated to both the British and the Chinese the intention of the Chinese to become a permanent part of the society despite any measures taken to dissuade them from doing so. By providing public buildings, commercial buildings and housing, the Chinese in essence constructed an entire community supplying its inhabitants with services paralleling those in the larger British society. Chinese status within the main society did not increase with the construction of Chinatown. The status differences between the two communities were most striking in housing.
In British society, all classes of people lived primarily in single family homes of varying sizes and qualities. Businessmen and workingmen in the brick industry both owned and lived in brick houses. In contrast, most of the Chinese, even the wealthy merchants who owned the buildings, lived in the tenements above the retail areas. The merchant's rooms were well furnished, clean and ventilated. Most of the other residents of Chinatown lived in small, crowded, dark and poorly ventilated rooms in and about the tenements (Li 1988; Report 1902). They were in fact comparable to the worst of the squalid slums of industrial Europe, conditions many of the Europeans had left behind. They were considered a public disgrace by most of British society and certainly did nothing to increase the status of the Chinese.

4.6 BRICKMAKING AND SOCIETY

In all cultures the techno-economic subsystem mediates between the social and ideological subsystems and the environment. It provides the means for people to obtain food, clothing, shelter and other material goods. Feedbacks among it and other major subsystems allow the whole system to function. The natural environment, which supplies basic human needs, is not
without limits. If demand from the social system becomes too great, additional sources of supply must be found. Large, stratified and segmented societies develop complex trade networks to provide essential as well as luxury goods.

Demand for a product comes from people in the social system but justification for the demand develops from ideas and attitudes in the ideological system. This in turn originates from individuals and groups in the social system. This constantly changing feedback directly affects the economic system setting in motion the production or importation of the desired goods. This cycle can be illustrated with brickmaking in the study area (Figure 4.1).

As a colony of Great Britain, the study area was part of the larger world system of trade. The area was well timbered, an abundant source of material for shelter. However, brick was needed for chimneys and ovens and although adequate clay was available, brick was imported until 1851 when the first brickmaker(s) arrived. Local production did not include firebrick and until 1890 this special clay product was imported.

Brick was not used for entire buildings until 1858 when permanent shelter became necessary for the thousands of transient miners on their way to the
Figure 4.1: Brickmaking and Society
Fraser gold fields. The first two brick buildings constructed were hotels. Most other buildings constructed over the next few years were warehouses and stores. Brick buildings represented stability and permanence in the colony. Brick was more expensive to purchase than timber and building construction required more labour. Because of this, consumers of brick were associated with notions of prestige, wealth and power. For instance, in an area with a predominance of wooden buildings and a record of several disastrous fires, brick hotels were advertised as fireproof and therefore superior.

Even though brick was a prestigious product, brickmaking itself was not similarly viewed. The industry was considered dirty and degrading and its location in the early years reflects this attitude. Yards were situated well away from residential areas where the mess and smells would not offend.

This low status is also one of the reasons that Chinese labour became predominant in the industry. Not only did Chinese work for less money than whites but they performed the unskilled work which whites disliked. Many people in the area considered the Chinese to be much inferior to whites, suited only to menial labour. Early acceptance of the Chinese did
not, however, last very long. By the mid 1880s they were perceived as usurping white jobs. Meetings at all levels of government were held to deal with the Chinese problem and punitive taxes and laws were drawn up. Despite all this, Chinese in brickmaking maintained their dominant position and by 1900 some had become skilled brickmakers. None, however, owned yards.

As an industry providing a basic needs product, i.e. shelter, brickmaking was very susceptible to cycles of demand. Brickyards occupy large areas and the finished product requires space for storage prior to shipment. If no market can be found, the product must be stored indefinitely or dumped at lower cost. This sets up a chain reaction which has repercussions throughout the entire system. For example: in an economic recession, lower demand means less production which leads to less work for individuals. If lower paid Chinese labourers are kept working and whites are laid off or not hired, attitudes toward Chinese begin to change. These percolate through the social system and begin to involve workers from other industries. As a result, labour associations designed to protect white jobs develop. The inevitable result of this action is what happened to the Chinese in British Columbia.
While operation of the industry was tied to demand, supply was seldom a problem. Building brick was imported only when demand was so high that the local yards could not keep up. As the yards expanded, production increased and excess was exported. Unlike most other industries, brickmaking was a seasonal occupation lasting six to eight months from spring to fall. This placed limits on production. The annual output from the largest yards during peak production periods was about three million bricks. Another limit on production was yard space; the largest yards occupied an average of eight to ten acres. Raw materials were not a problem since the clay beds were deep and extensive and fuel, either wood or coal, was easily obtainable.

The smooth operation of a complex society requires interactions of thousands of feedback loops between all levels in each subsystem. Alterations in any one can have long term effects on another. Changes in both the ideological and economic subsystems led to the demise of brickmaking in the study area. The development of new building technologies and the perception that brick was no longer prestigious resulted in decreasing demand for brick. Owners of brick buildings even covered their buildings with new materials to bring
them in line with the new attitudes.

4.7 CONCLUSION

Relations between the British and Chinese in both the brick industry and society were, in general antagonistic. As foreigners with strange customs who did not even look like most of the residents, the Chinese were distrusted and barely tolerated. The British attitude of superiority relegated the Chinese to a very low status beneath even the lowest British person. To the emerging businessmen, however, the Chinese provided an abundant source of cheap labour which was necessary if their business was to succeed in a competitive environment. Without this labour pool, it is not likely that brickmaking would have been as successful as it was in the area.

Despite the antagonism of the British toward them, the Chinese maintained their presence in the society by forming an enclave where they could retain many of their customs. Their use of brick in the community signified to both groups that the Chinese intended to become a permanent part of the society. The Old Town area of Victoria, which includes Chinatown still contains many original brick buildings, mute testament to the Chinese contribution to both the brick industry
and to the larger society.
CHAPTER 5

ARCHAEOLOGICAL RESOURCE MANAGEMENT PROGRAM

... shipbuilding yards, several large furniture manufactories, six breweries, two soda water manufactories, coffee and spice mills, a piano factory, carriage, boot and shoe and powder manufactories, brush works, stair building works, saw and planing mills, and sash and door factories in great numbers, Vancouver Iron Works, harness and trunk factory combined with a tannery, marble and granite works, shirt and clothing manufactories, pottery and terra cotta works, brick yards, large bakeries, a large lithographing house, printing establishments in addition to box, tin can, wire works and match factories and a host of others too numerous to mention (Victoria Illustrated 1891:20).

In the nineteenth century Victoria was the manufacturing centre of British Columbia yet there has been no systematic archaeological investigation of any industry in the study area. A detailed study of an historical industry such as brickmaking can cover a wide range of technoeconomic and sociocultural topics. The resulting synthesis provides a comprehensive body of related information of value to people in a variety of disciplines. Historians, archaeologists and other social scientists can recover information that may otherwise be missed. Governments at various levels and heritage resource managers are informed of the
existence and value of the sites. Finally, the general public can be made aware, through interpretive programs, of the significance of the industry in the history of the area.

Historical archaeological projects of any sort are rare in the study area. Portions of Fort Rodd Hill, a national historic park, have been investigated and there have been two separate brief excavations at Point Ellice House, a provincial historic site. Apart from these professional explorations, undocumented amateur work is carried out by pot and bottle hunters. Such work is often detrimental to the site and may negate its archaeological significance.

Focussing primarily on topics covered in the preceding historical reconstruction, an archaeological resource management program for brickmaking in the study area is outlined. Construction of the resource program is based on recommendations contained in Guidelines for Heritage Resource Impact Assessment in British Columbia (Aplan and Charlton 1987). As no archaeological excavation is contemplated at this time, the program is essentially incomplete. However, it does contain a detailed excavation plan which, under the right conditions, could be implemented.
5.1 ARCHAEOLOGICAL RESOURCE MANAGEMENT PROGRAM

Brickmaking is generally considered a mundane industry of little academic interest. However, much can be learned about interrelationships in society through the study of a labour intensive industry. Brickmaking was carried on extensively in the study area for more than 60 years yet very little is known about it. Although its final product is clearly visible throughout the area, the production sites have all but disappeared. Brickmaking sites have evinced little archaeological interest, in part because there is often little to find (Hume 1969). While this may be partially true for isolated manufacturing sites, it is not the case when considering concentrations of the industry such as those which occurred in the study area.

