

Fragmented Integration: The Nova Scotia Steel and Coal Company and the Anatomy of an Urban-Industrial Landscape, c. 1912

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Article abstract

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Abstract:

This paper examines how forces of fragmentation within the Maritimes contribute a partial but important explanation of the urban-industrial collapse that marked the region in the early 20th century. Specifically, weaknesses that affected the spatial strategies of the vertically-integrated industrial giant, the Nova Scotia Steel and Coal Company, provide evidence of limited interaction within the Maritime urban system. Profits from exporting staples, pig iron, and steel products to foreign and national markets, although initially aided by tidewater location and control over all phases of production, were not sufficient to overcome, in the long-run, such forces of fragmentation as dispersed and limited regional markets, increased costs of producing poor quality resources, or the minimal presence of external economies. With "Scotia's" eventual demise, towns like Sydney Mines, Trenton, and New Glasgow suffered economic and population decline.

In 1912 ["Scotia" was] a corporation with fourteen million dollars capital, six thousand persons on its payrolls, operating on land and sea and under land and sea, owning its own iron ore and coal mines, blast furnaces, steel works, rolling mills, forges, steel finishing shops, and annually freighting over one million tons of ore and coal to two continents under its own house flag.

Basing all its operations on the two elements essential to all modern industrial progress, possessing unlimited stores of raw materials and controlling every stage in the manufacture of the most highly finished steel, "Scotia" is in an unrivalled economic position, being ever assured of a market for all its products by the continued growth and progress of Canada and the tidewater location of all its works, with consequent low freights to all the world's markets.¹

On the eve of the First World War, the directors of "Scotia" were certainly well aware of the strategies of vertical and spatial integration that propelled the company's growth and development as one of Canada's largest industrial enterprises. The company's promotional brochures (such as the one quoted above), its financial press statements supporting the sale of stocks, and its annual reports all spoke of the essential need to maintain tidewater access to material inputs and markets, and also to control all phases of production—from mining coal and iron ore, producing basic pig iron and steel, through to manufacturing finished steel products.

To function in this way, "Scotia" maintained a "sphere of operations"—a specific spatial strategy and structure—that sought integration across Atlantic Canada and more broadly within the North Atlantic economy, albeit from a periph-

eral location (see Figure 1). "Scotia" achieved corporate leadership by progressing successfully through Alfred Chandler's evolutionary three-stage model of modern industrial enterprise.² Over four decades from 1872 to 1912, it (1) developed various production facilities; (2) put in place marketing, distribution, and purchasing networks; and (3) implemented a hierarchy of management along functional lines to operate a vast, vertically-integrated enterprise. This development was clearly evident in 1912 (see Figure 1). "Scotia's" New Glasgow head office was located in Pictou County, the historic centre of Nova Scotia's industrial revolution. In nearby Trenton was the large metallurgical works that included rolling mills, forges, and various finishing departments. Steel and some pig iron were shipped to Pictou County from Sydney Mines on Cape Breton Island. This was the location of "Scotia's" blast and open hearth steel furnaces, as well as its collieries and limestone and dolomite quarries. From Wabana on Bell Island, Newfoundland, iron ore was freighted by the company's steamers to North Sydney where it was unloaded into the hopper cars of "Scotia's" private railroad and then moved several miles to the blast furnace at Sydney Mines. Although sharing tidewater locations, these production sites were scattered some 600 miles apart. Markets were even more dispersed. "Scotia" sold iron ore to customers in Europe and along the eastern United States seaboard; shipped coal throughout the Maritimes and the St. Lawrence River valley; and sent finished steel products as far away as Canada's west coast (see Figure 1).

Urban-Industrial Decline in the Maritimes

"Scotia's" management believed firmly that the lower costs associated with inte-

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Résumé:

Cet article montre comment les forces de fragmentation à l'intérieur des Provinces maritimes offrent une explication partielle, mais importante, de l'effondrement urbain-industriel qui marquait la région au début du vingtième siècle. Plus précisément, les faiblesses qui influent sur les stratégies spatiales de la Compagnie "Nova Scotia Steel and Coal," un géant industriel à l'intégration verticale, témoignent de l'intégration limitée à l'intérieur du système urbain des Provinces maritimes. Malgré les avantages initiaux d'une situation au bord de la mer et de l'autorité sur toutes les étapes de production, les profits provenant de l'exportation des produits de base, de la fonte brute et des produits d'acier aux marchés nationaux et internationaux étaient insuffisants, à longue échéance, pour surmonter les forces de fragmentation tels les marchés régionaux dispersés et limités, les coûts augmentés de la production des ressources de mauvaise qualité, ou la présence minimale des économies externes. Tout cela aboutit finalement à la fin de la compagnie "Scotia," et des villes comme Sydney Mines, Trenton, and New Glasgow subissaient une baisse de l'activité économique et une diminution de la population.

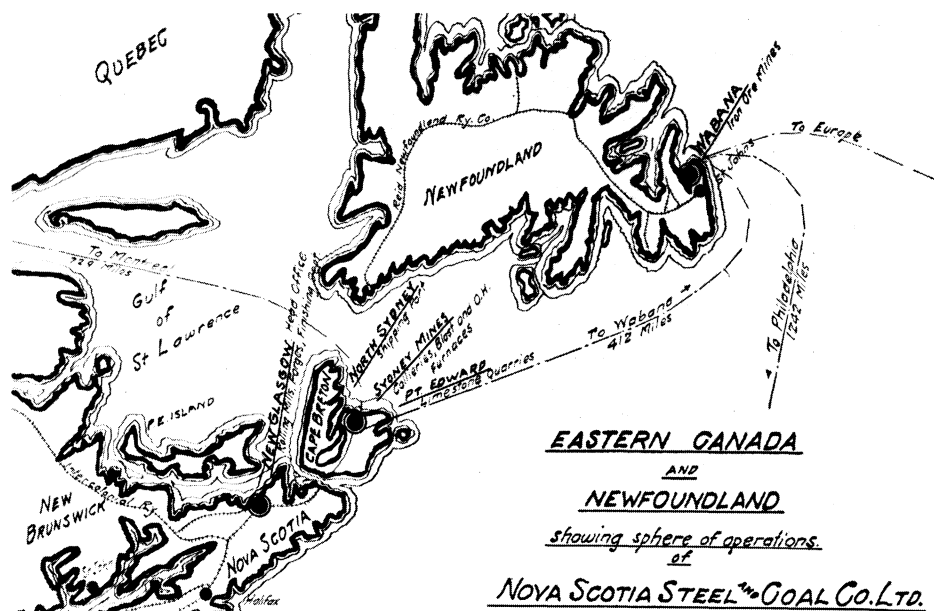


Figure 1: The 'Sphere of Operations' of the Nova Scotia Steel and Coal Company, 1912.

grated production and location at tidewater sites would sustain the continued viability of the company. But considering the eventual demise of "Scotia" in the 1910s, how realistic was the company's spatial strategy of dispersed, integrated production and its heavy reliance on waterborne distribution? We know a great deal about the Nova Scotia Steel and Coal Company's rise and fall, its business leaders, and its workers in various divisions of labour, but much less about whether "Scotia's" long-developed spatial structure of integrated operations could remain economically feasible in a hinterland region characterized by considerable fragmentation.³

Fragmentation in a core-periphery urban system is one possible explanation that needs to be considered more fully in the growing debate about the process of urban-industrial decline that plagued the Maritimes in the early 20th century. Of course, no one explanation can be offered to account solely for the deindus-

trialization and urban population losses of this hinterland region.⁴ Writing in the 1940s, the New Brunswick economist B.S. Keirstead argued that the region's limited market and industrial environment could not provide the external economies necessary for sustained and integrated urban-industrial development. Maritime businessmen were forced to compete against central Canadian firms which had accumulated considerable benefits from a core region's more favourable agglomeration economies.⁵ Therefore, for most Maritime manufacturing companies to grow in size, to remain competitive by acquiring economies of scale and scope, and in turn to stimulate urban growth, an essential strategy was for them to sell their products in extra-regional markets. But this business plan runs into problems of market accessibility. In this regard, some argue that rising freight rates played a role in hindering market accessibility; but others suggest otherwise.⁶ It is nevertheless clear that firms in Ontario could parlay substantial

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production savings from their economies of scale to overcome the transportation costs of shipping products to the Maritimes.⁷ In other cases of hinterland decline, the quality of Maritime resource endowments affected production costs and investment strategies, hindering urban-industrial development.⁸ Poor, if not incompetent, financial management is also cited as a concern.⁹ Other scholars contend that exploitive policies towards deskilling labour while also failing to invest in new technologies were critical reasons for making firms uncompetitive, and for towns to experience limited growth.¹⁰ Further, with limited regional population growth and continual out-migration, local market potential and capital formation were held in check.¹¹ The cumulative weight of all these, as well as other, factors which so typically weigh against hinterland regions was the much publicized deindustrialization and restricted urbanization in the Maritimes. To contribute further understanding to this debate, this paper analyzes in detail the c.1912 anatomy of "Scotia's" "sphere of operations," arguably the most sophisticated spatial strategy of any integrated resource and manufacturing company in pre-war Canada, to better understand how strategies of integration vied with shifting conditions of fragmentation to shape the urban-industrial landscape of the Maritimes region.

