A REVIEW OF CLAYBURN MANUFACTURING AND PRODUCTS, 1905 TO 1918*

by John Adams

En 1909, la Clayburn Company Limited est devenue la plus grosse briqueterie de Colombie Britannique. Fondée en 1905 sous le nom de Vancouver Fireclay Company, la Clayburn a fabriqué une grande variété de briques et de différents autres produits en argile très répandus en Colombie Britannique, particulièrement dans la région de Vancouver, et même sur les marchés extérieurs. Le succès de la Clayburn peut être directement attribué à la richesse de l'argile et aux dépôts d'argile schisteuse que l'on trouve sur la Sumas, montagne située à environ quarante milles à l'est de Vancouver, et qui constitue la meilleure des rares réserves d'argile de la province. A partir de ces matières premières, la Clayburn a produit une brique réfractaire jaune clair et une brique de parement dont l'excellente qualité lui a valu une grande renommée. La compagnie fabriquait aussi des briques ordinaires, carrées ou diversement arquées, des blocs pour les hauts fourneaux des cimenteries et des fonderies, des briques pressées de couleurs variées, des tuiles et des tuyaux d'écoulement. La présente étude porte sur l'expansion de l'usine Clayburn de 1905 à 1918 et sur certains des produits qui en sont sortis.

In British Columbia the name Clayburn has dominated the brick industry for over half a century. In 1905 John Charles MacClure founded the Vancouver Fireclay Company Ltd. and established a brickworks in the newly created village of Clayburn, forty miles east of Vancouver. By 1909, when the firm's name was changed to that of the village (which had also

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Fig. 1. A partial general view of the brickworks at Clayburn village, ca. 1912-15. Note the raised track to the right of the photo that carried the trains from the clay mines at Straiton. (Photo: British Columbia Provincial Archives, neg. no. 74816-b.)

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been adopted as the brand name of one of the firm's major lines of brick), the Clayburn Company had surpassed in output its largest competitor in the province, the Columbia Clay Company of Anvil Island. After a period of expansion Clayburn purchased its nearby rival, Kilgard Fireclay Company, in 1918. Dual operations continued at both the Clayburn plant, which specialized in brick, and the Kilgard plant, which specialized in clay tiles and pipe, until 1930 when the plant at Clayburn was abandoned and that at Kilgard enlarged to accommodate brick manufacturing as well. The main reason for this consolidation

was the economy of transporting clay to the Kilgard site. In 1949 a fire destroyed much of the facilities at Kilgard. Subsequently, part of the operation was rebuilt at Kilgard while part was re-located to Abbotsford, five miles away.

In 1979, after several name changes, these two plants survive. Flex-Lox operates at Kilgard; Canadian Refractories Ltd. operates at Abbotsford and still uses the name Clayburn on some of its brick products. The Abbotsford plant of Canadian Refractories is the only surviving brick producer in British Columbia in 1979 out of the more than 100 brickyards known to have existed in the province during the period from 1852 onwards. The initial rapid growth of the Clayburn Company and its eventual size and longevity can be attributed directly to the wealth of easily accessible, top quality clay deposits at its disposal from the beginning. This study will focus on the company's development, its products, and its history prior to 1918, before the merger with the Kilgard Company.

The variety of Clayburn's clay resources is shown by the different beds of clay on the western flank of Sumas Mountain which is near the settlement of Straiton and directly east of Clayburn village. These beds had been located and named by the company as early as 1909 and were described in the 1908 Report of the British Columbia Minister of Mines as follows:

> No. 1 Bed This bed is about 15 feet thick and lies immediately under a thin seam of coal; it is very refractory and makes a high-grade firebrick.
>
> No. 2 Bed Is a bed of fireclay, varying from 10 to 20 feet in thickness, immediately overlaying and separated from No. 1 Bed by a thin seam of coal. This clay is not as refractory as that of the No. 1 Bed, but makes a very good fire brick, though not as good as those from the No. 1 Bed. This bed is not being worked at present.
>
> No. 3 Bed This bed, locally known as "China clay" is below the No. 1 Bed, being separated therefrom by four feet of clay that is discoloured by iron oxide. The bed

> is about 20 feet thick and the clay is very refractory, having a high fusion point and burning white.
>
> No. 4 Bed This bed has been opened up at the Thornton mine, a mile nearer the works than the other seams, and is about 18 feet in thickness, being overlain by a hard conglomerate. The clay is not as refractory as the other seams, but makes a good facing brick of a buff colour.
>
> No. 5 Bed Is a bed of shale, about 8 feet in thickness, situated about 180 feet above the railway track, and burns to a cherry red colour.
>
> No. 6 Bed Lies above No. 5 and is a bed of plastic blue clay, which when burned, is yellow.
>
> No. 7 Bed Lies above No. 6, being overlain by a sandy shale, and is a bed of clay about 8 feet thick which burns to a red colour.[1]

Although other beds were located later to augment these seven on the western side of Sumas Mountain and still others were located above Kilgard, this early list demonstrates how rich in clay resources the Clayburn Company was, even in its earliest period.

Beds one through four, of Cretaceous origin and part of the coal-bearing deposits of that age, were similar to those present in several other coastal localities such as Comox and Extension on Vancouver Island where coal mines had been operating since the nineteenth century. Clays of the type extracted there are generally used for making pottery, firebrick, and other products with a high fusion point.