The archaeological resource management program outlines the present condition of the sites, site preservation options and a provisional management program. This is followed by a proposed archaeological investigation as an example of what could be accomplished by such work.

5.1.1 Present site conditions

Brickmaking occurred at various locations in the study area. The earliest brickmaking sites cannot be
precisely located and are not included in the following preliminary assessment. There were three major areas where brickmaking took place: the Mayfair cluster (Figure 5.1), the Sidney cluster (Figure 5.2) and west of the Victoria, mostly along the railway (Figure 5.3). These sites are now located in environments ranging from a provincial park to an urban shopping centre. Each area is discussed separately below.

5.1.1.1 Mayfair cluster

Yards in the Mayfair cluster were situated in the Gorge/Burnside area west of Douglas and between Tolmie and Topaz, east of Douglas. The major firms are illustrated in Figure 5.1. All sites have been developed, some extensively. The only visible remains of the industry in this area are variously sized clay pits. The earliest pit, now the site of a B.C. Hydro garage, is a visible depression occupying several lots between Gorge and Garbally roads. The banks of a second pit are visible along Tolmie and Blanshard and form part of Mayfair shopping centre. Portions of other pits may exist between Finlayson and Topaz on both sides of Douglas. The area has several depressions which may be man-made. The hill near Topaz on Douglas, known as brickyard hill in the 1880s, was cut down in
Figure 5.1: MAYFAIR CLUSTER
G.A. Reimer 1980
General locations of western yards
in relation to Mayfair Cluster

1. Mayfair cluster
2. B.C. Pottery
4. Parson's Bridge
5. Silica Brick & Lime Co.

Figure 5.3: WESTERN YARDS
Army Survey Establishment 1962
1883 and an embankment widened in front of the brickyard. Exactly how much alteration took place, however, is difficult to determine.

Plant sites of the major firms have all been developed. Impact of development ranges in severity and magnitude. All sites have been considerably disturbed and in most, excavation required during construction phases has resulted in irreversible damage. The margins of some sites may be accessible as well as any areas which were simply converted into parking lots.

5.1.1.2 Sidney cluster

Impact of development on sites in the Sidney cluster varies more widely. Yard locations are illustrated in Figure 5.2. The site on Sidney Island, currently located in a provincial marine park, is the best preserved and has suffered little disturbance. The plant was simply abandoned and is overgrown with vegetation. No visible structures remain since the material was recycled; however, brick can be found scattered around the site. The two remaining brickyards have both been disturbed. The site of Sidney Brick & Tile is now part of a residential subdivision and the yard’s clay pit has become a duck pond near Greenglade school. Part of the Bazan Bay
site was destroyed during highway construction in the 1950s but some portions still remain near the water on essentially rural land.

5.1.1.3 Western yards

The yards west of Victoria (Figure 5.3) were all involved in specialized production either for specific projects (graving dock) or special products (silica brick and firebrick). With the exception of Kempster Bros., all were located along the railway. Since a precise location for Kempster Bros. has yet to be found, condition of the site cannot be determined at this time. Two descriptions place it somewhere above the Gorge bridge. The B.C. Pottery site on Viewfield road has been developed. The clay pit was at least 30 feet deep and some evidence of this should still be visible. The remaining yards are in View Royal in semi-rural residential/commercial areas. The location near Parson’s Bridge has been developed to some extent. The second site, about 1/2 mile further west, is less developed.

5.1.2 Site preservation

Given the probable present conditions of the sites, several options concerning preservation exist. Since all the sites in the Mayfair cluster have been
developed, nothing can be done to preserve this area. The situation is similar in all urban locations whether residential or commercial. This eliminates conservation of Sidney Brick & Tile, B.C. Pottery and probably Kempster Bros. as well as the Parson's Bridge location. Any further development in the urban locations should be brought to the attention of an archaeologist in order to determine if any remains of brickmaking are evident.

The semi-rural sites of Bazan Bay Brick & Tile near Sidney and Silica Brick & Lime Co., west of Parson's Bridge, should be preserved until archaeological investigations can be completed. If development of the sites is contemplated, such development should be conditional on archaeological investigation. The entire site on Sidney Island should be preserved intact. It is the only remaining brickyard site in the study area and as such, is an invaluable resource both archaeologically and historically. Since it is currently under provincial jurisdiction, development is not likely in the near future.

5.1.3 Provisional management program

In order to realize the maximum potential of the sites as archaeological resources and the value of the
industry itself as a heritage resource, the significance of the sites must be considered. While nothing can be done to preserve most of the sites, this does not mean they are without significance. Assessing the significance of a site can be difficult; what may be significant to one observer may not be to another (Bickford and Sullivan 1984). To assist in determining the value of a site, several types of significance, each with explicit defining criteria, have been outlined (Pearson 1984; Schiffer and Gumerman 1977).

For evaluation purposes, former brickyard sites in the project area can be treated in two ways: as one large industrial grouping or as individual sites. Each designation results in different measures of significance and subsequent management. Only a preliminary evaluation, based primarily on documentary evidence and current land use, is possible at this time. Recommended management procedures are only provisional.

5.1.3.1 The Regional Brick Industry

Considered as a single representative group, brickyard sites have relatively little public, economic or ethnic significance. Apart from former clay pits in several locations and brick scatter on Sidney Island,
there are no visible remains of brickmaking at any site. It is also unlikely that the Chinese would wish to be reminded of an industry that exploited their labour. However, the group does have some value as an historical archaeological site. Its value in this case is primarily scientific.

Despite the disturbance of most sites, the grouping does have some historical significance. Brickmaking played an important role in the economy and development of the area and analysis of its spatial patterning can contribute to an understanding of historic settlement patterns and land use. From an archaeological point of view, scientific significance is relatively high. As noted earlier, no archaeological studies of an industry have been done in the area. Furthermore, the sites occur in a range of environments and have undergone a variety of alterations. The group offers an opportunity to improve and develop methodologies and techniques, especially in urban locations. In addition, since the operations of each firm varied somewhat, study of the entire group can help in understanding these differences and how they may have affected the archaeological record.

An intensive field survey is recommended in order
to provide more concise parameters for each site. This will assist in determining actual areas within each site available for archaeological investigation. The survey will also enable a definite determination of present site conditions and allow for more precise preservation recommendations. Following the survey, a well organized research plan, designed to maximize archaeological data recovery, should be developed. While every site cannot be excavated, all can be sampled to some extent. In this way, data representative of each environment can be recovered.

Consideration of brickmaking sites as a single group indicates that their value is primarily scientific. Public significance is relatively low, although governmental agencies and resource managers should be made aware of site locations.

5.1.3.2 Brickyards as Individual Sites

As individual sites, some brickmaking locations have more potential than others. As with those in the group situation, the individual sites have primarily scientific significance. However, two locations also have public significance that has potential value in resource planning. These are the former yards contained in the Mayfair cluster (Figure 5.1) and the
abandoned yard on Sidney Island (Figure 5.2). In the former case, this area of the city was the focal point of the industry and, at the peak of production, annual output by all the yards in operation was more than 15 million bricks.

Recommendations for management of individual sites are based primarily on site conditions and significance. Archaeological investigations of individual firms in urban areas are not recommended at this time. Excavation in urban areas is costly and the sites are considerably disturbed. More information can be obtained from an investigation of all sites as previously discussed. As noted, the Mayfair cluster does have public significance. The shopping mall itself would be an ideal location for some type of public information display about the industry.

For the rural and semi-rural locations, archaeological investigations are recommended. A full scale excavation of the yard in Sidney Spit marine park would be of considerable interest to park visitors and would serve to enhance the history of the Sidney area. Such an excavation would also provide valuable information concerning manifestations of brickmaking in the archaeological record. As the only remaining intact brickmaking site in the study area, it must represent
the entire industry. It is an important provincial heritage resource and should be designated as such. Limited archaeological investigations are possible in the undeveloped portions of the semi-rural sites. However, these investigations would yield more information if they were part of the investigation of sites as a single group.