Fragmented Integration

Most scholars argue that the Maritimes is more fragmented than integrated, and that the regional settlement system is characterized by isolated communities of considerable independence. Through time, the various provinces have comprised a region thought to be diversified, separated—that is, fragmented—geographically, culturally, economically, and politically. Amongst many factors, a variegated coastline; large, uninhabited forest

lands; scattered patches of usable agricultural land; cultural groups limited in space to original hearth areas; political diversity; and dispersed and scattered resources that shifted in relative value and quality all have contributed to the commonly-held perception of fragmentation.¹² "Politically divided, ethnically diverse, and differentiated by income, employment, experience, tradition, and religion, the people of the Maritimes form a markedly plural society."¹³

The repercussions of these factors for urban and economic development have been immense. According to Ian McKay, "the region's links to the world capitalist economy in the period of merchants' capital ... focused development in dependent export enclaves [and] undermined the socio-economic potential for integrated and balanced growth..., leaving a fragmented and dependent region vulnerable to rapidly expanding central Canadian capital."¹⁴ But what of community isolation and independence in the industrial era? As late as 1911, Maritime urban places remained small in size by North American standards, separated widely from each other, and scattered randomly at resource sites throughout the region (see Figure 2). Moreover, the industrial profiles of most places were markedly independent of each other and still largely focused on export markets outside the Maritimes. This was especially true of the staple-producing communities—the coal towns, fishing ports, and sawmilling centres—but also of some the more specialized secondary manufacturing towns such as Marysville, Milltown, Amherst, Trenton and New Glasgow. These were places that sent their products to traditional overseas markets in Great Britain, the United States or the West Indies; or were highly reliant on newer central and even western Canadian outlets for their goods. In the language of regional development theory, there is little evidence here of actual or

potential industrial linkages (forward, backward, final demand) that might strongly integrate an internal or regional urban network.¹⁵

Paradoxically, these same places, despite apparent isolation and fragmentation, were joined together as a rudimentary settlement system through various lines of communication—by subsidized steamship routes, by a simple road network, and most importantly, by a railroad system of some 4,300 miles (see Figure 2). Besides Saint John and Halifax, the largest and fastest growing urban places were located along the main lines of the Intercolonial and Canadian Pacific Railways which facilitated the movement of industrial materials, wholesale goods, and passengers between towns and cities.¹⁶ Capital, labour, and technological innovations likewise moved fairly freely, when necessary, within the region.¹⁷ The railroads, moreover, joined the Maritimes more closely to central Canada and the eastern United States, creating the means for take-over and merger of regional enterprise by corporate interests based in Montreal, Toronto, and elsewhere.¹⁸ These take-overs, and the various other types of branch business activity that soon followed—banking, retailing and wholesale distribution, for example—can be construed as a sign of integration within a national urban system, albeit to the advantage of cities in Ontario and Quebec.¹⁹ From this perspective, there is really no paradox. There was a certain amount of integration; but attempts at integration suffered repeatedly from forces of fragmentation within the Maritimes that shifted constantly in strength and in focus. As will be argued, resource quality, production methods, technological needs, or marketing schemes might change drastically from one year to the next, adversely affecting the economic viability of "Scotia's" strategy of spatial integration.

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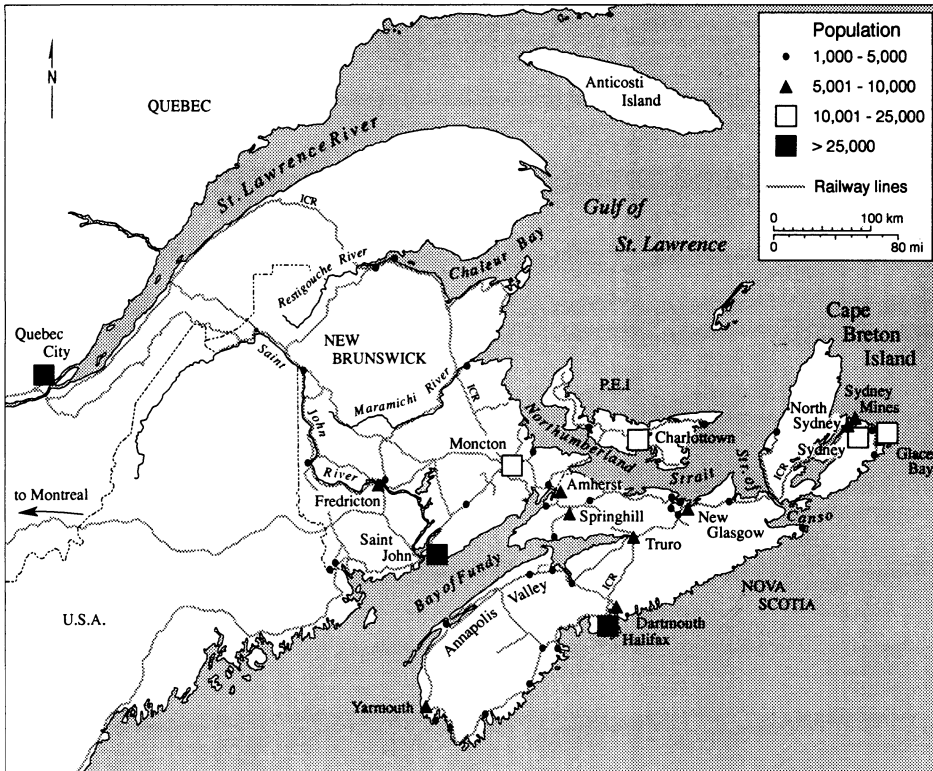


Figure 2: Distribution of urban places in the Maritimes, 1911.

Early Strategies of Vertical and Spatial Integration²⁰

Throughout its growth and development, “Scotia” pursued the possibilities of vertical integration. At first this policy was based largely on the advantages of Pictou County, but gradually the company shifted more widely afield to embrace all Atlantic Canada, and later even considered mining iron ore in South America as essential to its overall spatial strategy. In the first decade of its existence (1870s), it used imported materials to produce marine and rail forgings, but strong local and extra-regional demand for steel encouraged it to become, with financial backing from Pictou County’s mercantile community and tariff support under the aegis of the National Policy, Canada’s pioneer steel making company in 1882.

Continued dependence on imported British pig iron supplies soon proved too costly as duties soared, forcing “Scotia” to reconsider producing its own material inputs. This led eventually to the creation, in 1891, of the New Glasgow Iron, Coal and Railway Company, mainly to supply pig iron to the newly-merged Nova Scotia Steel and Forge Company. Both companies were controlled by the same entrepreneurs. Their initial success, combined with the possibilities of greater efficiency in management and production, suggested the need for further merger activity in 1895. The result was the Nova Scotia Steel Company, a vertically-integrated manufacturer of steel and steel products that was supported almost entirely by regional resources, capital, labour, and entrepreneurship (see Figure 3).

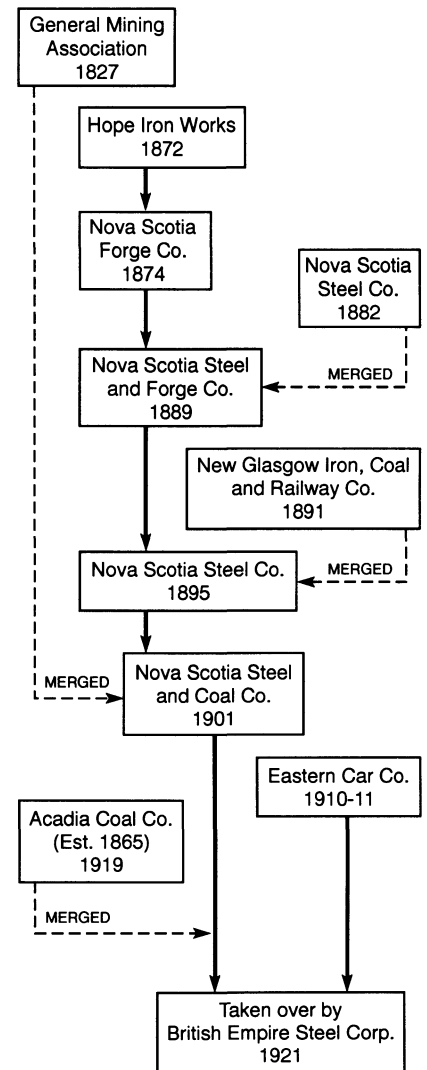


Figure 3: The corporate development of the Nova Scotia Steel and Coal Company, 1872-1921.

The arena for these early developments was Pictou County. Settled in the late-18th century by Scottish immigrants, the county was not only a meaningful political entity, but also a unique physiographic region, rich in natural resources—at least in mid-19th century

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terms—and structured apart, somewhat isolated and fragmented from other areas in Nova Scotia (see Figures 2 and 4). Settlement focused on Pictou Harbour which, unfortunately, usually remained ice-bound for a few months of the year. Several rivers swept inland, passing through a rich agricultural basin to reach their highland source areas that in turn separated county settlement from other populated areas located to the south, west, and east—notably Truro, Amherst, and Antigonish. To journey here, in fact, is to pass through a landscape that portrays Maritime mercantile and industrial capitalism at its strongest. Places occupying coastal basin sites in the late-19th century included the port of Pictou, the coal mining towns of Westville and Stellarton, and the industrial centres of New Glasgow and Trenton. Further inland, along the East River of Pictou, were smaller industrial villages—Ferrona, Springville, Black Rock and Bridgeville—that played pivotal roles in “Scotia’s” “sphere of operations” in the mid-1890s.