The principal fire clay beds for the plant at Clayburn were located from 2 to 3½ miles east of Clayburn. They were connected to the plant by means of a narrow gauge railway which had a downgrade of about 3 percent to the works. These deposits were generally deep and were accessible only by means of underground mining.

Beds five through seven consisted of blue grey silt clays of the glacial period and were useful for the manufacture of

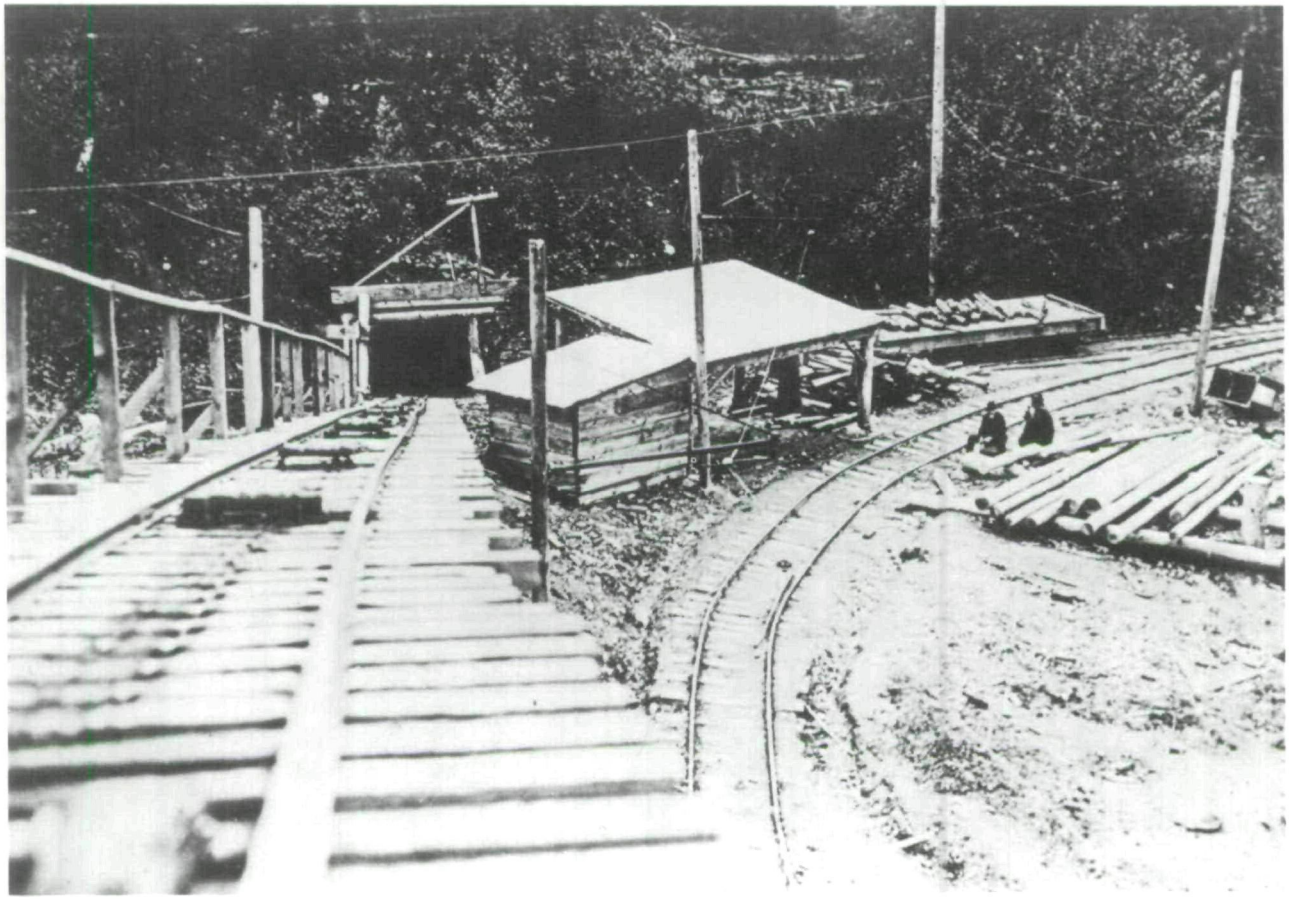

Fig. 2. View of the mouth of the Fire Clay Mine taken from the top of the bunkers and showing a section of the Clayburn Company's private, narrow gauge railway leading to Clayburn village and Kilgard. (Photo ca. 1919; private collection.)

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common brick. They resembled the many other deposits in western British Columbia from which common or red brick was made,[2] including New Westminster, other Fraser Valley localities such as Port Haney and Ruskin, and Victoria. The blue grey glacial clay deposits on Sumas Mountain were located about 1,000 feet east of the brick works and were excavated by means of a steam shovel in an open pit operation.[3]

The Clayburn Company's early growth is illustrated by the annual Reports of the British Columbia Minister of Mines for the years 1911-19. These reports list the total production by

district of miscellaneous building materials and include specific listings for pottery and red, fire, face, and silica brick. In addition to these totals, the Clayburn Company's production was usually listed separately. Table 1 is a composite table giving the total values of production of Clayburn common red and firebrick compared to the provincial totals for the same products in each year.