Brickyards as individual sites have scientific significance and varying public significance. Although some type of archaeological investigation at each site is possible, it is recommended that extensive excavation be confined to the intact yard on Sidney Island. Public significance is high at two locations; ethnic and economic significance is negligible at all sites. The City of Victoria, the town of Sidney and the Capital Regional District should be informed about sites in their areas. This will allow better resource planning and should any further development be undertaken, the proper authorities can be notified.

5.2 ARCHAEOLOGICAL INVESTIGATIONS OF BRICKMAKING ON SOUTHEASTERN VANCOUVER ISLAND

5.2.1 Proposed Project

The proposed project consists of a series of test excavations designed to discover the nature and
distribution of archaeological remains under different formation conditions. Former brickmaking sites have been subjected to varying degrees of reuse from abandonment to total redevelopment. Under these circumstances, it is expected that the archaeological record will reflect the degree to which the site has been disturbed. As an area develops, it often builds over the top of evidence of previous occupants of the site, not altogether destroying evidence but covering it over. Therefore, the nature of the archaeological record in an urban area depends in a large part on land use and some sites have more potential than others (Staski 1982). Test excavations in urban sites also serve a goal of urban archaeology, designing methodology applicable to various urban situations (Staski 1982; 1987). The remaining brickmaking sites are in semi-rural and rural areas. The entire program also functions as a design model for other industries, thereby serving a goal of industrial archaeology. Industrial archaeology projects involving excavation are rare, in part because the field is not practiced by many archaeologists and in most cases is confined to above-ground resources (Grant 1987).

Because of the varied nature of the sites, test excavations will also reveal any problems in
conservation or recording which may occur, solutions to which may be applicable in other excavations. Furthermore, the project will generate a data base to serve as a foundation for future problems. Finally, the significance of the sites can be determined so that resource managers can be informed of the potential of the sites for future programs. Completion of the project will serve history as well as archaeology since without the archaeological data, an integrated historical archaeological study is not possible.

5.2.2 Project Area

The area covered by the project includes all of the Capital Regional District and the provincial marine park on Sidney Island. The most active brickmaking region was located at the northern limits of Victoria in the Tolmie-Topaz area. During peak production periods five or more yards were operating at one time, all manufacturing common red building brick. Four locations west of the city supported only one yard each, two of these producing specialized bricks. The yards near the town of Sidney and on Sidney Island all turned out red brick.

5.2.3 Problems

The historical reconstruction of brickmaking in
the study area focussed on aspects of organization and ethnicity. Lack of archival material, as well as data found in documents suggested several problems which might be solved through archaeological means. These concern location and spatial organization, technology and shelter.

An industry such as brickmaking which requires large amounts of raw material is not likely to locate in an area where none are available. Not only clay was needed, but sand to temper it, wood to burn the clamps and coal to run the steam plants. How would a brickyard be laid out to make efficient use of all materials? How much space was needed for the operation?

It is apparent from archival research that local brickyards used a variety of technologies to manufacture the same product. Different types of kilns were in use and both machine and hand moulded bricks turned out in different yards at the same time. Was one method more effective than another? Was method related to the quality of the raw material (clay)? Was the quality of the product affected by the different methods?

Several documentary sources refer to housing provided for the workers. Where was this located
relative to the yard? What type of housing was it? Were different qualities of housing provided for white and Chinese workers?

In designing an excavation program to answer these questions, some idea of what to expect in the archaeological record would be useful. The vast majority of manufacturing industries involve some steps in the process that will leave no evidence in the record (Gorman 1982). A general model of brickmaking is used to determine which steps, or parts of steps, are most likely to leave tangible remains.

5.2.4 Archaeological Evidence of Brickmaking

The hypotheses constructed in the following sections are based on an idealized case, that of an abandoned, undisturbed brickmaking site with no visible buildings. There are six basic stages in brick manufacturing. These are illustrated in Figure 5.4.

Winning, or digging, the clay is the first step. Surface methods are by far the most common. The turf and soil must be removed to reach the clay. This material forms a spoil bank. Unless used for other purposes, the spoil bank should be a feature of the site. The other major feature is the clay pit itself which will vary considerably in size according to the
Figure 5.4: GENERAL MODEL OF BRICKMAKING
extent of the operation. Clay heaps, piles left to break down during the winter, may also be present. If small tram cars were used to transport the clay to the next stage, some evidence of the track system may be present.

The preparation stage subjects the clay to various processes until it is the right consistency to mould. There are three steps any or all of which might be used. Washing removes large stones from the clay. If this was done concentrations of stone may be evident. Grinding is unlikely to leave any evidence. Tempering done in a pit may be evident. Besides the round pit, a circular path traveled by the horse may be visible.

The moulding process used is most evident on the brick itself rather than in the ground. Both slop and sand moulding leave characteristic surfaces. It is also possible to distinguish hand from machine moulded brick in a similar manner. Furthermore, machine made bricks are generally more uniform in size. Other distinguishing criteria include the presence of finger indentations, surface intrusions and manufacturer's marks (Gurke 1987; Harley 1974; Kelly and Kelly 1978). If a machine was used, the remains of the building where it was located may be evident. The location of hand moulding sites may also be indicated by
concentrations of clay and sand discarded during the process.

There is not likely to be much indication of natural (seasonal) drying methods. It may be possible to identify the drying yard by its slope and evenly spaced ruts could indicate the placement of the hacks. Post holes could reveal the location of drying sheds. Artificial drying (non-seasonal) requires the construction of specially designed permanent buildings. Two basic systems were used: a building with a heated floor and a tunnel dryer. Either type should be identifiable in the record.

The type of firing process used should be evident. Permanent kilns require foundations as do some forms of temporary kilns (Heite 1968; Hume 1969). Even scove kilns use a base of burned brick. The continual use of one location for scove kilns could be revealed through ash and rubble layers in the record rather than by a brick foundation.

The final stage in the process is sorting the burned brick. Some sort of rubble pile should be in evidence; depending on the firing method used, rate of discard varies considerably. Up to fifty percent of the kiln may be lost in firing. The colour of the
brick in the rubble can be used to approximate its position in the kiln. Too close to the fire results in a black and/or vitrified brick; too far, in a light coloured and incompletely fired brick.

Non-brick artifacts may also be present on the site. A large quantity of equipment was used in brickmaking and broken moulds, tools, parts of wagons etc., may have been discarded on site somewhere. Locating the dump would be quite useful. If housing was provided for the workers, middens may be useful in determining its location.

5.2.5 Test Excavation Program

The test excavation program is designed to answer questions about location and spatial layout, technology and shelter and to test the hypotheses concerning archaeological implications of the industry. In doing so, it serves both primary and secondary goals of the project. The work required to obtain the data needed for solution of the preceding problems will be carried out in stages over a period of two years. A crew of up to ten people will be needed at some stages. The services of some specialists will also be needed.

STAGE 1: Background Documentary work

Time: 6 months - September to April

Preliminary historical research has outlined the
development of brickmaking in the project area. Individual firms have been approximately located in most cases. Only two firms can be placed in accurate positions (Baker Brick Co. in Victoria and Sidney Island Brick Co.). More documentary work needs to be done in order to give more precise locations for the individual yards and their work areas. A general historical overview of the period from 1850–1930 is also needed in order to view the industry as part of the whole cultural system. Local histories currently available can serve this purpose.

Also important during this stage is ethnographic work with people who worked in the industry in the area. A recorded interview with one informant, since deceased, is available. Documentary evidence pertaining to brickmaking can also be treated as a class of data. In order to construct a typology of this material, each documentary record should be photocopied or transcribed and given a temporary number. It is expected that two people should be able to complete all the work described in the following steps within the allotted six months.

Step 1: Ethnography

Any informants living in the area should be
located and interviewed. The interviews should be planned with the archaeological investigations in mind. Questions that may reveal answers about location, spatial layout, technology and housing should be included. However, other information about brickmaking which cannot be investigated archaeologically should not be excluded. This would include information about labour, wages, production, management and transport that would be of use in solving other problems. Besides the taped interview previously mentioned, a letter from an informant is also available. Given the length of time involved, it is not expected that many informants will be located.