Figure 4 portrays the structure of “Scotia’s” locational strategies and major material flows in the mid-1890s after the firm’s rise to considerable industrial prominence. The steel works and secondary metal-working activities were located in Trenton on a larger and better water-supplied site than in neighbouring New Glasgow, the company’s original base from 1872-1878. Moulding sand for foundry work was supplied from Windsor, Nova Scotia; limestone for flux at the steel works was quarried at Springville and Black Rock in the East River valley; and coal for fuel was obtained mainly from local coal companies.²¹ Despite taking out some leases on potential coal properties during the 1880s and developing the Vale Colliery at Thorburn, “Scotia” was a late arrival on the coal mining scene, and never managed to produce, by itself, sufficient coal or coke for the company’s various Pictou County operations until it

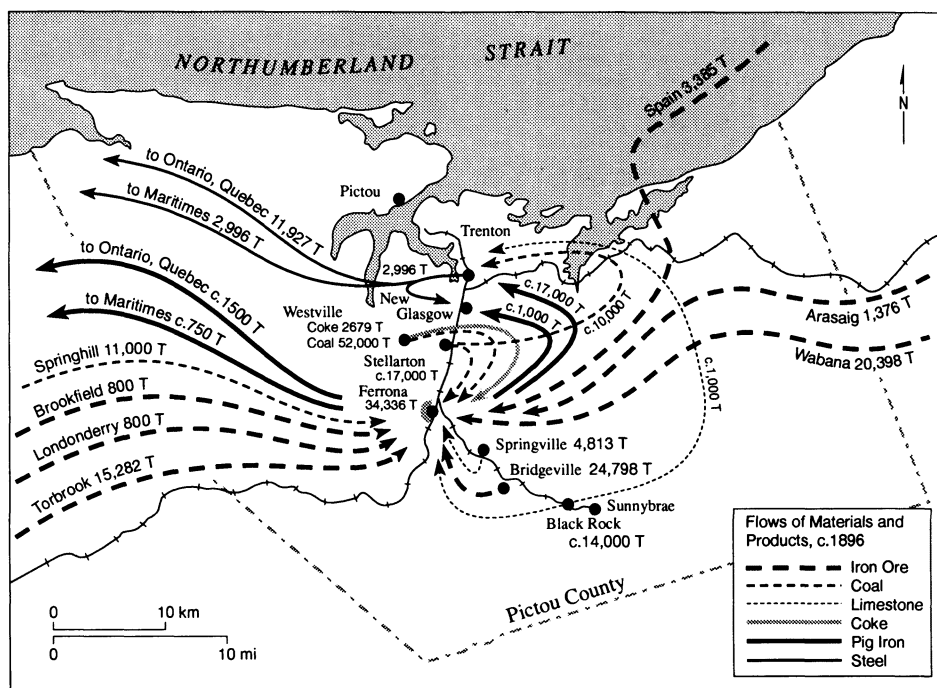


Figure 4: Material and product flows of “Scotia,” c.1896.

developed the Marsh Colliery and acquired the Acadia Coal Company early in the 20th century.²² For example, in the mid-1890s, coke for the New Glasgow Iron, Coal and Railway Company’s blast furnace at Ferrona came from two sources. The iron company produced a majority of its own coke at Ferrona, but to do so it first bought and treated locally-mined Albion and Drummond coal at Stellarton and some from Springhill, Cumberland County, in a washing plant before processing these in retort coke ovens. The remaining coke was supplied from beehive ovens owned by the Intercolonial Coal Company at Westville.²³

Iron and supplies needed for forging and steel making were initially imported from British suppliers. These sometimes arrived by ship at Pictou Landing, situated a few miles north of Trenton, but most were transported by rail from the ports of Pictou, Halifax, or Montreal.

These were the same routes travelled by the shipments of German, British, and American machinery that equipped the Trenton metallurgical works. Very little pig iron came from the Londonderry Iron Company, located some 120 km to the west, because this pig was not suitable for “Scotia’s” acid-lined, open-hearth furnace. Once the company finally decided to produce its own “Ferrona” brand of basic and foundry pig, it managed to acquire several leases for what were initially thought to be good supplies of iron ore at Bridgeville, located about 12 km further up the East River valley from Ferrona. Other ores, obtained at a fair price, came from the adjacent Bartlett properties and the nearby Pictou Charcoal Iron Company. When all these ores turned out to be too high in manganese, alternative but still inadequate supplies were purchased mainly from the Torbrook Iron Company’s mines in the Annapolis Valley—and even from Spain.

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Small deposits controlled through short-term leases by "Scotia" at Arasaig and Brookfield in neighbouring Antigonish and Colchester counties were also tapped intermittently (see Figure 4).²⁴

"Scotia's" locational strategy in the mid-1890s was clearly designed to minimize transportation costs between various Pictou County production sites. Besides managing its own railway for the cheaper movement of materials, the company's Ferrona blast furnace site represented the approximate mid-point between local iron ore and coal sources and its metallurgical works. From Ferrona, the entire output of basic pig went directly to the steel mill in Trenton; about half of foundry pig production moved to either Trenton or linked metal-working industries in New Glasgow; and the remaining foundry pig was exported primarily to Ontario agricultural implement manufacturers, but also to some Maritime stove foundries. From Trenton, a variety but limited amount of higher-valued steel materials was bought by Maritime railway car builders, machine shops, boiler makers, and engine factories. Most producer and consumer steel products, however, were exported to meet the demands of central Canadian markets. Material flows therefore established forwardly-linked integration within the Maritime urban system, but these regional connections beyond Pictou County were secondary to the linkages forged with towns and cities in Quebec, Ontario and points west which took most of "Scotia's" output.²⁵

The structure of cost minimization so carefully organized within Pictou County was in process of change by the mid-1890s. Although one of only a few steel makers in Canada, and therefore able to control prices to its considerable advantage, "Scotia's" production costs, hindered by poor quality ore and coke, were escalating to the point where alternative production solutions were essential for

the company to remain competitive in national markets. From this perspective, a striking pattern on Figure 4 is the movement of iron ore from Bell Island, Newfoundland, and of coal from Sydney Mines on Cape Breton Island to the blast furnace at Ferrona. The search for new material inputs to overcome resource fragmentation represented a considerable shift in strategy by the owners of "Scotia" who were no longer convinced about either the adequacy or economic efficiency of producing local resources. Ownership of Bell Island's huge reserves of red hematite ore was purchased in 1893 to guarantee regular shipments to Ferrona which totalled, for example, some 20,000 short tons or about 40 per cent of the iron ore used in 1895. Moreover, to meet costs of expansion and enhance general revenues, "Scotia" had also begun, by 1896, to expand significantly its "sphere of operations" by exporting iron ore to the United States, Britain, and continental Europe.²⁶

Similarly, the search for a better coking coal had led "Scotia" to examine coal fields on Cape Breton Island.²⁷ Various types of coal were tried, both alone and in mixture with mainland supplies. Eventually "Scotia" bought control of the General Mining Association's long-held holdings at Sydney Mines in 1900, leading the company to reorganize a year later as the Nova Scotia Steel and Coal Company (see Figure 3). Rather than continuing to send coal to Ferrona for coking, the company instead built a coal washing plant (1901) and coke ovens (1902) at Sydney Mines. By shipping coke, a less bulky and cleaner product, significant economies were achieved. Acquisition of these Cape Breton coal properties also propelled the revamped company into the coal trade, where it continued the General Mining Association's policy of shipping to the St. Lawrence market. At the turn-of-the-century, then, "Scotia" was a fully-integrated

coal, iron, and steel company—Chandler's modern industrial enterprise—but over the next decade, and operating from an oligopolistic position, it would once again restructure its "sphere of operations" to overcome the shifting forces of resource fragmentation that were affecting the Maritime space economy.

***"Scotia's" "Sphere of Operations" in
c.1912***

At the Annual Meeting of the Canadian Mining Institute held in Ottawa in 1913, Charles Cantley, the engineer son of Thomas Cantley, "Scotia's" General Manager and Vice-President, reported that even before "Scotia" purchased the General Mining Association's holdings in 1900, "a policy of expansion having been adopted ... it was decided ... to *concentrate* the smelting departments of the Company, so that steel could be produced as close as possible to the *physical centre of gravity* of the raw-material to be treated" [emphasis mine].²⁸ Strategies of concentration at the centre of gravity meant selecting a Cape Breton coal field site located near tidewater for an integrated steel works. In doing so, "Scotia" was clearly operating in harmony with Weberian least cost theory which states that because almost twice as much coal as iron ore is used to make one ton of steel, production (chiefly transportation) costs are less when a steel mill locates close to supplies of coal, not iron ore.²⁹ Not even Newfoundland's offer of iron bounties (eventually countered by the Canadian government in 1902) could offset this strategy.³⁰ Of several possibilities considered in the late 1890s—including establishing its own plant at either Louisburg or Sydney, or joining in the formation of H. M. Whitney's Dominion Iron and Steel Company—it was decided to locate the iron and steel complex at Sydney Mines.³¹ Building the coal washing plant and coke ovens here in short-term support of Ferrona's needs was obvi-

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ously the first step, to be followed by the construction of more coke ovens and blast and open-hearth steel furnaces from 1902 through 1905. With these in place, the Ferrona iron works was closed down and the open-hearth furnaces at Trenton dismantled, causing population and employment loss, notably at Ferrona.³² This new strategy of concentration at tidewater initially proved economically beneficial. The cost of producing a ton of pig iron was slashed in half, from \$10.50 to \$5.50; and the conversion of basic pig to steel billets, now \$5.00 instead of \$8.00, realized further savings of almost 40 per cent.³³ But as Kris Inwood has demonstrated so ably, this competitive edge did not last beyond World War I, when poor resource endowment again surfaced to plague iron and steel production.³⁴

Once the Sydney Mines complex was fully in operation by July 1905, the elements of "Scotia's" "sphere of operations," stretching across eastern Canada and Newfoundland from Montreal (where it maintained large coal handling facilities) to Wabana, were now firmly and finally in place. The company next embarked on a phase of consolidation through the internal expansion of its various divisions. The production and employment of each sector grew tremendously over the next several years, climaxing in a structure of vertically-integrated operations in 1912 that marked the company as a giant of Canadian industry (see Figure 5). Nova Scotia's coal and iron and steel companies, of which "Scotia" was the major firm, accounted for about 20 per cent of provincial employment; and their potential impact throughout the wider regional economy was therefore very great.³⁵ Figures 6 through 11 trace in detail "Scotia's" major production sites and movements of material inputs and product output that shaped the anatomy of the regional urban-industrial landscape.

The overall pattern demonstrates quite clearly that despite claiming possession of "unlimited stores of raw materials and controlling every stage in the manufacture of the most highly finished steel," it was extremely difficult for "Scotia" to function efficiently and profitably within the restrictive Maritime space economy. A probe of each sector reveals the possibilities and difficulties in "Scotia's" chain of integration.