TABLE 1

Production of Fire, Face, and Silica Bricks

Year	Clayburn	British Columbia	% of Total
1911	$141,000	$147,000	95
1912	156,000	175,406	89
1913	137,000	154,000	89
1914	73,000*	114,704	64
1915	58,000	71,827	81
Production of Fire, Face, and Red Bricks			
1916	164,000**	167,261	98
1917	slightly higher than for 1916	190,849	--
1918	250,000	290,112	86
1919	slightly less than for 1918	226,777	--

* "The production of building materials during 1914 was less than in the year 1913, due no doubt to the financial depression and the war, which have, to some extent, retarded construction work, especially in the Coast Cities." B.C., Report of Minister of Mines for 1914, p.27.

** The large increase in 1916, nearly twice that for 1915, was partly due to an increase in the supply of firebrick for the electrolytic zinc refinery at Trail. B.C., Report of Minister of Mines for 1916, p.31.

Much of the Clayburn Company's popularity was probably due to the diversity of its products. An entry which Clayburn submitted to Might's Directory in 1913 indicated that the company manufactured firebrick, square and all standard arch shapes, smelter and cement kiln special blocks, sacked ground fire clay, pressed brick in buff, grey, speckled, red, and full flashed shades, agricultural tile, partition tile, vitrified sewer pipe, and common brick.[4]

But diversity was not the only selling point of Clayburn's products; uniqueness must also be considered. For example, Clayburn was the only brick supplier on the British Columbia coast that produced buff-coloured bricks[5] or that regularly made specialty bricks. Furthermore, after 1906 Clayburn was the sole manufacturer of firebrick in British Columbia.[6]

For special fire clay shapes or tile, J.B. Millar, plant manager, advised one enquirer that the company could manufacture "anything required" and deliver it within thirty days. Prices for these materials ran from twelve to twenty-two dollars per thousand according to size and difficulty of manufacture.[7] One such special fire clay shape was retort blocks, for which Clayburn developed a small market among such local gasworks as those in Vancouver and New Westminster. This work was done by an employee who had formerly worked for the Glenboig Company in Scotland.[8] Such was his skill that Clayburn boasted that it could assure better quality and cheaper prices than imported retorts.[9] Other specialty jobs included making special stove brick for the Canadian Lang Stove Company Ltd. of Vancouver in 1912, firebricks for the dredge King Edward in 1911, and firebricks for Canadian Pacific oil-burning locomotives in 1913 at fifty dollars per thousand.[10] The company even supplied clay for modelling on at least one occasion and some employees used it themselves for modelling and pottery work.[11] The company also tested the quality of clays sent to it for the purpose from as far away as Winnipeg.[12]

Fig. 3. Rusticated log planter (height 73 cm; diameter 30 cm), dark brown. A limited number of these planters were produced in the Clayburn Company's pipe plant under the direction of J.W. Ball, plant manager, probably in the 1920s. This example is one of two he used in his own garden -- where it was photographed in 1978. (Photo by the author.)

Fig. 4. Ed Stevens, a Clayburn employee, modelled this bust (height ca. 15 cm) of his wife in 1918 and fired it in one of the Clayburn Company's kilns. This is one of a pair in the Matsqui-Abbotsford Museum, Abbotsford, B.C., cat. no. 73.15.1. The colour is the distinctive Clayburn speckled salmon buff. (Photo by the author.)

Because of the scope of Clayburn's products they were sought after by architects and contractors who wished to add originality and quality to the colour, texture, and design of their structures. The popularity of Clayburn bricks is attested to by their use in some of the most prestigious buildings built in Vancouver and Victoria before the First World War. Among those built in or near Vancouver were the World Building, Dawson Building, and Bank of Commerce Building, all in 1911, the Asylum at New Westminster in the same year, and the Hotel Vancouver, Police Station, and Oakalla Prison Farm in 1913. In Victoria the list includes the Union Club and Victoria High School, 1912, the Royal Jubilee Hospital and Provincial Jail, 1913, and the Armories, 1914. During the 1920s Vancouver's Marine Building and St. Paul's Hospital and the new wing of Victoria's Empress Hotel were three of the most important buildings which used Clayburn bricks in their construction.