Step 2: Archival and records search

Further work at provincial and city archives needs to be done. Preliminary research in newspapers of the time period suggests that more information is contained in the publications than was expected. Early newspapers contain few pages and local news is generally confined to specific sections. It would be feasible to scan some sixty years of daily editions in the allotted time. In addition, since only the major paper, The British Colonist was consulted, other papers of the nineteenth century should be searched.

Information in provincial Department of Mines
reports has been abstracted and is available together with material from provincial sessional reports. The records of the Hudson's Bay Company, Puget Sound Agricultural Company, railway companies and shipping companies still need to be searched. Whether this is feasible depends on the availability and extent of any records of this type and the decision to proceed can be made at that time. Geological and soil reports are another source of information. They often contain details about the clay at specific brickyard locations.

Primary sources of information, namely company records, have not been located. If they are still extant, they may be traceable by backtracking from the last owner of the business. Land titles have also not been searched and may prove quite useful. Both of these searches are time consuming and somewhat costly, two reasons why they have not yet been done.

Early fire insurance maps are an excellent source of information about industries. Two brickyards have been located by this method and scaled plans of the spatial layout of the yards are available. Other fire insurance maps are located outside the study area and still need to be consulted.

Another source of information about location and
layout is aerial photography. Some former brickyards are now located in rural or semi-rural areas where there has been little disturbance of the sites. It is therefore recommended that some low level air photographs of these sites be taken in order to determine if any features are visible. Air photos of the city were taken by the Royal Air Force in the early 1920s and may contain pictures of the brickyards. These should be consulted. There are also some photographs available in the archives, in newspapers and in mines reports which may be useful in locating features although the area has changed considerably.

Step 3: Document analysis and typology

Before any survey or sampling can be done, the documentary records need to be analyzed. The typology for this data class can be developed at the same time. The typology should be constructed by formal classification methods (W. Adams 1988; Stone 1970). In order to facilitate cross-referencing and topical analysis, each document (artifact) should be recorded on a computer data base program using fields corresponding to the attributes of the classification. Preliminary sorting by company should be the first step. If the documentation refers to more than one company, duplicate copies must be made. Oral histories
should be transcribed and the information categorized the same way. When the most accurate location of each yard is determined, each document should be given a site designation code and a permanent number. In this way, the documentation can be treated as an integral part of the site.

Attributes of the documentation to be covered in the classification should include the following: name of the yard, location (present legal description), source of the document, type of document, author (if known), statistics of any sort (for example, production), brief summary of information contained in document, date of document, site designation, and any other attributes that become apparent during analysis.

Once the typology is developed and recorded, flow charts covering the operations of the individual yards can be constructed. These will give a clearer understanding of the technology used at each yard which may have influenced the layout of the work area. All information relating to location and spatial layout will then be correlated with the present use of the land to determine the areas available for survey and sampling. As soon as this is complete, acquisition of permits and permission from landowners for excavation
or survey should begin.

STAGE 2: Survey, Sampling and Excavation

Time: 1 year - May to April

Excavation in urban areas can pose problems not found elsewhere. Multiple use of a site over time results in different patterns of deposition and disturbance and stratigraphy can be difficult to determine. Urban sites are often highly visible in public areas and become focal points of interest necessitating more security than usual to prevent disturbance of the site. Because almost all urban excavation is costly and disruptive, great care must be taken before any excavation is started. Intensive field survey is required, a combination of extensive documentary research, construction of land use maps for different time periods and test excavation, if possible. Once completed, it may be found that most of the site is inaccessible, causing sampling problems. For example: if only 15% of a site is accessible, the available portion in effect forms a non-random sample of the entire site. This produces a bias and may result in too little data to be statistically significant. The problem is further compounded if the available portion contains few, if any, features expected from the former activity. Density of the
built environment also affects the size of the exploration and the scale of excavation. Small test excavations, core samples or sub-surface survey may be the only techniques possible. Even when traditional types of excavation can be carried out, the unexpected presence of underground services can become obstacles, further eliminating part of the site from exploration.

A multi-stage research design, although time consuming, is often the best approach. Thorough preliminary research can result in more accurate predictions of features likely to be found in accessible areas. Once this is determined, the decision to excavate becomes less problematic. Stage two of the proposed project is a simplified example of part of a multi-stage design. This stage will supply the archaeological data needed to answer the questions and test the hypotheses. It is expected that for the survey, sampling and excavation up to ten people will be required. Also required will be the services of some specialists. This stage is carried out in steps.

Step 1. Survey

After preliminary documentary research has determined the most accurate locations, a systematic survey can be undertaken. This is especially important
in non-residential urban locations since land use
categories are somewhat general. Only by walking
around the sites and mapping current positions of
buildings can the actual areas available for sampling
and excavation be determined. For example: part of the
kiln area of Baker Brick Co. is presently the site of a
service station and the deep excavation needed to bury
fuel storage tanks would destroy kiln evidence. The
outlines and extent of large clay pits can be
determined at this time. Sites now situated in
residential, semi-rural and rural areas should also be
surveyed to determine the extent of development and to
detect any surface evidence of brickmaking. After
completion of the surveys, maps for each site should
indicate accessible test areas.

Step 2: Sampling

Because of the extent of development in urban
locations and the difficulties of excavation in such
sites, a sub-surface survey program using a proton
magnetometer is recommended. This survey is, in
effect, a non-random sample of the site since the
presence of buildings eliminates that part from the
procedure. Only large paved lots, residential lots and
any other accessible areas can be tested. Baked clay
features such as brick generally yield readily
detectable anomalies (von Frese 1984; Weymouth 1986) and fires used in the burning of scove kilns or clamps may also affect the magnetism of the soils where they were located (von Frese and Noble 1984). Because baked clay drain tiles were used extensively, it is recommended that a known location of these be tested to determine the magnetic pattern they create. This will serve as a control in the actual sampling program should they be found in the test area. The proton magnetometer survey is expected to reveal the locations of any concentrations of brick or brick related materials such as ash.

For rural and semi-rural sites, a core sampling program will be used. Documentary evidence and the site surveys will be used to determine the main locations for the sampling. Other areas should also be sampled as well in order to eliminate any bias. A systematic, stratified, unaligned sampling technique will be used (Judge, Ebert and Hitchcock 1975; Mueller 1975; Redman 1975). The area to be sampled will be marked off into a grid pattern of two metre squares. Each of these squares is subdivided into sixteen units. Beginning at a randomly chosen square, every third square will be sampled. Five randomly chosen units
within each square will be cored using a posthole digger or auger. The stratigraphy revealed by the cores will be recorded and any features or artifacts present noted. It is expected that brick rubble, burnt clay and ash layers may be disclosed in this way. Samples from each core should be saved for soil analysis. In addition, since brickmaking was seasonal in most cases, samples should be retained for pollen analysis. The results of these analyses can then be mapped.

Step 3: Excavation

After the core sampling program has been evaluated, squares with test units that show a marked concentration of the expected features of the industry (ash layers, brick rubble) can be randomly chosen for excavation. If the area sampled contained known buildings or other features, excavation at ten centimeter levels is recommended. If the area contained no known features, it is most likely that the remains are the result of burning or discard and a trench excavation should reveal the most information. The cores should indicate how deep the artifact bearing layers are and a backhoe could be used to remove the top layers of soil and vegetation. Material removed by backhoe will be screened to recover any artifacts
remaining in the roots of the vegetation. As the trench is excavated, its stratigraphy will be noted and the backdirt screened. All brick and burnt clay found should be saved for further analysis. The provenience should be kept by square and level in order to keep track of the quantity of material found. All non-brick artifacts found should be individually marked with the site designation and a number and retained in marked level bags. If a large amount of brick is encountered, it should be determined, if possible, what type of feature it represents (rubble, base of kiln) and a decision made about further excavation. It is recommended that any whole or large pieces of brick be saved, if their condition warrants it, since they may be of use in the restoration of heritage buildings.