Production and Export of Iron Ore and Coal

No other proven iron ore field in North America was larger than Bell Island during the late-19th and early-20th centuries (see Figure 6). This created the possibility of exporting ore that was not needed for blast at Sydney Mines. Although comprising a non-Bessemer red hematite, the overall quality of the ore body (48 to 58 per cent metallic ore, 8 to 13 per cent silica, and 0.7 to 0.9 per cent phosphorus) was acceptable to enough steel makers in the United States, Britain, and continental Europe to stimulate, from the late 1890s on, a sizeable and sustained export trade.³⁶ In any given year, as much as 80 per cent of the ore raised was shipped abroad (see Photo 1 and Figure 7).³⁷ It left a sheltered and deep-water port on the south side of Bell Island that was connected by an extensive system of tramways to the northern ore beds, situated two miles away. The main tram line ran through Wabana, the company town that was home to some 700 "Scotia" miners, dock workers, and other job holders, as well as the many employees of the Dominion Iron and Steel Company, which had purchased some of "Scotia's" ore holdings in 1899. Relying on a few of its own steamers, but mostly on long-term Norwegian time charters managed under the "Scotia" flag, shipments from Bell Island took just six days to reach Philadelphia and Baltimore and about 11 to enter Rotterdam, Glasgow or

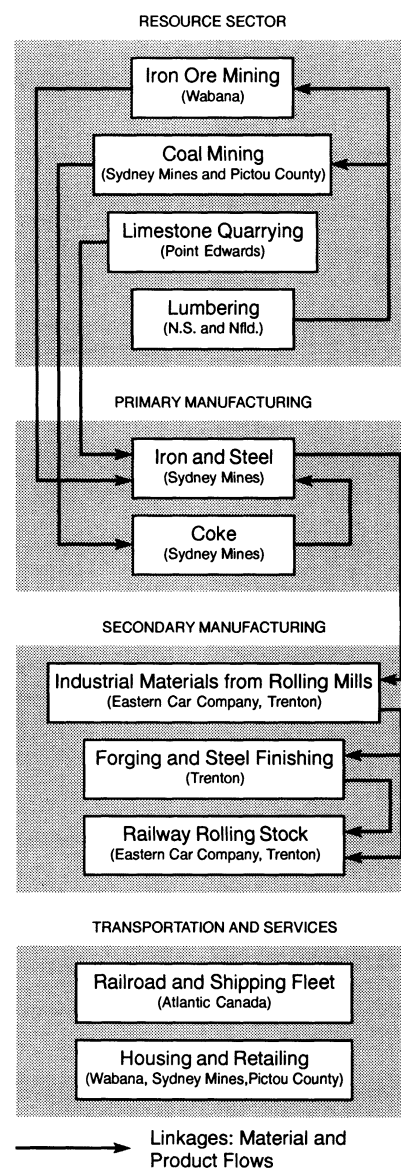


Figure 5: The vertical integration of the Nova Scotia Steel and Coal Company, 1912.

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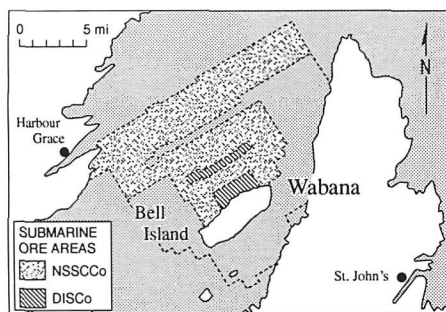


Figure 6: Iron ore properties at Wabana, Newfoundland, c.1910.

Middlesbrough. It was only a two-day journey to North Sydney on Cape Breton Island where "Scotia's" major iron ore and coal handling facilities, stretching some 1,900 feet along Sydney Harbour, were located (see Photo 2).³⁸ The promise of foreign markets, and the obvious advantages of tidewater location and cheap transportation costs, spurred the decision to expand production further; but as the development of the Wabana ore field shifted inevitably from open pit to submarine mining after 1907, production costs escalated dramatically—beyond expectations—outstripping market price increases in Europe and the United States by a ratio of three to one from 1901 to 1912. Costly ventilation, drilling, and hauling technologies, essential for these submarine operations, were the cause.³⁹

"Scotia's" coal operations relied almost exclusively on Canadian customers, but this became policy only after the company tried unsuccessfully to tap European and South American markets. As a first strategy, domestic markets were acknowledged as the most secure. In classic supply and demand fashion, the company developed four new collieries at Sydney Mines, recognizing that urban-industrial growth was encouraging railway and steamship companies, manufacturers, and residential users across eastern Canada to require more

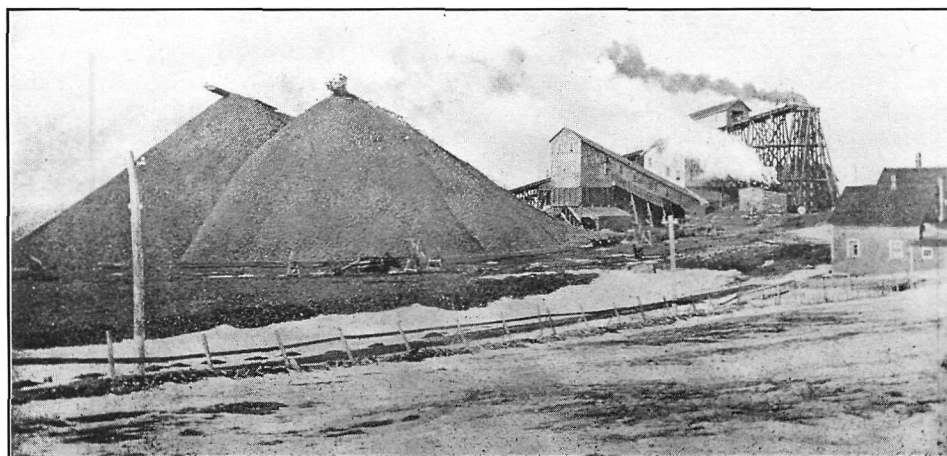


Photo 1: Stock pile and deck head of iron mining operations of the Nova Scotia Steel and Coal Company at Wabana, Newfoundland, 1912. (PANS N-7731)

and more coal. In doing so, annual output at Sydney Mines shot-up from about 240,000 tons to over 840,000 tons between 1901 and 1912.⁴⁰ Growth would have been larger, but the Ontario government's industrial development policies favoured cheaper American coal over Nova Scotia materials, a position that clearly supported the central province's developing iron and steel industry at Hamilton.⁴¹ "Scotia's" Industrial Heartland customers therefore remained almost exclusively in Quebec—the so-called St. Lawrence market—where they were serviced from the company's waterfront distribution facilities at Quebec City and Montreal (see Figure 7 and Photo 3). Maritime and Newfoundland accounts took a lesser but still considerable amount, chiefly through the ports of Halifax, Saint John, and St. John's. Smaller shipments to inland towns went by more expensive rail routes. As a final market, less than one-third of "Scotia's" Cape Breton production was actually consumed for its own use, either to make coke or to fuel its factories in Sydney Mines and Trenton. Supplementary fuel for the metallurgical works at Trenton came intermittently from Pictou County's Marsh Colliery, mined by

"Scotia" since 1902. On Cape Breton, company reserves that included massive submarine fields were said to total over 3,000,000,000 tons. When these areas were finally exploited but at ever-increasing costs, company officials soon noted both declining productivity and diminishing profitability. The ratio of the coal selling price to extraction costs reportedly dropped from \$1.32 in 1901/1903 to \$1.06 in 1911/1913, but through the company's miscalculation of depreciation and depletion costs, the coal trade actually "operated at a net loss as early as 1910 and never returned to profitability." As well, the massiveness of "Scotia's" reserves proved inaccurate. In fact, workable deposits became exhausted before the end of the First World War, marking the coal trade as yet another example of fragmented integration that contributed to the eventual takeover of the company by the Dominion Iron and Steel Company.⁴²

Although the flow of materials integrating "Scotia's" collieries with its network of coal distribution centres was not altered substantially by these difficulties, restriction to the eastern Canadian market in the first place was determined largely by

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the Anatomy of an Urban-Industrial Landscape, c.1912**