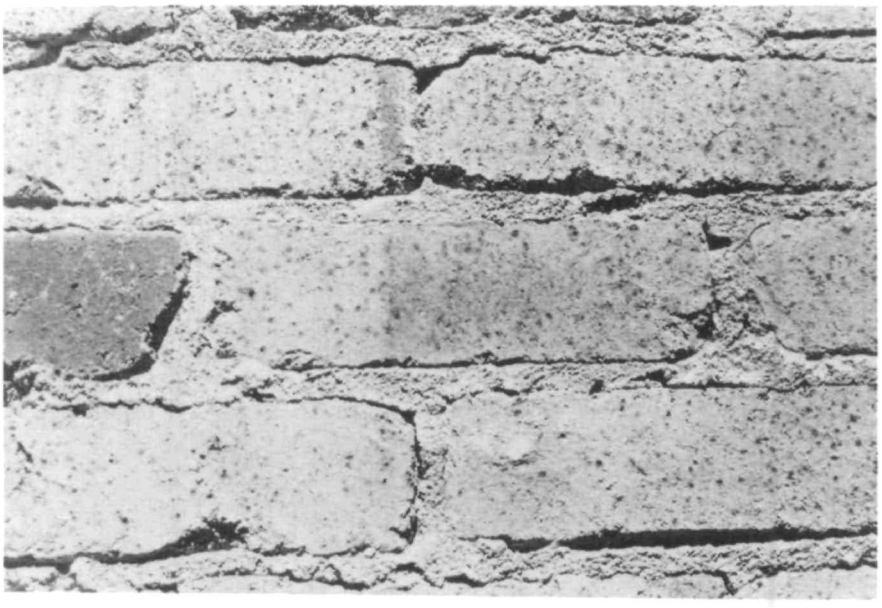

Fig. 5. "Hotel Vancouver Brick," the pride of the Clayburn Company in 1913, a repressed, speckled, salmon-coloured fire-brick. It is pictured here as used in the re-built brickyard at Kilgard, originally salvaged from the second Hotel Vancouver. (Photo by the author.)

The best-known specialty building brick produced by Clayburn was that made for the Hotel Vancouver[13] and aptly called "Hotel Vancouver brick." These bricks were a repressed firebrick made for facing purposes and contained a mixture of twenty-two percent Thornton clay and a balance of fire clay.[14] They were generally considered by the company to be a very durable product. In fact, when the plant at Kilgard burned in 1949, the company bought back quantities of its brick from the demolished Hotel Vancouver, cleaned them, and used them in the reconstruction of its new plant. Apart from the regular Hotel Vancouver brick the company also produced at least two special bricks for the hotel, one designed especially for two niches in the hotel, the other a larger, moulded brick.[15] So popular did Hotel Vancouver brick prove to be that the company marketed it under that name.[16]

Notable among the other bricks specially manufactured by Clayburn were Union Club bricks made for the prestigious Union Club's new building in Victoria. These were a hand-selected, dark pressed brick.[17] The fact that the Clayburn Company could obtain an order for bricks in Victoria for any job, but especially for a prominent building such as the Union Club, demonstrates that the company could successfully compete with the local Victoria brickyards in their own market area. This was probably largely due to the company's willingness to make up special orders. But at least one major Victoria building contractor, Luney, was known to favour Clayburn common red bricks even though that was the type of brick the Victoria yards themselves produced almost exclusively.[18] Perhaps the company's ability to keep the cost of its products low was another major reason for their acceptance in Victoria. Even after the freight charge of five dollars per thousand and the distributor's ten percent commission were added to the thirty-five dollars per thousand charged for the bricks, Millar could observe that:

> I have examined many shipments of red bricks coming into the city which cost considerably more than the price we are getting and do not compare at all favourably with...the goods we are shipping.[19]

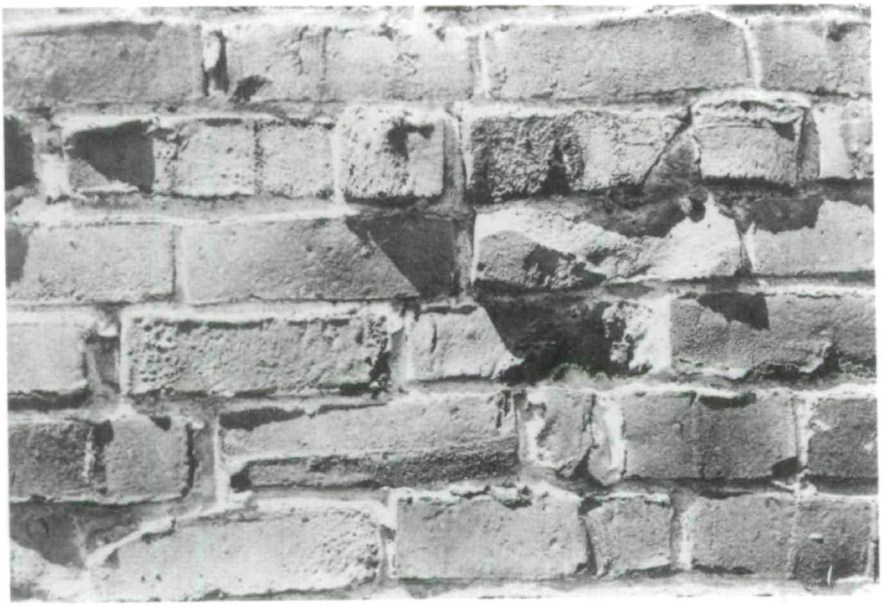

Fig. 6. Clayburn red clinker brick, a very common building material on the West Coast prior to 1920. It is seen here gracing the exterior wall of a company-owned house (erected ca. 1911) in Clayburn. (Photo by the author.)

One brick product which can be classified as special but which is, in effect, a natural product of improper burning, is clinker brick. This is brick which has been overheated, has started to melt, and is frequently darker than normal or has a glassy or bubbled surface. In 1914 the company was anxious to clean up its yard and dispose of the clinker brick which it had accumulated. In June of that year it received a substantial clinker order from Victoria at a price of four dollars per thousand.[20] Clinkers were used for decorative purposes in residential construction, particularly in the California bungalows popular in Victoria and Vancouver before 1925. This created an additional market for all brickyards on the West Coast, a situation which Clayburn was ready to exploit in a major way.