Step 4: Analysis

The excavated brick and other materials should be analyzed during this step. The use of specialists is necessary at this time. Samples from brick buildings in the project area should be compared with brick excavated on the sites. This could be done with spectroscopic analysis. Clay samples from the site also need to be analyzed and correlated with the brick. It is known from documentary evidence that at least one
yard blended three types of clay together. How this may affect the analysis will have to be determined. Finally, the brick artifacts can be classified according to criteria developed by Harley (1974).

Other artifacts found during excavation may also need to be formally classified depending on what they are and how much there is. There may be machinery pieces, for example, and it is expected that other types of historical period artifacts will be encountered. Step four should take several months to complete.

STAGE 3: Final Data Analysis and Report

Time: 6 months - April to September

The last stage of the test excavation program is the preparation of the final report. This will include a detailed discussion of the development of the document typology and the results of the archaeological excavations. An evaluation of the methodology used in the survey and sampling portion will be contained in the report.

5.3 RECOMMENDATIONS AND CONCLUSION

An historical archaeological investigation of an industry can be time consuming and expensive. Two separate investigations must be completed and synthesized in order to produce an integrated and
comprehensive study. But the effort is worthwhile. The study of historical industries in archaeology is much neglected although some studies have been done in recent years. Nothing has been done in the project area, however. Brickmaking was only one of several dozen industries that once thrived in Victoria. While it would be impractical to do archaeological investigations of all of them, some particular areas could be examined. For example: the industrial areas of the waterfront along Store and Wharf in Victoria. At the very least some historical investigations of early industry need to be completed.

Urban archaeology—doing archaeology in the city (Staski 1982, 1987)—is a fairly new field since it was thought that urban development would obliterate previous occupations of the site. This is not the case, however, and the city of Victoria in particular, has a vast potential in this field. A great deal of the nineteenth century city center still exists and has much to offer archaeologists. As development takes place in the city, an archaeologist should be consulted to determine the significance of the site. Insight into early building techniques, the development of ethnic enclaves, and multiple-use of buildings are only
a few of problem areas that could be investigated with archaeological techniques. Combined with historical research, the result could reveal aspects of nineteenth century society otherwise unobtainable.
CONCLUSION

Archaeology is visibly bringing history to the public .... With care and attention, the earliest vestiges of the city heritage are being recovered from between the office towers much to the surprise of sceptical city developers. With imaginative public awareness programs, citizens can thus relate to their heritage. With this public support, the next step will be to demonstrate that archaeological resources are not solely the domain of academics but are of concern to everyone and that these archaeological resources need to be managed, protected, interpreted, and exhibited

(Brown 1987:82).

Historical archaeological projects ideally combine data from two fields and have the potential to increase knowledge in both. The investigation of brickmaking on southeastern Vancouver Island covered in this thesis is of interest not only to historical archaeology but to industrial archaeology and urban archaeology, two recently developed, more narrowly focussed fields.

As an historical archaeological study it fills a gap in Canadian and provincial history. Few pioneer industries have been studied in any depth and bricks were produced in many areas of the province. Southeastern Vancouver Island, particularly the city of Victoria, was the centre of the industry during the nineteenth century yet little is known about
brickmaking here. Research has shown that brickmaking was a complex industry with several firms operating as building contractors, a wide range of structural clay products being produced in addition to brick, two speciality bricks—firebrick and silica brick—being manufactured and one firm involved with street lighting. At least two brickyard owners were city aldermen in the 1880s-1890s and Victoria-made bricks were exported throughout the Pacific Northwest from Alaska to San Francisco. In addition, a great deal of the city core is built of locally made brick. Brickmaking provided jobs for hundreds of workers not only in the yards but in related trades such as construction, transport and lime production. By the end of the nineteenth century, brickyards were operated mainly by cheaper Chinese labour, a key factor in the industry maintaining its number one position in the province. Historically, the industry played a major role in the development of the area and grew along with the city.

The systemic approach allows analysis at all levels of society. Locational analysis indicates that changes in the physical location of brickyards occurred at times of social and economic change, at temporal boundaries. Furthermore, initial and expansion period
location was on the periphery of the social system at the frontier. The basic relationship between location of the yards and society in general is one of distance from residential areas. However, this could not be maintained in Victoria itself as the city expanded northward and residences began to surround the brickyard complex.

The many interrelationships between the industry and society are also seen more easily from a systemic viewpoint. The key relationship here is one of supply and demand. On the whole, the industry is unstable for if demand falls below a certain limit, the industry ceases to be viable. It cannot maintain itself if society does not want its product. In addition, there is a social boundary in brickmaking. Chinese workers, even if skilled, never crossed the boundary to become owners of yards.

Systems have both boundaries and frontiers at which point change is more clearly visible (Green and Perlman 1985). Analysis of brickmaking at two levels has illustrated that change occurs primarily at boundaries, either physical, temporal or perceived, that exist at all levels throughout the system. Boundaries serve to contain the many hierarchical units
that constitute each subsystem but these boundaries are not solid. They allow feedback between the layers and are changeable. The level of change, however, depends on a vast number of variables, a few of which have been described in this analysis.

Archaeological data complements the historical and the two combined provide a comprehensive picture of a little known industry. It is archaeological data that serves the goals of industrial archaeology and urban archaeology. Industrial archaeology tends to be dismissed as unimportant by archaeologists and for some good reasons. It began in the 1950s-1960s as an effort to record remains of the Industrial Revolution which were rapidly disappearing under developments. It was not even practiced by archaeologists but by geographers and historians and as a result only surface features were generally recorded (Grant 1987). Only rarely was excavation done and this often superficially. By the 1980s, though, the field was attracting some attention as an archaeological pursuit and excavations were being done (Darvill and McWhirr 1982, 1984). The archaeological investigations outlined in this thesis can serve as a model for other manufacturing industries and indicate how much information can be gained by using archaeological techniques in conjunction with
traditional recording methods. In doing so, industrial archaeology becomes a legitimate archaeological pursuit and work done by industrial geographers and historians can form the core of a research project. Brickmaking is an ancient industry begun during the neolithic era and eventually spreading throughout most of the world. But while the history of brickmaking has been presented many times, little is known of the archaeological implications of the industry. Much more work needs to be done to understand the ramifications of brickmaking in the archaeological record at different times and under different environmental conditions.

Finally, the project addresses the goals of urban archaeology. It focuses on both archaeology in the city and archaeology of the city (Staski 1982, 1987). The former is concerned with techniques of doing archaeology in an urban environment; the latter, with using archaeological methods in the study of urban development. Urban archaeology has developed quite rapidly as a field of interest and plays an increasingly important role in heritage conservation. The built-up environment requires a distinct archaeological methodology, one which gathers the most information with the least disruption. Urban
archaeology is expensive and a well planned research design is essential in any urban site excavation. Urban archaeology also offers the most public exposure to the field of archaeology in general and in this way can serve as an avenue to public awareness. As people become aware of what is beneath their feet, of what made the city what it is today, many begin to appreciate the value of preserving its heritage. It is this appreciation for the past that aids all cultural resource management programs.
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NWR: Northwest Review, Portland, Oregon.

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APPENDIX A

19TH CENTURY BRICK PRODUCTION
BRICK PRODUCTION

Before the clay can become a brick, it passes, in the most common method of brickmaking, through the following steps: Digging the clay, shoveling in carts, dumping in the pit, and tempering; shoveling in barrows and wheeling to the grinder; moulding, putting on trucks, carrying to yard and dumping; spattering, turning up, and hacking in the yard; putting on trucks, tossing up in the kiln, setting, tossing out of the kiln, and dumping from the wagon at the place of building (Scientific American Nov. 27, 1886: 343).

Brick manufacturing is one of the oldest industries in the world and has, over time, developed a unique terminology to define its processes and equipment. Illustrations of typical processes and equipment are used to clarify the various steps. None of the illustrations represents any yard in the study area. The information used to construct this synthesis comes primarily from manuals on brickmaking and brick construction written during the nineteenth and twentieth centuries. These include Bevan (1876), Chamberlain (1856a, 1856b), Crookes (1891), Dobson (1850, 1928), Gurcke (1907), Hammond (1981), McKee (1976), Notes on Building Construction (1879), Withey and Aston (1919) and Woodforde (1976). Early editions of Scientific American provided several of the illustrations.
Modern brickmaking is now almost completely mechanized. Therefore, the following description covers late nineteenth and early twentieth century procedures. There were six basic steps involved in producing a finished brick:

1. Winning
2. Preparation
3. Moulding
4. Drying
5. Burning or Firing

Except for step six, these are illustrated in Figure 1.