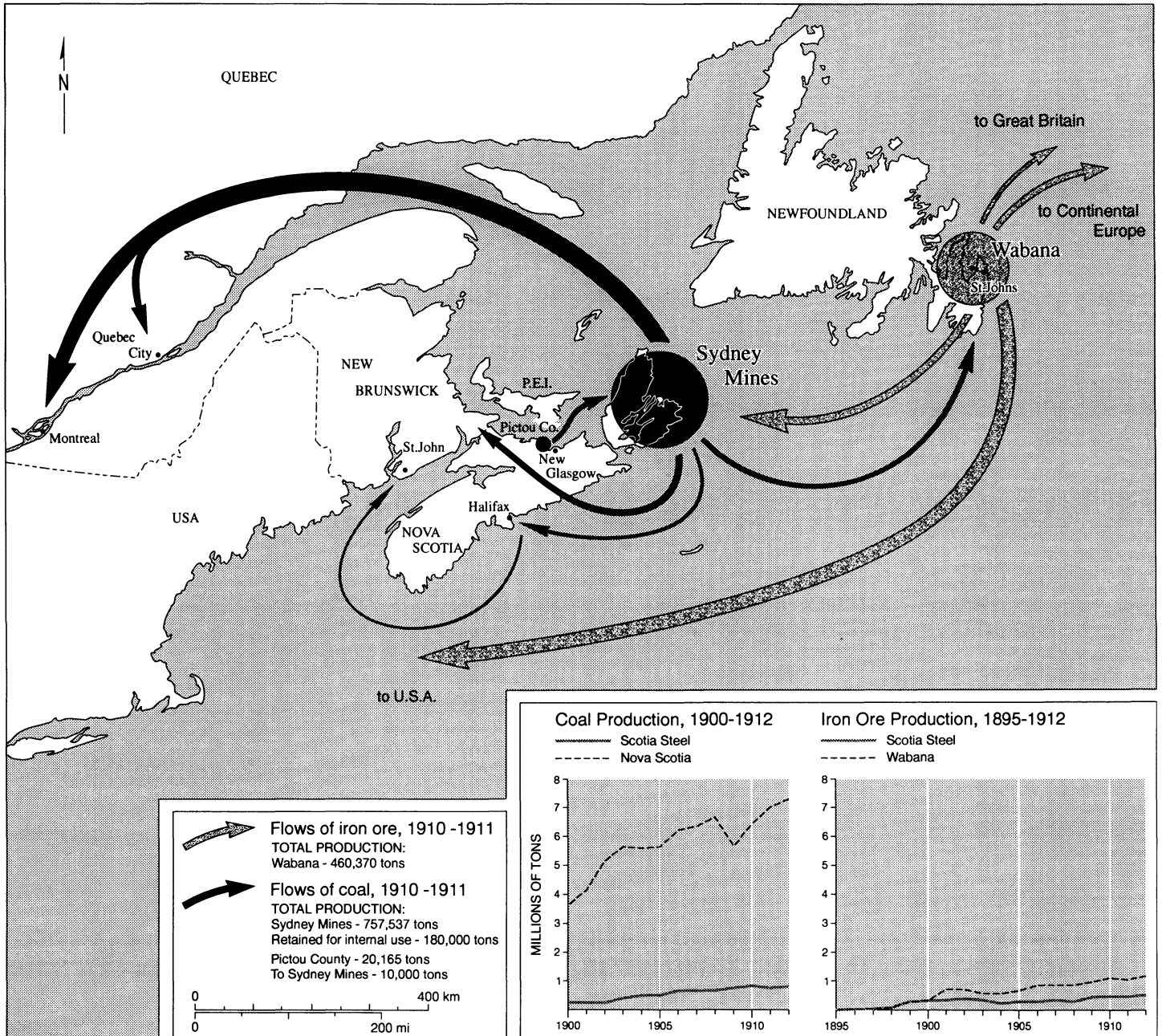


Figure 7: Shipments of iron ore and coal by the Nova Scotia Steel and Coal Company, c.1912.

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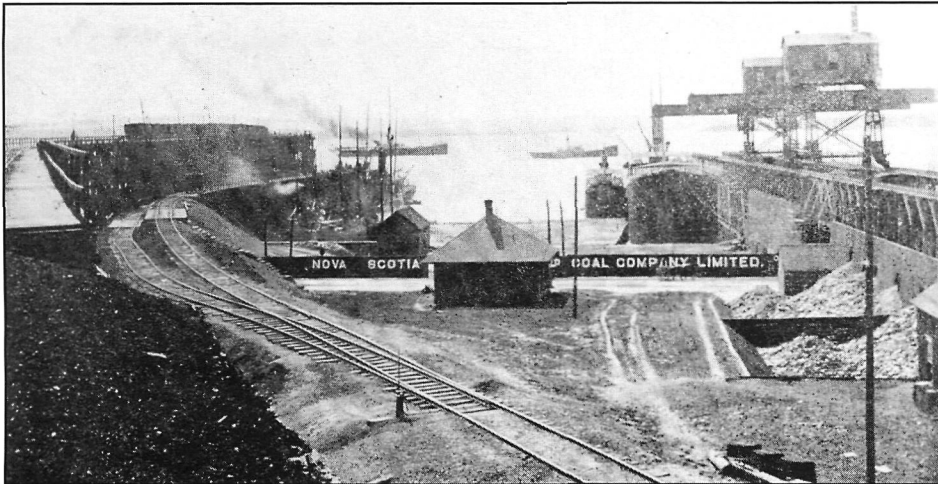


Photo 2: Coal and ore piers of Nova Scotia Steel and Coal Company at North Sydney, Nova Scotia, 1912. (PANS N-7732)

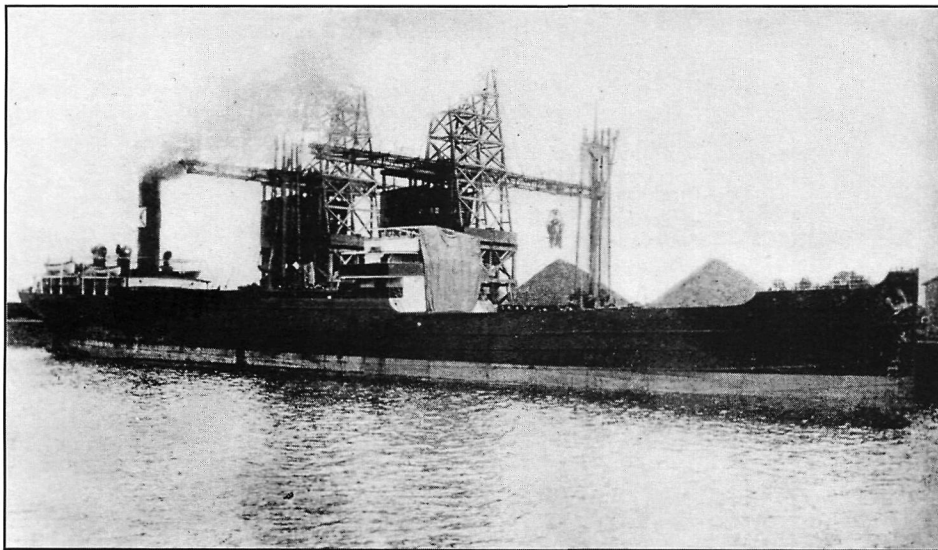


Photo 3: Montreal discharging plant and a "Scotia" collier, 1912. (PANS N-7737)

the company's failure to secure a wider "sphere of operations" in Europe, South America and Africa (see Figure 8). The American market, especially in New England, had been closed by anti-pollu-

tion laws since the late 1890s. To replace it, company officials investigated thoroughly the possibility of a wide-ranging coal and iron ore trade. Their obvious strategy was to advance "Scotia's" role

as a multi-national trading company. As early as the fall of 1900, shortly after purchasing the General Mining Association's holdings, Thomas Cantley was in Europe visiting the ports of Marseilles, Genoa, Naples, and Venice in search of Mediterranean coal markets. Although he could "see no reason why we cannot do an enormous business with Europe when our coal property is equipped as proposed," earning "a profit of \$1.25 per ton on our shipments," nothing came of this proposal. Nor did the prospects of the South African trade, "as well as all the coaling stations en route," come to fruition.⁴³

The records are silent on the reasons for failure, but a reasonable explanation lies in "Scotia's" inability to dislodge long-standing competitors and overcome other obstacles of doing business in foreign countries, which was certainly the case in its scheme to export coal to Brazil in exchange for iron ore.⁴⁴ Always in search of better resources, both for its own limited use and for delivery in the larger export trade, "Scotia" sent Robert Chambers (the man who developed Wabana for the company in the early 1890s) to Minas Gaeres in late 1904 to evaluate some reportedly very good quality hematite ore deposits similar in make-up to Wabana ore. Not coincidentally, Chambers' visit occurred shortly after "Scotia" first recognized that its Wabana submarine reserves would be very expensive to mine. The quality of the Brazilian ores tentatively confirmed, this visit was followed by Harvey Graham's extended four-month visit in 1906. As the trusted Secretary of "Scotia," it was Graham's task to meet with Brazilian government officials and to investigate all aspects of getting these deposits into production. Multi-year options were secured on three large and excellent properties, located about 480 km from Rio de Janeiro on the main line of the Brazilian government's Central Railway (see

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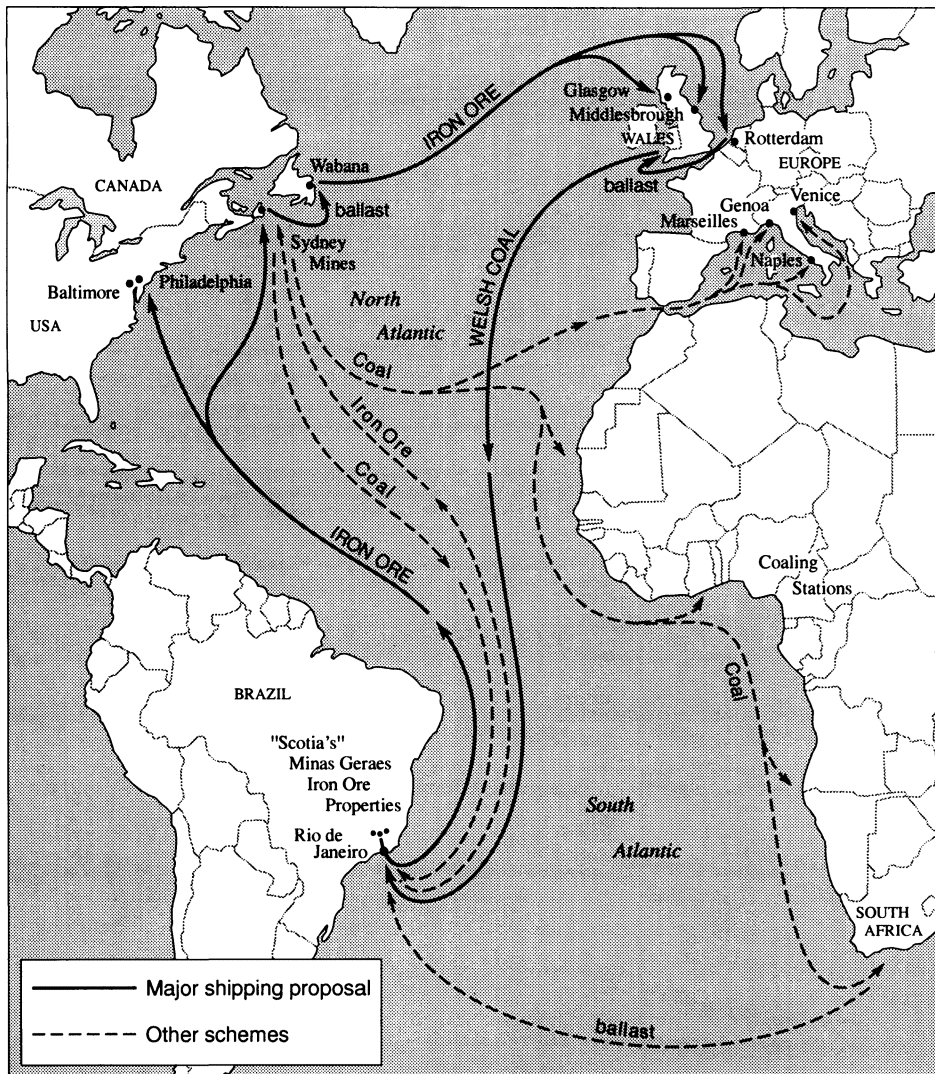


Figure 8: A larger world: “Scotia’s” search for coal and iron ore markets in Europe, Africa, and and South America in the early-20th century.