Early brick production at Clayburn initially used the clays first discovered by Charlie MacClure and his exploring partner, Rube Thornton. But these clay deposits eventually were mined out and other sources of clay on Sumas Mountain were brought into use. An exact analysis of the clays used in manufacturing Clayburn brick is not possible. Not only did variation occur between the clays of one mine and another, but also between clays within one mine itself. In the fire clay mines, for example, three layers of clay were laid one atop the other, each separated by a seam of soft coal. The clay of the top layer was the least refractory and that of the bottom layer the most refractory so that in order to insure some uniformity of production the clays of each layer were combined.[21]

Other properties such as weight, colour, and size of the bricks are more easily tabulated than clay composition, although even these properties are not necessarily uniform over time. For instance, the weight of a brick is contingent upon several factors, such as the type of clay used, markings, type of manufacture, and the amount of moisture contained in the brick at the time of weighing.

In May 1913 the Clayburn Company quoted the following weights to the British Columbia Electric Railway Company for three types of bricks:

Firebrick	6 3/4 pounds
Pressed brick	5 3/8 pounds
Common brick	4 5/8 pounds[22]

In October 1912, however, a common brick had been quoted as weighing only 4 pounds 7 ounces,[23] somewhat less than the 4 5/8 pounds later quoted to the Electric Railway Company. Presumably both weights were for finished dry bricks.

Although the Clayburn Company made red common bricks, buff bricks became its trademark. Because of the soft mud[24] technique used in manufacturing red common bricks at Clayburn these bricks were all made with a frog, or indentation, on the top. The buff bricks, generally harder and more refractory than

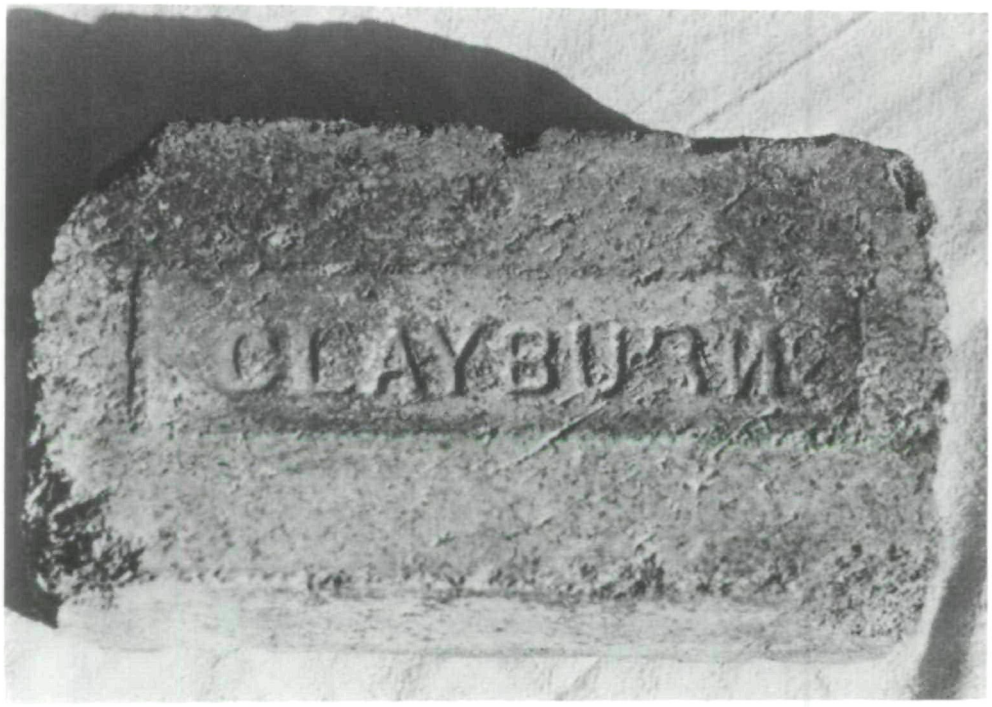

Fig. 7. A well-worn Clayburn firebrick, ca. 1905-09, pulled from an abandoned kiln in a rival brickyard in Port Moody, B.C. Note the backwards final "N" of "CLAYBURN" in the frog, an error which is not frequent in other Clayburn products of the era. (Photo by the author.)

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the reds, were manufactured by a different process, usually stiff mud or repress,[25] and as a result did not bear a frog but had the name "Clayburn" impressed in capital letters on the face of each one.[26]

The quality of bricks can also be affected by the burning process. The type of brick being burned determines the type of fuel needed. At Clayburn common bricks could sometimes be successfully burned in scove kilns[27] using slabwood, a waste product of sawmills, but higher grades of brick required coal. Size, hardness, and purity were important features of coal which could vary according to the work they were needed for. Before 1914 Clayburn experienced repeated difficulty in obtaining the coal it desired. As a result it tried a number of suppliers,

all of whom had difficulty maintaining good quality shipments. Occasional bad shipments of coal, however, did not adversely affect the quality of Clayburn bricks in the long run.

Probably because of its wealth of clay deposits and its start in the early twentieth century (relatively late in comparison to most of its competitors in British Columbia),[28] the Clayburn Company did not follow the general pattern of development which the older brickyards in the province had experienced. For example, the nearest competitive yards, those at Port Haney (established in 1886), had originally been seasonal operations only, as had been the earliest yards in Victoria. Also, in these other yards the methods of obtaining clay, transporting it to the works, working it, and even drying and burning it had tended to be done by hand or with the aid of horsepower.