1. WINNING

Winning was the process in which the clay was extracted from its original location. Two methods were generally employed; surface mining, the most common and underground mining.

**Surface Mining**

In surface mining, the first step was unsoiling or encallowing—the removal of the layer of soil and vegetable matter from the clay bed. This was done either by hand or by plowing and scraping. Ideally this material was set aside for later replacement when the bed was no longer used. Once the clay was exposed, two approaches could be taken. For small yards, a simple pit was used. For larger operations with
extensive clay beds, quarrying methods were used. Benches up to nine feet high and eight feet wide were worked, gradually extending both the depth and the width of the pit. The end result resembled an open pit mine.

The clay was extracted either by hand, using narrow bladed spades (grafts), or by some mechanical means such as a steam shovel. After the clay had been extracted it was usually weathered prior to preparation. It was transported to the weathering area and/or the preparation area by a variety of methods including wheelbarrows, horse drawn carts and mechanical methods such as cars on a track system or conveyer belt.

Winning the clay was a fall and winter occupation since the rain and frost were needed to begin the weathering process. The clay was either piled into small heaps or spread out in layers. In some locations coal ash (breeze) could be spread on the layers. This helped make the clay more porous, prevented or reduced shrinkage and could shorten the burning period.

**Underground Mining**

Underground mining for clay was used only when the deposit was too deep and the additional expense could be justified. It was rarely used to obtain clay for
common brick. However, fireclay, usually associated with coal beds, was normally acquired using underground methods. Fireclay was not weathered since it is often in the form of shale and must be crushed before use. It was transported from the mine to the brickyard by train, wagon or boat depending on the location.

2. PREPARATION

The weathered clay had to be tempered or prepared in order to make it plastic enough for moulding. Any or all of three operations - washing, rolling and pugging - could be carried out at this stage.

Washing

Washing the clay removed stones and other intrusions that, if left in the mix, resulted in an inferior brick. The extra time and expense required often meant that this clay was used only for special bricks such as face brick. The wash mill (Figure 2) consisted of a round pit or trough and a set of harrows worked by one or two horses. When the clay and water were thoroughly mixed, the thick slurry was released through a grate or sieve which trapped the stones. The clay sank to the bottom and the water was drained out. The resulting clay was quite smooth and plastic and could be used without further treatment.
WASHING-MILL FOR CLAY

Plan of clay-washing mill.
a. Inlet from the chalk-mill.  
b. Outlet to the shoot.
cc. Harrows.  
d.d. Cutters.  
e. Pump.

Sectional elevation of clay-mill.

Figure 2: Wash mill from Dobson 1850, 1928
Rolling

A rolling mill (Figure 3), sometimes called a disintegrator, was a simple device made up of one or more pairs of heavy iron rollers which crushed or ground the clay. This was more commonly used rather than the wash mill. If the large rocks were picked out first, the smaller ones could be crushed and mixed with the clay. With the softer brick clays only one set of rollers was required but for the heavier fireclays three or more pairs could be needed. These mills were often steam driven and were therefore associated with machine made brick.

Pugging

The final step, and often the only one used, was to process the clay in a pug mill (Figure 4). Prior to the development of this machine, the clay was simply put in a pit, water and sand (or in some locations coal dust or ash) were added and it was mixed either with bare feet or with wooden spades. However, it was difficult to produce a consistent mix this way. A typical pug mill was basically a tub with a set of horizontal blades on the inside which chopped and mixed the clay and any additives into a smooth plastic state ready for moulding. These were first operated by
HORSE-DRIVEN CLAY-CRUSHING ROLLS

- Plan of horse-driven clay-crushing rolls.

- Elevation of horse-driven clay-crushing rolls.

- Cross-section of crushing rolls.

Figure 3: Rolling mill from Dobson 1850, 1928
Figure 4: Pug Mill from Dobson 1850, 1928

--- Elevation of pug-mill. ---

a. The roke arm.
b. The ejection opening.
c. The brick-earth surrounding the mill, on which is an inclined barrow road to the top of the mill.

--- Section of pug-mill. ---

a.a. Force knives. These are not provided with cross knives, like the others, their purpose being merely to force the earth downwards and out at the ejection hole.
horses, later by steam. As the tempered clay was ejected from the bottom of the pug mill, a tool called a cuckhold or cuckle was used to cut off lumps which were taken to the moulder. If the moulder could not keep up with the supply, it was set aside under wet sacks so that it retained its plasticity.

3. MOULDING

Moulding, the formation of the raw or green brick, could be done entirely by hand or machinery or by a combination of both.

Hand Moulding

There were two methods of hand moulding, slop-moulding and sand or pallet moulding. These terms were not mutually exclusive however, since slop-moulded bricks could be associated with pallets in some areas. The two procedures required slightly different yard layouts and the output varied considerably. Both systems employed "gangs" to make the brick. These gangs, which varied in size depending on the procedure, often consisted of family members with the gang head, the brickmaker or moulder, responsible for paying the members a set price per 1000 bricks. The brickmaker sat at a moulding table or stool generally located under a shelter of some sort, either temporary or
permanent. Examples of equipment used in the moulding process are shown in Figure 5. These include various moulds, a cuckle for cutting lumps of clay, and a bow, strike and scraper used in the initial moulding step.

**Slop Moulding**

In slop moulding the brick mould was dipped in water to prevent the clay sticking. In some instances slop moulding could simply refer to an extra soft pugged clay. In either case, the excess water used resulted in a green brick which required special handling to maintain its shape. This in turn affected the entire operation and layout of the brickyard. Slop-moulding required fewer gang members and a weekly production of 10,000 bricks by each moulder was considered high.

The equipment for slop-moulding was very basic often consisting of only a rough table (Figure 6), a water trough, two brick moulds, a strike and a bow for each gang. A minimum of three per gang was needed for this process. The feeder or pug-boy transported the prepared clay to the moulder or brickmaker. Using the bow, the moulder cut off a lump of clay and formed it into a rough rectangular shape called a clot or waulk. Then, holding the clot high above the wet mould, he
Multiple mould, wooden, but with iron facings, for use with a brick-moulding machine.

Woodforde 1976

Minter and Nash 1981

"Copper" brick mould.

Dobson 1850, 1928

Figure 5: Moulding Equipment
Figure 6: Slop-Moulding table from Dobson 1850, 1928

Figure 7: Slop-moulding brickyard layout from Dobson 1850, 1928

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A. sloping plank for clay
B. tempered clay
C. sand box
D. clot moulding area
E. mould
F. water box
G. rest for plane
H. taking-off area
I. gutter for slush (tub not shown)

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- General view of a brickworks.
  A. The face of the workings.
  m.m. Heaps of brick-earth, dug in the autumn, to be worked up
  the following season, after being mellowed by the winter frosts.
  c. The clay-mill or crushing rolls.
  m.m. The working floors, generally 10 yards wide.
  E. The hovels or drying sheds.
  F. The kiln.
  G. Spaces for bricks stacked ready for sale.
threw it forcefully into the mould. After ensuring that the clay completely filled all parts of the mould, he used the strike or bow to remove excess clay from the top of the mould. A wet strike was also used to smooth the top of the fresh brick. The third person, the taking-off boy, carried the fresh brick still in its mould to the drying floor or flat. He carefully unmoulded it directly onto the sanded floor and returned the empty mould to the brickmaker where another brick was ready to take away.

Because the bricks had to be laid out separately during the initial drying period, the distance from the moulder to the clear area was, of necessity, short. Therefore in order that the flow be uninterrupted, the moulding stool was periodically moved. This crucial factor influenced the layout and operation of the yard. The layout illustrated in Figure 7 was typical of a slop-moulding yard. The kiln occupied the centre of the site, surrounded on two or more sides by the hovels or drying sheds. Around these in turn was the work area and beyond this the mills and clay banks. For each moulder on site, an average 1/2 acre was allotted for the work area and hovel.