Figure 8). Left in abeyance were such matters as the legality of one lease, railway freight rates, royalties, and who held responsibility for harbour and additional railroad development. These and other matters would be lobbied on behalf of “Scotia” over the next few years—at a cost of some \$60,000—by William Mac-

Kenzie of the Rio Tramway, Light and Power Company, a Canadian corporation operating successfully in Brazil.

To make the scheme work, the original strategy was based simply on shipping Cape Breton coal to Brazil in return for iron ore, but the Brazilians had previously shunned American coal and now opposed Canadian imports, preferring instead long-favoured Welsh coal. As an

alternative strategy, therefore, a “triangular freight” was proposed that entailed first shipping iron ore from Rio de Janeiro to Cape Breton, then moving iron ore from Wabana to Rotterdam, and finally completing the freight by hauling coal from Wales to Rio de Janeiro. Negotiations with the Brazilian government proved troublesome and protracted, and issues in Nova Scotia surrounding the take-over attempt of “Scotia” in 1910 by Montreal capitalists held back further interest in this scheme. It is clear, however, that the export of industrial materials at very high volumes, thus achieving profitability through greater economies of scale at a time of rising production costs, was all-important to “Scotia’s” strategy for expansion. It is also reasonable to suggest that without developing this increased volume of trade, “Scotia’s” increasing production costs were not being offset in any way, hindering the firm’s profitability.

Manufacturing Coke, Iron, and Steel in Cape Breton

When estimating the profitability of development in the export trade, tidewater location and the cheapness of ocean freighting were always emphasized. In other phases of “Scotia’s” chain of integration, however, particularly in producing steel at a competitive and profitable level, the financial advantages of tidewater location could neither offset production difficulties nor improve market share and accessibility.

“Industrial Cape Breton”—the words ring evocatively in the regional vocabulary of the Maritimes. Putting meaning to this phrase, the coal mines, coal washing plant, coke ovens, coal and limestone storage bins, blast furnace, slag heaps, steel plant, power house, foundries, railway yards, trackage, shipping facilities, and rows of company housing at Sydney Mines epitomized the essence of an

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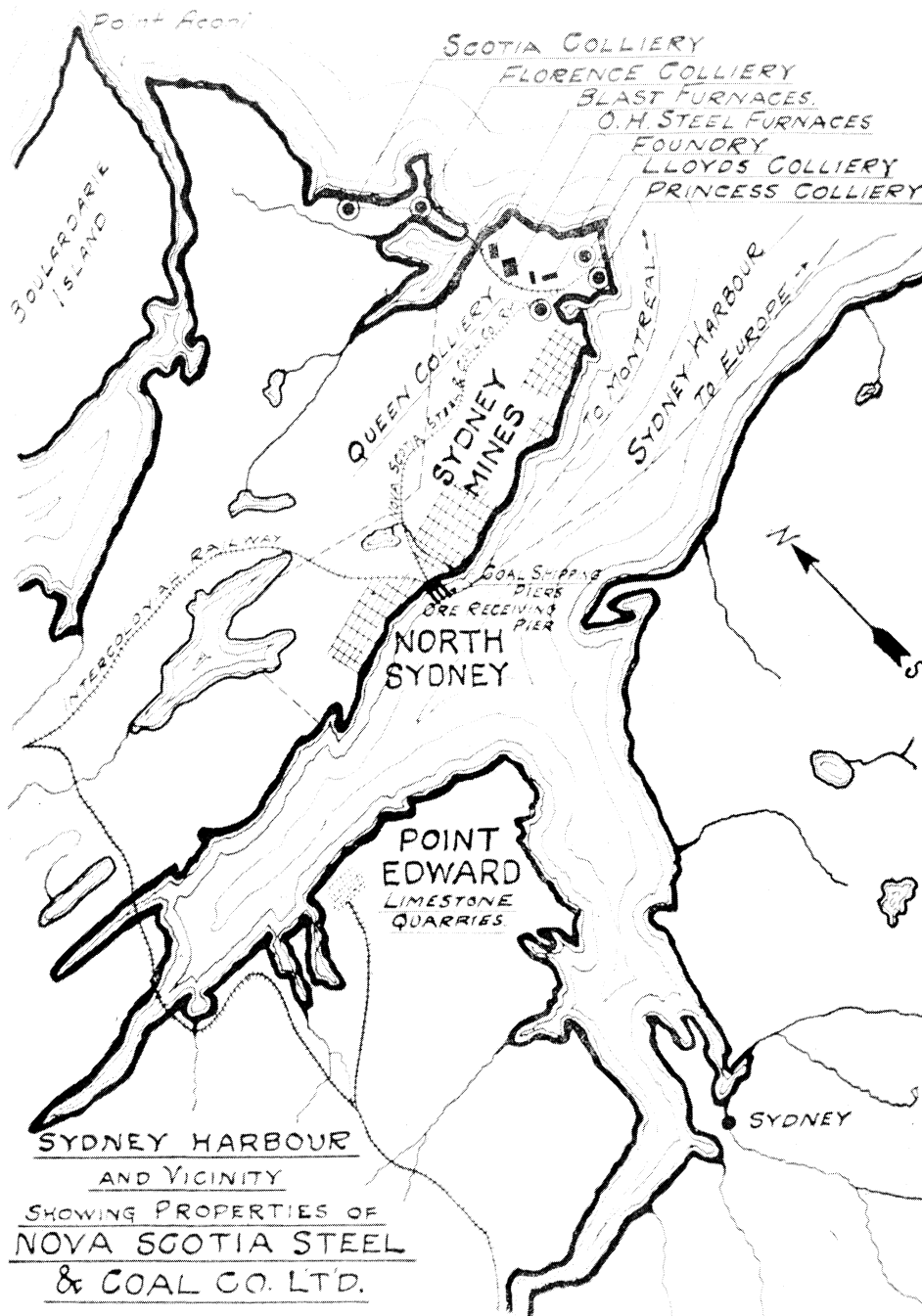


Figure 9: "Scotia's" coal mining and iron and steel operations in Industrial Cape Breton,

early-20th century Canadian urban-industrial landscape (see Figure 9). But above all, Sydney Mines was a "Scotia" town. With some 900 employees at work in the five collieries scattered on the northern and eastern periphery of town, and a similar number of men engaged at the iron and steel works located on the town's northern edge, its population had more than doubled from 3,191 to 7,470 between 1901 and 1911.⁴⁵ Within this recently-arrived, largely working-class society, there were few class-bound or immigrant quarters that divided the town. For one thing, senior company officials resided in New Glasgow. For another, company houses—some 650 in all—had a levelling effect on any differences that occupational status might confer.⁴⁶ Instead, the residential pattern was differentiated strongly by religious affiliation.⁴⁷ Neighbourhoods centred on either a Catholic, Presbyterian, or Anglican church. Regardless of attachment, and while church spire competed with pit head and blast furnace stack for prominence in the townscape, no resident could escape the all-powerful presence of industry.

Besides the visual strength of mine and mill, the pungent smell of the coke ovens and the orange smoke of the blast furnace permeated the town (see Photos 4 and 5). By 1912, about 200,000 tons of coal were being turned into some 88,000 tons of coke. Because Cape Breton coal was high in sulphur, and more of it was required to manufacture coke than in Hamilton, "Scotia's" operations were hindered, comparatively-speaking, by higher costs and inefficiency in handling and decreased labour productivity.⁴⁸ At times relatively small amounts of Pictou County coal were shipped to Sydney Mines to mix with Cape Breton coal, but this failed to alleviate the problem.⁴⁹ Moreover, the finished coke was still very high in sulphur content when charged to the blast furnace. This created a further,

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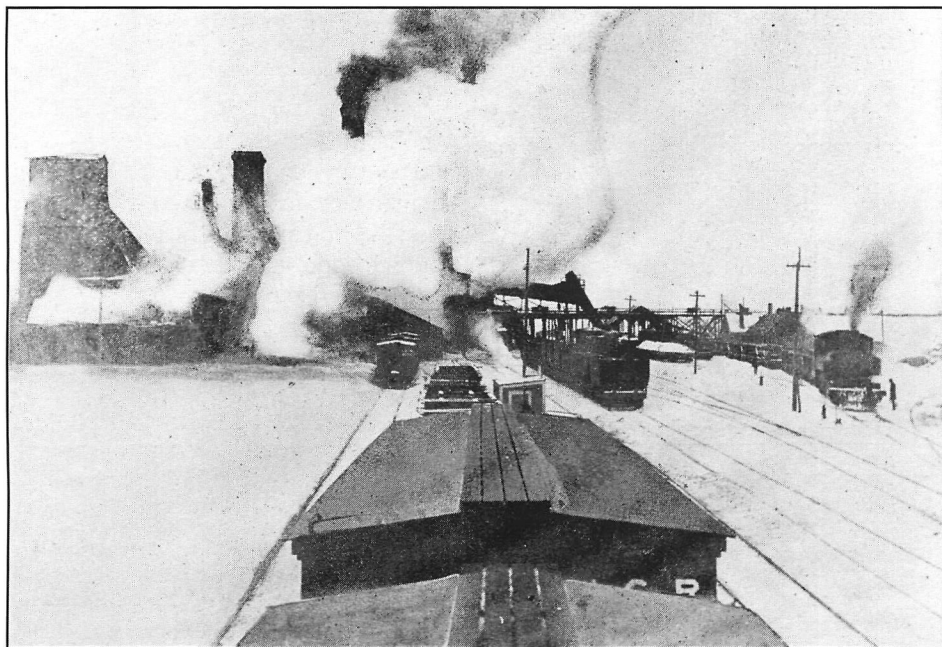