But the Clayburn Company and its predecessor by-passed these more primitive, unmechanized stages entirely and from the beginning produced bricks all year round, using the most advanced machinery available. By August 1906, after only one year's operation, the vice-president of the Vancouver Fireclay Company boasted that "our plant is modern in all respects ....." and listed the installations as consisting of:

> one dry pan with elevator screens
> two dry presses, capacity each 10,000 [bricks]
> one pug mill
> one auger machine
> one repress
> one automatic cutter
> one eight-tunnel dryer, 105 feet long with force and exhaust fans.[29]

Although no permanent kilns had been built as yet, the company was burning its first output in primitive scove kilns only in order to make bricks to build for more permanent works.[30] In 1909, prior to the re-organization of the Vancouver Fireclay Company, one more dry pan[31] was added to the plant, doubling the dry pan capacity of 1906. Also by 1909 seven beehive kilns

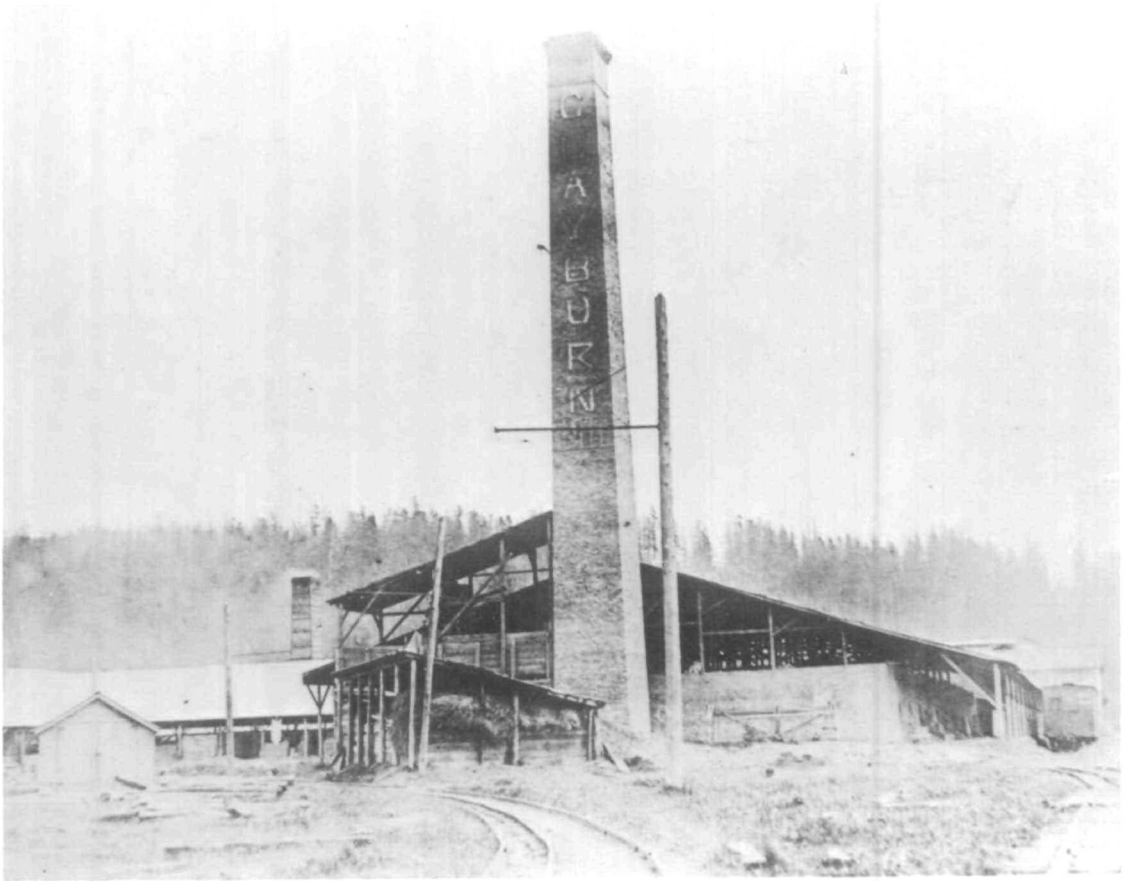

Fig. 8. A landmark on Matsqui Prairie after 1911, this smoke-stack for a continuous kiln bore the name "CLAYBURN 1911" in raised brick on one face. Demolished ca. 1930. (Photo ca. 1919; private collection.)