**Sand or Pallet Moulding**

Sand moulding required more equipment and a larger
gang but more than tripled the number of bricks produced in a week. Consequently, much more space was required, at least two acres per moulder. The minimum size of a pallet moulding gang was six. The pug-boy took the clay to the moulding stool (Figure 8) where the clot-moulder or waulk-flatter prepared the rough rectangular block for the moulder. Both the mould and the table were liberally sanded and the moulded brick was turned out on to a pallet, a little larger than the brick, placed on an extension of the stool called a page. These were in turn loaded on to a hack barrow (Figure 9) by the taking-off boy. Each barrow normally held 26 bricks although larger ones were sometimes used. At least two wheelers were required to take the barrows to and from the hack ground. Three barrows were needed to maintain the flow, one always being loaded while the others kept moving. Since barrows were used, the distance from the stool to the drying area was not a major concern and the moulding stool was not moved.

An average of 36,000 bricks a week was produced by one gang. A skilled brickmaker could produce over 5000 in a 12 hour day; an exceptional moulder with an efficient gang could sometimes produce 1000 in an hour.
Figure 8: Sand-moulding table) from Dobson 1850, 1928

- a. Clay paste from the pug mill.
- b. Moulder's sand.
- c. Cloth-moulder's sand.
- d. Bottom of the mould, or stock board.
- e. Water-tub.
- f. Puge.

- g. Bullets in proper position for use.
- h. A newly-made brick ready for taking-off.
- k. Moulder's place.
- m. Cloth-moulder's place.
- n. Taking-off boy's place.
- o. Cuckhoold.

Figure 9: Hack Barrow from Dobson 1850, 1928

- The hack or off-bearing barrow—loaded.
The illustration in Figure 10 shows the layout of a typical sand-moulding operation. The pug mill was close behind the moulding stool which remained in a fixed position. The drying yard extended in front of the stool and beyond this the clamps were constructed.

**Machine Moulding**

Throughout the 19th century hundreds of patents were taken out in England and North America for a wide variety of machines for use in all aspects of brick manufacturing. A large number of these were for the moulding process. All of the machines operated on the same principle and differed only in design. Three general types of machines were developed, each utilizing a specific clay mix: soft-mud, stiff-mud and dry-press. Examples are shown in Figure 11.

**Soft Mud Machines**

Soft mud machines, which basically duplicated hand moulding methods, were the first to be developed. The soft mud was released from the pug mill (either manually or by steam power) under pressure and forced into a set of moulds, generally one unit with an average of six divisions. This was then taken off and an empty mould returned. These machines often required more labour to operate than needed for hand moulding. Although too cumbersome to move, the output was higher
Figure 10: Sand-Moulding Brickyard Layout

Dobson 1850-1928
and therefore more labour was needed to carry off the green bricks to the drying floor. Later 19th century designs sometimes incorporated rolling mills as well as pug mills and output varied from ten to fifty thousand bricks a day.

**Stiff Mud Machines**

Stiff mud machines were developed after soft mud machines. They used a much less plastic mud (only 15-20% water) and potentially produced a more uniform brick. An auger in the machine forced the clay out in a block which was cut into individual bricks by wires. This led to the machines being called wire-cut machines. They did not, however, yield a brick of as good quality as that produced by the soft-mud machines. In early machines, the wires were hand controlled and unless kept perfectly straight, cut bricks had angled ends. There were also problems with finished bricks crumbling or flaking due to too little water in the mix. Furthermore, unless the clay was well mixed and free of intrusions, the wires would often snap when they encountered a rock.

**Dry Press Machines**

Dry press machines were not as common as the latter two types. They were used mainly for hard clays such as fireclay. The clay was ground into a powder,
and, using pressure of up to 80 tons, formed into a brick. These bricks were very uniform in shape, especially necessary when constructing anything which required a tight fit. Since they contained very little water (less than 10%) the moulded bricks could go straight to the kiln for burning eliminating the drying period. Both soft and stiff mud bricks had to go through varying periods of drying before burning.

4. DRYING

Water used to make the clay plastic had to be evaporated in order to burn the bricks. If too much water remained the firing process would destroy the bricks; if too much was removed the bricks crumbled when handled. Bricks could be dried in the open air with temporary coverings, in permanent drying sheds or hovels, or in specially constructed and artificially heated buildings. All of these were used in the study area. The number of steps in the drying process depended primarily on the moulding process followed.

The Drying Floor or Flat

The drying floor or, flat was an area some 6-8 yards wide and of varying length. It had a gentle convex shape to allow for drainage. Slop-moulded bricks were unmoulded directly onto the sand sprinkled
area where they remained at least 24 hours or longer depending on the weather. Sand was also sprinkled on top of the drying bricks both to absorb moisture and to deflect some of the sun’s rays. When they were sufficiently dry to handle they were hacked in drying sheds or hovels. Alternately they could be hacked on the drying floor and covered with tiles or straw roofs for protection.

**Hacking**

Sand moulded and machine moulded bricks were firm enough to be hacked immediately after the moulding. Using the pallets on which the individual bricks were placed by the moulder, the waller carefully set the brick edgeways on the hack ground. A typical hack was two bricks wide with the bricks set 1/2 inch apart at right angles to the hack length. Each row was allowed to harden before the next row was started. Hacks were generally eight bricks high, in effect forming a low wall.

**Scintling**

When the hacked bricks were partially dry, they were scintled or set slantwise. Since this increased the distance between the bricks, the drying process was speeded up. The rows alternated directions with each brick lying across three others. These scintled rows
were protected from the weather and when dry were ready for burning. Alternately bricks could be scintled before being hacked.

Prior to scintling some bricks could be repressed. This was done either by hand on a dressing bench using a clapper, dresser or plane or by a portable pressing machine (Figure 12). This operation smoothed the surface of the brick and corrected any warping which occurred during the initial drying period. It was used primarily on hand-made bricks since machine-made bricks were already uniform if correctly prepared.

In some locations, the bricks could be placed directly onto large raised pallets which could then be stacked. This eliminated handling the green brick. The entire drying process, depending on the method used took from 2-6 weeks.

Artificial Drying

Drying the bricks in the open air limited the operation of the yard to the warm dry season. With an artificially heated building, the yard could remain open all year if desired. There were two basic systems: a permanent building with a heated floor and a tunnel dryer. In the former, the floor was heated by
Figure 12: Re-pressing equipment
waste heat from a kiln or by a series of steam pipes beneath the floor. A tunnel dryer consisted of a long building or tunnel about 40 feet long and made of brick. Leading into and out of the gently sloping tunnel was a railroad track. Bricks were hauled directly onto special cars which slowly moved through the tunnel, emerging some 24-48 hours later dry and ready for burning. The tunnels were heated either through waste heat, steam heat or by a series of graduated fires beneath the tunnel. The bricks began at the cool end of the tunnel and slowly progressed through hotter sections.

5. BURNING

Hand made or soft-mud machine-made bricks had to lose 25% of their water during drying before they could be safely burned. Stiff-mud bricks, which contained less water, required a shorter drying period while dry-press bricks could be burned immediately.

**The Firing Process**

Temporary or permanent kilns could be used for the firing process which has three stages: water smoking, dehydration and vitrification. The whole process of firing took from ten days to six weeks depending on the quality and quantity of the bricks and the type of kiln used.
Water Smoking

The dried bricks still contained water which had to be driven off during the first stage. The fire was slowly built up to a temperature of 250-350 degrees Fahrenheit. If it was too high the bricks would shrink excessively. During this stage, the steam produced rose through the kiln, hence the name water smoking.

Dehydration

When the steam stopped, the fire was gradually raised to between 1400 and 1800 degrees Fahrenheit. Any chemically bonded water and all combustible materials in the clay were destroyed or driven off during this stage. A large amount of oxygen was needed and a strong draft had to be maintained.

Vitrification

The final stage needed temperatures of 1600-2200 degrees Fahrenheit in order to melt or anneal the individual grains of the clay together. The draft was cut down and the kiln sealed to retain heat. Once this had occurred, the fires were put out and the whole kiln left to cool for 2-3 days or more.