Photo 4: *Princess colliery of Nova Scotia Steel and Coal Company at Sydney Mines, Nova Scotia, 1912.*
(PANS N-7734)

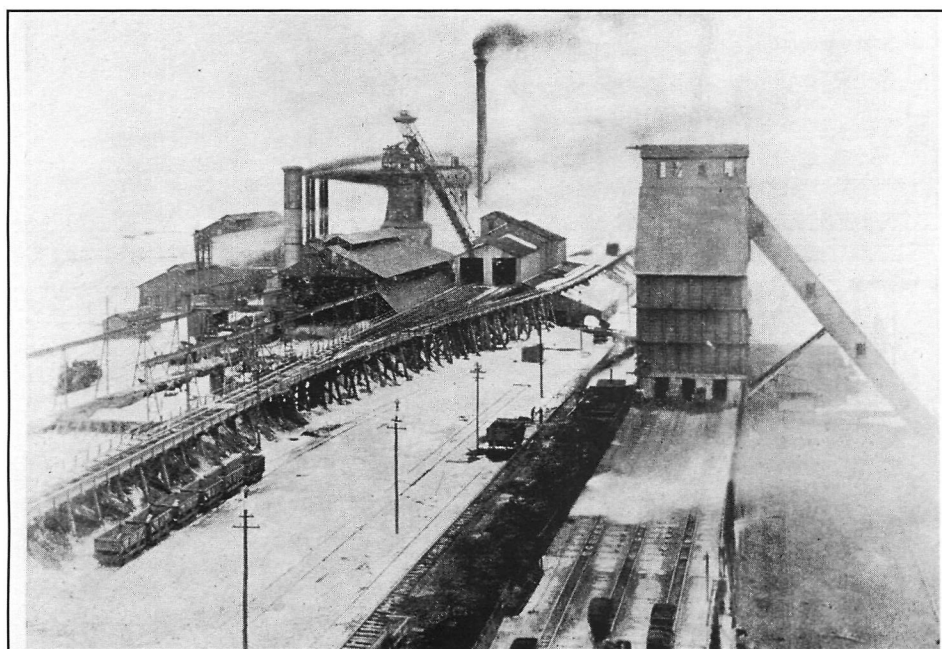


Photo 5: *Coke ovens and blast furnace of Nova Scotia Steel and Coal Company at Sydney Mines, Nova Scotia, 1912.*
(PANS N-7733)

but not the only, problem in the production of pig iron. Relative to the competing ores that were used at Hamilton, the silicious and phosphorus content of Wabana iron was very high. This required heavier fluxing, which in turn increased fuel consumption and handling costs while at the same time reducing furnace capacity. This was unfortunate, because the 250 tons per day capacity of "Scotia's" blast furnace—with an annual output of about 60,000 tons—was relatively small by North American standards, making lower production costs essential to compensate against the scale economies of core area production.⁵⁰

A more vexing problem occurred when making steel. The daily capacity of "Scotia's" three open-hearth furnaces was about 300 tons, although annual output also was limited to about 60,000 tons to compensate for the limited flow of pig iron and the additional production time associated with the difficulties in producing steel. The strong presence of both silicon and phosphorus in the pig iron meant that neither basic nor acid metallurgy alone could eliminate these minerals, necessitating more expensive duplexing or running the pig through both acid and basic furnaces. To further overcome these difficulties, the company used a tilting hot-metal mixer to refine and homogenize the pig iron between the blast and open hearth furnaces. It also introduced, in 1909, a Harmet-type plant of 1,200 and 4,000 tons presses for "fluid compressing" steel. The aim was to prevent the formation of pipes, blow holes, and undue segregation or internal strains in the metal—in short, to render the steel ingots, ranging in size from 2.5 to 25 tons, more homogeneous.⁵¹ Because the ingots were sent to Trenton for further processing, it was essential to reduce waste, thereby minimizing already expensive transshipment costs and the added expense of reheating the ingots. Although seemingly innovative, in

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the sense that "Scotia" was one of the first companies in North America to adopt fluid compressing, the necessity of using this technology again indicates the growing costliness of the company's operations to overcome fragmentation.

"Scotia's" iron and steel production was integrated with regional and national centres in several ways. In fact, the iron trade is a meaningful measure of integration within an industrializing economy because the movement of iron from mill to market, either directly from producer to industrial consumer (the pattern "Scotia" typically followed) or indirectly through a wholesaler (a procedure "Scotia" shunned), reveals essential linkages that shape an urban system. Data on "Scotia's" pig iron customers, which are available from 1904 to 1908, make it quite clear that the Maritime market was limited in size and diversity.⁵² All urban places in the Maritimes possessed some kind of metal-working capacity, typically blacksmiths, machinists and perhaps a foundry,⁵³ but this industrial base was small compared to competing regions such as Canada's Industrial Heartland or the American manufacturing belt.⁵⁴ Scattered throughout the region's towns and cities were only about 300 metal-working firms, and most of these were small in scale and scope of operations.

The flow of materials linking Sydney Mines to urban places in the Maritimes was not strong; and all-important forward linkages, so essential for regional urban-industrial development, failed to materialize as they did in central Canada (see Figure 10).⁵⁵ "Scotia's" sales representatives did manage to sell some pig iron in most of the largest urban centres, but certainly not in all places. Railway car makers and stove foundries in Amherst, Halifax, and Sackville were amongst the best customers, but metal-working firms in Saint John and Moncton were not. Saint John manufacturers continued to

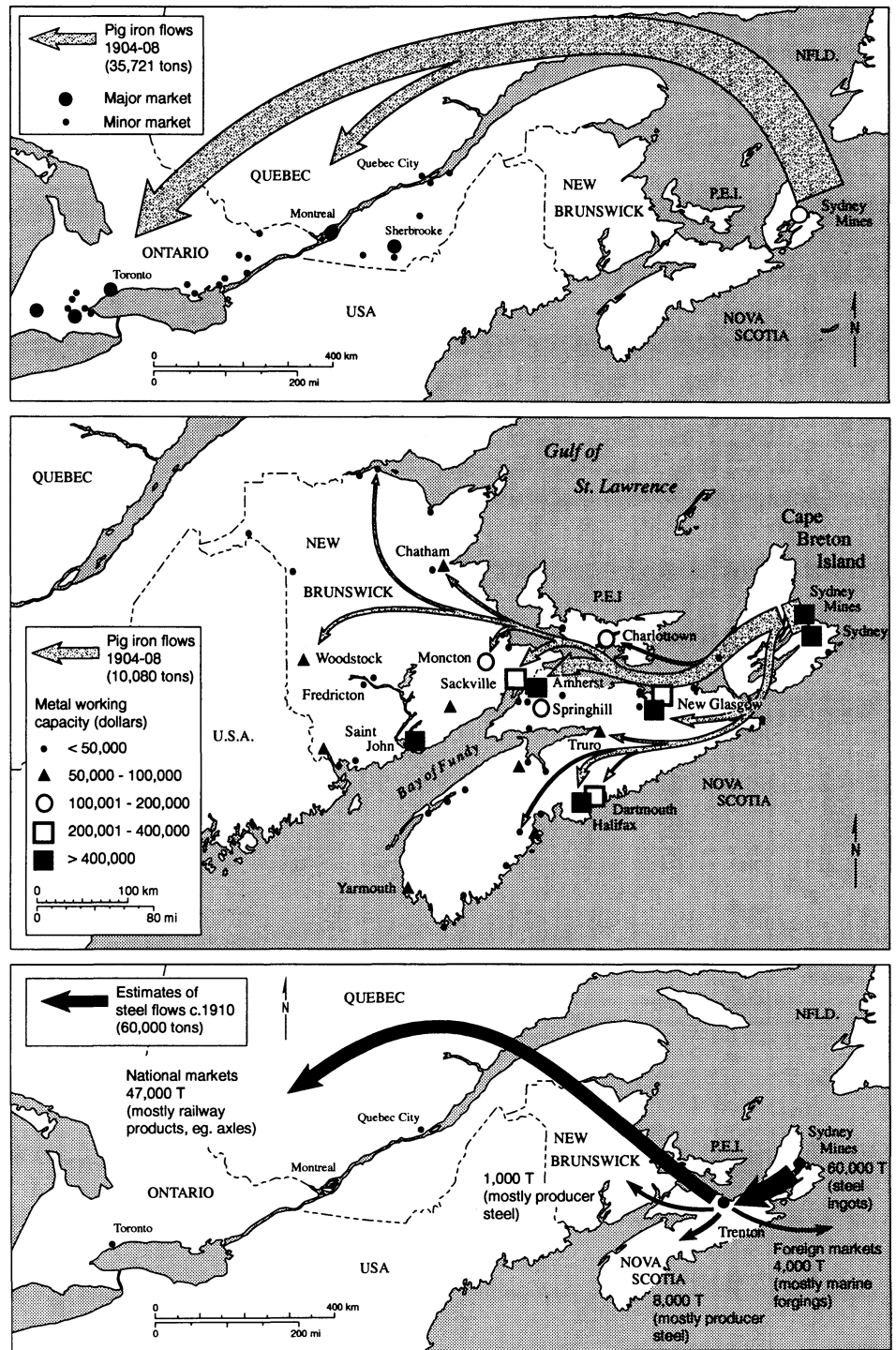


Figure 10: Fragmented integration: shipments of pig iron and steel, 1904-1910.