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were in operation, each holding from 40,000 to 75,000 bricks, as well as one Millar down-draft kiln holding 180,000 fire-bricks.[32]

From 1909 to 1918 the expansion at Clayburn was supervised by John Brown Millar, formerly a manager at the Don Valley Brick Works in Toronto. Pre-war additions included the extension of the existing plant as well as the addition of new facilities to expand the range of the company's product. In 1910, for example, two new large kilns, each with a capacity of 200,000 bricks, were

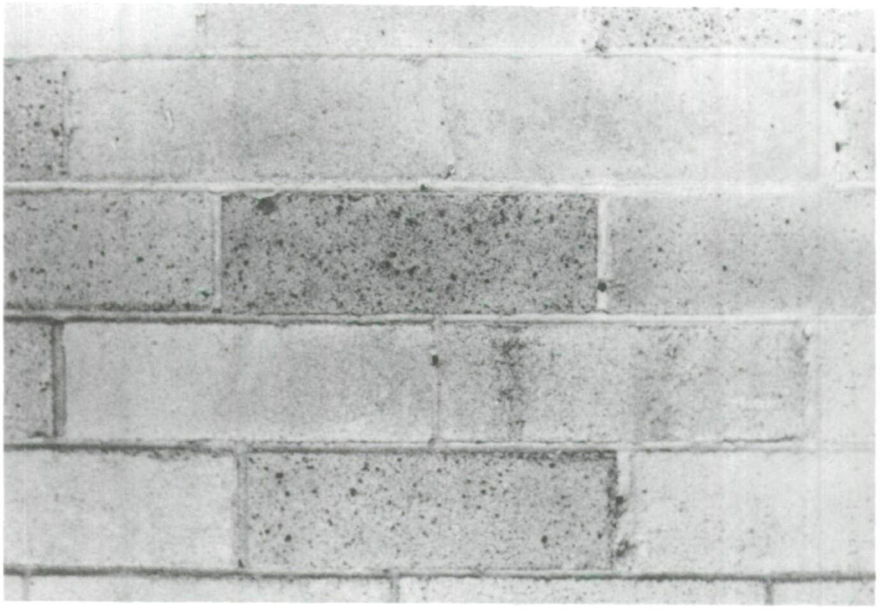

Fig. 9. A fine example of a Clayburn pressed, speckled buff face brick, shown in the exterior wall of the Clayburn plant manager's house, erected 1907, Clayburn village. (Photo by the author.)

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completed in addition to new dryer tunnels; these were necessary because the company was also installing new pressed brick machinery.[33] Also within a year it had finished a completely new plant for producing sewer pipe up to twelve inches in diameter because its clay deposits had been proved "equal to the best foreign and domestic clays for this purpose."[34] By April 1911 Clayburn had added a new soft mud plant for common brick with a capacity of 50,000 bricks per day. To serve this plant a continuous kiln was completed by the end of 1911 and the company boasted that it probably had the largest capacity of any in the Dominion.[35]

The bountiful natural resources at the disposal of the Clayburn Company, combined with the keen business acumen that

inspired the managers to keep up-to-date with equipment and methods, and above all the wide variety of clay products it produced, put the firm ahead of all its competitors. Clayburn bricks have left a visible legacy throughout the province but especially in the Vancouver area where the distinctive buff colour is seen in many firehalls, commercial and institutional buildings, and South Vancouver schools. Clayburn products, especially refractory bricks, have been less visible but of great importance in the industrial life of the province; few bricks taken from post-1905 chimneys, ovens, or kilns, bear any other markings than "Clayburn."

NOTES

1. British Columbia, Provincial Mineralogist, Department of Mines, Report of the Minister of Mines for 1908, pp.J186-J187, (hereafter cited as B.C., Report of Minister of Mines, for a specific year).

2. Ibid., p.J182.

3. Interview with Archie Millar, son of J.B. Millar (Clayburn plant manager 1909-18), Mission, B.C., 29 September 1975.

4. R.W.W. Reid to Might Directories Ltd., Toronto, 22 July 1913, Clayburn Letterbooks, vol. 3, p.533, (hereafter cited as Letterbooks). Prices for these products varied according to the size of an order and the desire to secure a market, but examples of prices quoted to a small consumer in 1914 were as follows: Number 1 pressed red or buff, $40 per thousand F.O.B. Clayburn; square firebrick, $32.50 per thousand; firebrick wedges, $35 per thousand; common brick $11 per thousand; three-inch drain tiles, $27.50 per thousand. Reid to Thomas Jones, Matsqui, B.C., 17 April 1914, Letterbooks, vol. 3, p.793.

5. The Doukhobor-owned and -operated brickyards, established in British Columbia's Kootenay region after the sect settled there in 1911, also produced buff-coloured bricks.

6. The limited firebrick production associated with some collieries on Vancouver Island had ceased by 1906, although the mines at Comox, Wellington, Union, and Extension did ship 488 tons of fire clay in 1907 for the purpose of making pottery. See B.C., Report of Minister of Mines for 1907, p.23.

7. J.B. Millar to C. Mackenzie, Department of Mines Branch, Nelson, B.C., 14 April 1914, Letterbooks, vol. 3, p.792.

8. Millar to Evans, Coleman & Evans, Victoria, 22 August 1913, Letterbooks, vol. 3, p.576. Evans, Coleman & Evans had the sole distribution rights for Clayburn products on the West Coast.

9. Reid to Nanaimo Gas and Power Company, Vancouver, 20 January 1914, Letterbooks, vol. 3, p.695.

10. Millar to Evans, Coleman & Evans, Vancouver, 27 August 1913, Letterbooks, vol. 3, p.589.

11. Millar to Evans, Coleman & Evans, Vancouver, 31 January 1911, Letterbooks, vol. 2, p.602. A small bust modelled locally of a salmon-coloured clay is in the collection of the Matsqui-Abbotsford Museum, Abbotsford, B.C. (fig. 4).