Kilns

Kilns were of two kinds: periodic or continuous. Either could be up-draft or down-draft—terms which
indicate the directional flow of the hot air or gases in the kiln. Periodic kilns were most common. They could be round or rectangular, permanent or temporary. Periodic indicated that the loading, firing and unloading were separate steps and were generally done manually. Temporary kilns were constructed where and as needed although some could last more than one season. Permanent kilns were specially constructed buildings in which the green bricks were stacked to be burnt. Continuous kilns were a late development in the brick industry, the first one invented by Hoffman, an Austrian, in 1859. There were two types, the Hoffman kiln and its variations and the tunnel kiln.

Periodic—Temporary: Scove Kilns and Clamps

These terms were often used interchangeably although they refer to different methods of construction and burning. The origin of clamp appears to be the term close-clamp, a particular construction confined to brickyards in the London (England) area.

Both of these temporary kilns were up-draft. There was no practical way to regulate or recirculate the heat generated and this resulted in an uneven burn with the bottom bricks receiving too much heat and the top ones too little. Losses ranged from 25-50% of the total brick burned.
Close-Clamps

Close-clamps required much less fuel to burn since the bricks themselves contained the material necessary for their vitrification. A close-clamp consisted of a series of walls or necks of closely stacked green bricks inclined against an upright wall of burnt bricks. This upright was wider at the base (6 bricks) than at the top (3 bricks) and beneath each neck was a pavement of burnt bricks. This pavement was made up of three separate layers. The base was edge laid brick used to prevent ground moisture from entering the clamp. The two succeeding layers were scintled bricks, that is, laid in alternate directions, spaced two inches apart.

As the clamp was constructed, live holes or flues were built into the upright and specifically spaced necks. These were filled with wood which was used to start the burning. As the courses were built up, layers of breeze (coal ash or cinders) were added. These decreased in thickness from bottom to top and served to ignite the bricks. When the clamp was completed, it was enclosed with burnt bricks to retain heat. The wood in the live holes was set alight which in turn ignited the breeze. The live holes were then
sealed and the whole clamp left to burn for 3-6 weeks. The length of time required depended on the number of flues; the more flues, the faster the burn. However, the longer period produced better bricks since the fire was slower and more regular.

**Scove Kiln**

A scove kiln was a temporary or field version of a permanent Scotch kiln which will be described later. A base of burnt bricks supported the loosely stacked green bricks. It was built in sections 35-40 courses high each containing about 30,000-40,000 bricks. In the centre of each section at the bottom the bricks were stacked to form an arch. This arch ran the length of the kiln and served as the fire box. When the kiln was complete it was encased in burnt brick and sealed with a layer of mud (clay) to retain heat and prevent drafts. The fire boxes were left open so that the fires could be maintained. They were closed during the later stages of burning.

**Periodic--Permanent : Scotch and Beehive**

The Scotch kiln, also an up-draft type, was the most common permanent kiln. It was rectangular, often partly sunk into the ground and was not paved. Fire holes extending the width of the kiln were located opposite each other along the sides and were lined with
fire brick. A lean-to roof extended over these sides protecting the fuel and acting as a wind barrier. The kiln walls, which were about three feet thick, were built of old bricks and brick rubble using loam or fireclay instead of lime mortar, which would not withstand the heat. Narrow doorways at each end were sealed prior to burning. The bricks were loosely stacked in alternate layers leaving continuous holes through the piles to distribute the heat. The size of these kilns varied considerably depending on the output of the yard. A kiln 20 feet long, 10 feet wide and 12 feet high would hold about 25,000 bricks and last up to 50 years or more with only occasional repairs. A typical kiln is shown in Figure 13.

The circular beehive kiln had a much smaller capacity (about 8000 bricks) than the rectangular type. Beehive kilns were generally down-draft and required considerable amounts of fuel. They did produce excellent quality bricks and were often used for facing bricks, tiles, and other special shapes. Figure 14 illustrates a typical beehive kiln.

**Continuous Kilns : Hoffman and Tunnel**

A Hoffman kiln was a permanent rectangular building with semi-circular ends. It was divided into
Figure 13: Scotch kiln from Hay and Stell 1986
Plan of kiln taken at top of fire-holes at level AB

Plan of kiln, looking down on top of oven.

-Elevation of kiln.

Figure 14: Up-draft beehive kiln construction
Dobson 1850, 1928
temporary chambers (often 16) which had to be loaded and unloaded manually. The heat from the first burn was used continuously. As some chambers were loaded, others were being fired, cooled and unloaded. It was very fuel efficient using only 25-50% of the fuel required by other types of kiln. Hoffman kilns varied in size and were most satisfactory in a larger operation where an output of at least one chamber per day could be maintained.

Tunnel kilns operated much like tunnel driers except that more heat was used. Steel cars, with walls and bases of firebrick and a capacity of about 1000 bricks, slowly proceeded through the various compartments. The finished bricks, cooled and ready for sale, emerged from the end.

6. SORTING

The final step in the manufacturing process was sorting the burnt brick. Numerous classification schemes existed based on criteria such as use, location, colour, quality and condition. The amount of sorting required depended a great deal on the method of manufacture and burning used. Scove kilns and clamps produced a wide variety of qualities. Specially constructed barrows, called crowding barrows, were used to cart the finished and/or sorted bricks to the
storage area ready for sale.

7. TILES

Besides common red brick, many of the larger yards also manufactured various types of unglazed tiles. The process was similar to that used for bricks, the major difference being the thinness and shape of the product. Paving tiles were in reality only thin bricks and were made the same way. Roofing tiles, which could be curved, flat or interlocking, were either hand moulded or machine-made. The tile machines were generally of the stiff-mud type using wires to cut the tiles. Coarse drain tiles could be made by hand or machine. Tiles were often burned in the kiln along with bricks although if demand was high enough a special tile kiln was constructed. This was often a circular down-draft model. The process is shown in Figure 15.

8. FIREBRICK AND FIRECLAY PRODUCTS

Firebricks are capable of withstanding temperatures that would crack regular clay brick. They were made with fireclay often found in association with coal seams. These refractory clays are almost pure silicate of alumina and contain only minute quantities of materials that act as fluxes in regular clay. Fireclay is very hard and must be crushed to a powder
1. Making Firebrick
2. Making clay retorts
3. Exhibit of Fireclay Products
4. Making tiles and irregular forms

Scientific American 1883:214

Figure 15: Making Firebrick, Tile and Clay Retorts
before being pugged. Previously burnt clay could be added to increase infusibility and to prevent cracking and shrinkage. After this, the prepared clay was treated in the same manner as regular clay.

Other fireclay products such as retorts, sewer pipes, flower pots, tiles and terra-cotta ware, were made of a mixture of fireclay and regular clay. Both firebricks and fireclay wares were burnt in circular down-draft kilns as much higher temperatures were required for vitrification (2400-2500 F.). Fireclay product manufacturing is shown in Figure 15. These products often appeared in nineteenth century exhibitions.

9. SAND-LIME BRICK (SILICA BRICK)

Silica bricks were first produced in the early 1880s in Germany. They were made with a mixture of thoroughly dry sand (92-94%) and slaked lime (6-8%). After being well combined in a dry mixer, the mixture was conveyed to a wet mixer where water was added. When the right consistency was reached, it was fed into a moulding machine which formed the bricks under immense pressure (100-150 tons). The moulded bricks were placed on iron cars or wagons and pushed into large cylindrical steel retorts. Once the retort was full, it was sealed and the bricks were subjected to
steam pressure of 125-130 lbs./sq.in. for 8-10 hours. When removed, the bricks were ready for use.

Correctly made silica bricks were very hard and were a uniform shape. They were long lasting and desirable as face bricks because of their smooth finish. They were, however, more expensive than regular clay bricks.

CONCLUSION

All of the processes and equipment just described were more or less standard in the industry throughout the world. It must be kept in mind, however, that much variation existed and, given a range of acceptable methods and equipment, no two brickyards were ever identical. Individual preference, availability of equipment, raw materials, market demands and a host of other factors all played a role in the operation and layout of a yard.