12. Reid to George Otto, c/o Dr. Geo. Otto, 12 Gilass Blk. Winnipeg, 21 May 1914, Letterbooks, vol. 3, p.829.

13. The second Hotel Vancouver, constructed by the C.P.R. and predecessor of the present (the third) Hotel Vancouver, stood on the southwest corner of Georgia and Granville Streets in downtown Vancouver. Started in 1905, it was completed in 1916.

14. Reid to J.J. Plommer, 16 June 1913, Letterbooks, vol. 3, p.491.

15. Millar to Skene and Christie, contractors, Vancouver, 5 September 1913, Letterbooks, vol. 3, p.603.

16. Millar to Evans, Coleman & Evans, Victoria, 23 October 1913, Letterbooks, vol. 3, p.642.

17. Reid to Evans, Coleman & Evans, Victoria, 18 April 1912, Letterbooks, vol. 3, p.85.

18. Millar to Evans, Coleman & Evans, Victoria, 11 July 1913, Letterbooks, vol. 3, p.839.

19. Millar to Evans, Coleman & Evans, Victoria, 6 September 1911, Letterbooks, vol. 2, p.839.

20. Millar to Evans, Coleman & Evans, Victoria, 11 June 1914, Letterbooks, vol. 3, p.843.

21. Interview with Tony Farina, a former Clayburn employee, Abbotsford, B.C., 19 July 1975.

22. Reid to W.D. Power, B.C.E.R. Co., Vancouver, 27 May 1913, Letterbooks, vol. 3, p.471.

23. Reid to J.J. Plommer, 21 October 1912, Letterbooks, vol. 3, p.230.

24. The "soft mud" process of manufacturing bricks predates the introduction of machinery. In this process the clay is mixed with water to make a very pliable "pug" which is then moulded in individual moulds, either by hand, or, since the nineteenth century, by machines. Sometimes the baseboard of the mould carries a shallow block which forms a recessed panel or "frog" on the moulded brick.

25. The "stiff mud" process of making bricks, introduced about 1890, is explained in T. Ritchie, Canada Builds (Toronto: University of Toronto Press, 1967, p.213): "The clay and water were mixed to a stiffer consistency than was usual in the hand methods of brickmaking, and the mixture was put into a cylindrical chamber where it was forced toward one end by a large rotating auger on a horizontal shaft. An orifice at the end of the chamber, slightly larger than the dimensions of the finished brick (to allow for shrinkage in drying and burning), channelled the clay mixture onto a moving table in an endless ribbon, rectangular in cross-section. There taut wires cut it into separate bricks which were removed from the table, dried and burnt."

26. Interview with Archie Millar, Mission, B.C., 29 September 1975.

27. Scove kilns (also called clamps or heaps) are the most primitive type of kiln used regularly by brick manufacturers in both the Old and the New Worlds. To make such a kiln "a foundation consisting of a layer or two of burnt brick is formed as a level site to protect the clamp from damp rising from the ground beneath. Channels may be arranged in this foundation in such a way as to form a number of fireholes or flues running the length and breadth of the clamp. These flues are filled with fuel. The green bricks, with more fuel between them, are then stacked and spaced so that the fire can penetrate throughout the whole mass. Burnt bricks and mud are laid over the top of the stack to protect it from the weather and to reduce heat loss. The clamp is set on fire and allowed to burn itself out, a process that might take several weeks." (See Norman Davey, A History of Building Materials [New York: Drake Publishers Ltd., 1971], p.65.)

28. The first commercial brickyards in what was to become British Columbia were established in Victoria in 1859 by Arthur Porter. By the end of the nineteenth century three large brickyards flourished there. In New Westminster there were several abortive attempts to make bricks as early as 1860, but none was successful until 1898 when John Coughlan started operations. With the growth of Vancouver after 1886 demand for building materials caused the Port Haney area to be the centre of an expanding brick industry. Other, smaller yards soon were established in the Fraser Valley. In 1909 the largest brickyard in the province was that of the Columbia Clay Co. on Anvil Island, 23 miles from Vancouver.

29. W.H. Armstrong to J.W. Ball, Mimico, Ontario, 6 August 1906, private collection.

30. Interview with Archie Millar, 29 September 1975. It was also using imported Scottish Glenboig firebricks in the construction of the permanent kilns.

31. A dry pan is a vessel in which clay or shale is pulverized, usually by means of a heavy rotating wheel.

32. B.C., Report of Minister of Mines for 1908, p.J187.

33. Curry to Gilley Bros., New Westminster, 17 December 1909, Letterbooks, vol. 2, p.37; Curry to Hemphill Brothers, Vancouver, 9 March 1910, Letterbooks, vol. 2, p.230; Curry to H.O. Seiffert, Everett, Wash., 16 March 1910, Letterbooks, vol. 2, p.257.

34. Millar to The Canadian Engineer, 12 April 1911, Letterbooks, vol. 2, p.670.

35. A continuous kiln is designed to economize on fuel. Consisting of several interconnected chambers, it allows heat produced in one section to pass through all the others rather than going directly up the chimney. Although efficient in saving fuel, the continuous kiln could not produce a top grade of firebrick so was used only to burn common brick (interview with Archie Millar, Mission, B.C., 29 September 1975).