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use a great deal of imported British and American iron. In fact, demand for iron in the highly competitive central Canadian market was much greater than internal Maritime industrial requirements. Exports to Ontario and Quebec totalled almost 23,000 tons in 1905, four times the amount sold in Maritime towns and cities. Toronto businesses alone took nearly 6,000 tons or one-tenth of "Scotia's" output; Montreal firms ordered about half as much again. Massey-Harris, whose president L. M. Jones was a "Scotia" director from 1901 to 1909, and several hardware and appliance manufacturers were the biggest customers. However, because of fluctuating and unstable prices; declining market demand in central Canada after 1906 in face of rising competition from Hamilton steel makers; loss of its oligopolistic price setting position; the increased burden of higher transportation costs for small, west-bound shipments; production difficulties at Sydney Mines; and "Scotia's" own strategic and evolving needs, most of these markets collapsed after 1907.⁵⁶ As a result, industrial connections within the urban system shaped by the pig iron trade declined substantially, re-emphasizing the shifting force of fragmentation. Eventually, the majority of "Scotia's" pig iron—at least 85 per cent—went no further than the company's Sydney Mines steel mill, which in turn shipped virtually its entire output of ingots to Trenton for conversion into both producer and consumer products—for example, bars, plate, railway axles and spikes, and special forgings. This was a strategy shaped by the reality of a changing, increasingly fragmented marketplace.

Metal-Working at New Glasgow and Trenton

In 1912, the metallurgical works of the Nova Scotia Steel and Coal Company at Trenton, employing about 900 workers and stretching over some 65 acres, com-

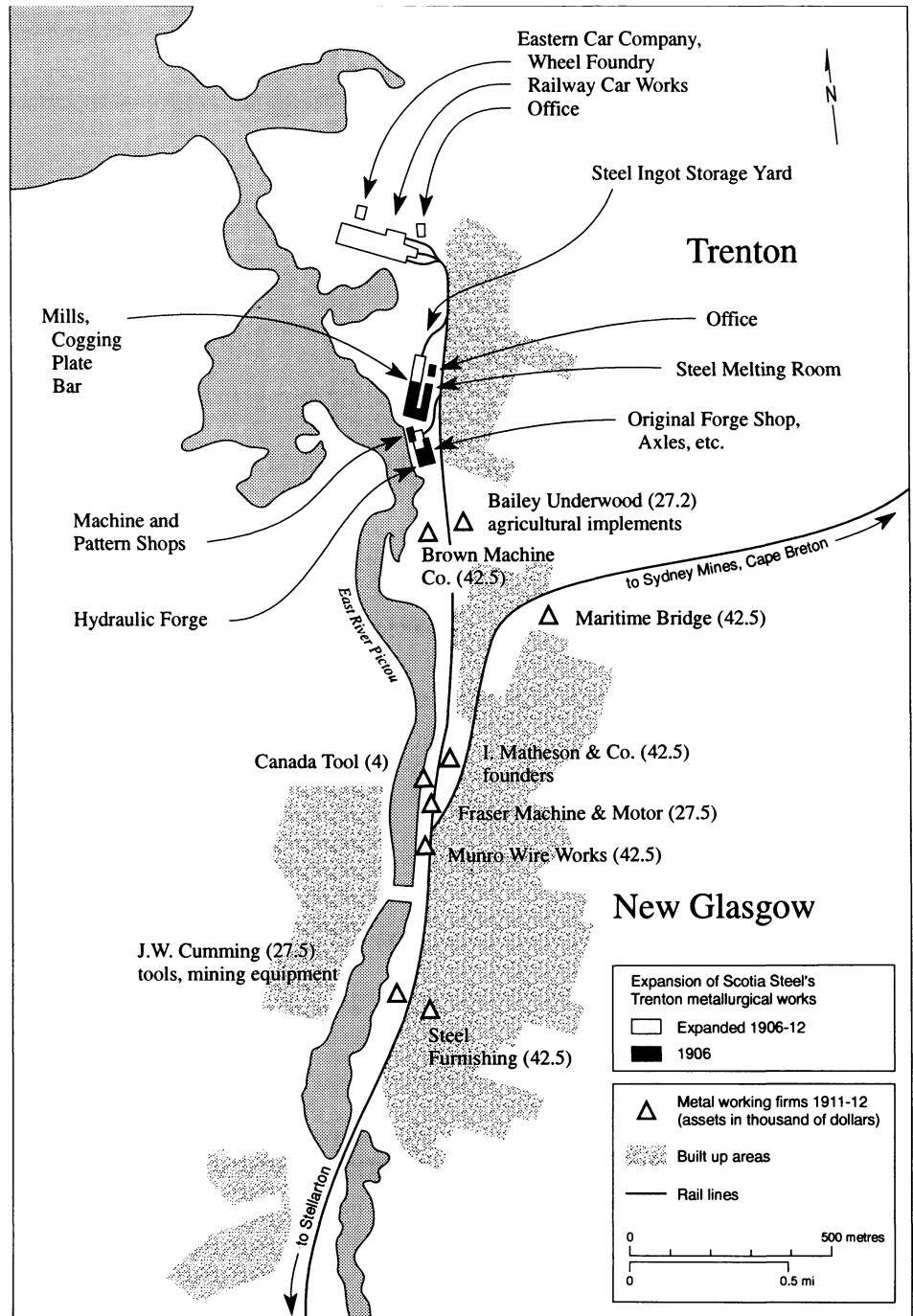


Figure 11: The urban-industrial landscape in the New Glasgow - Trenton area, c.1912.

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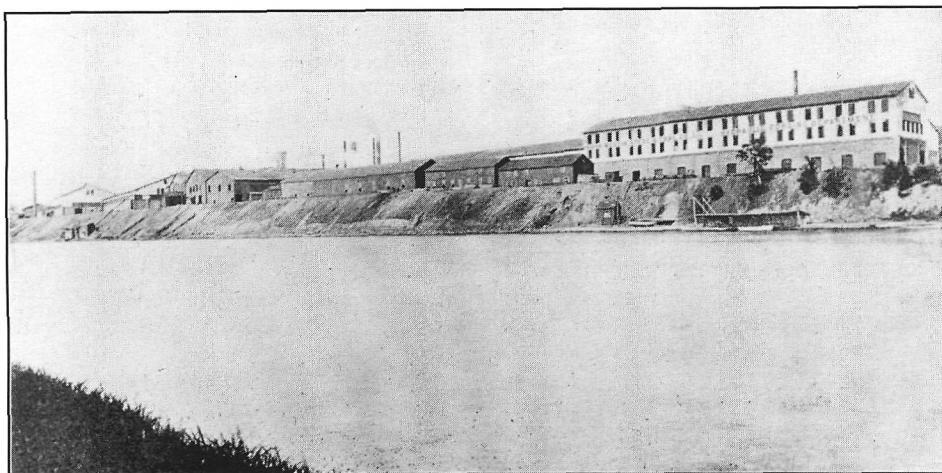


Photo 6: *Nova Scotia Steel and Coal Company's metallurgical works (southwest end) at Trenton, Nova Scotia, 1912. (PANS N-7736)*

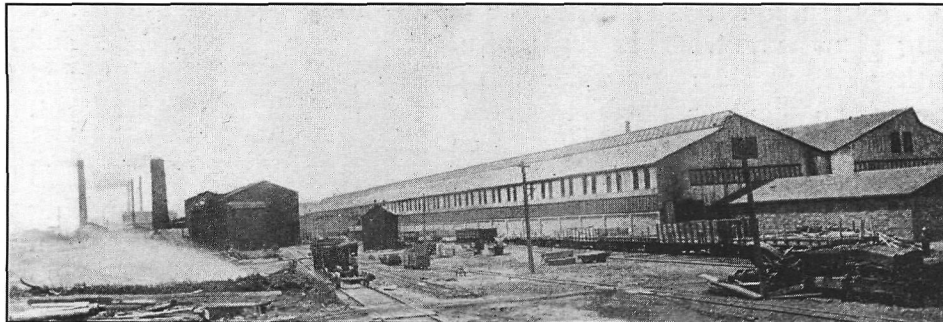


Photo 7: *Shipping and manufacturing buildings of Nova Scotia Steel and Coal Company at Trenton, Nova Scotia, 1912. (PANS N-7735)*

prised one of the most concentrated areas of industrial land use in the Maritimes (see Figure 11 and Photos 6 and 7).⁵⁷ Separated from the Sydney Mines steel works, built-up incrementally for over 25 years, dependent on rail rather than ocean carriers, and far removed from major markets, it also represented, arguably, one of the weakest links in the company's "sphere of operations."

Change was the order of the decade in working-class Trenton. The steel town's population stood at 1,414 in 1911, an

increase of almost 50 per cent since 1901; but many of "Scotia's" employees, including management, lived in neighbouring New Glasgow (population 6,383), connected by a short carriage or streetcar ride to their jobs in Trenton. Others, mostly those who were seasonally-employed, resided on small farms in the surrounding countryside where they combined farm work and industrial labour throughout the year.⁵⁸ Many employees had been with "Scotia" throughout their working lives, and had witnessed the company's dramatic transformation,

especially after 1905. The 1882 steel plant was redeveloped in that year as a melting room for the steel ingots now produced at Sydney Mines. The first forge, dating from 1878, burned to the ground in 1906. Over the next few years, "Scotia" invested heavily in several steel and concrete buildings that housed specialized activities such as a railway axle shop and a steam hydraulic forging plant designed specifically to handle steel ingots as large as 25 tons. It added a 28-inch cogging mill and also expanded various existing operations, including the plate mill and nut and bolt division. The most significant development came in 1910-11 when the Eastern Car Company, expected to employ around 1,000 people, was incorporated as a wholly-owned subsidiary of "Scotia."⁵⁹

When locating these developments, the company planned carefully for the continuous through flow of materials, attempting to create a micro-geography of economic rationalization and efficiency (see Figure 11).⁶⁰ Steel ingots from Sydney Mines were carried by the Intercolonial Railway for 30 cents per ton, or for about two per cent of the cost of producing a ton of steel. Upon arrival in Trenton, the steel was first stored outdoors in the "ingot yard" and when required, it was moved indoors next to the "melting room," ready for reheating in modern continuous heating furnaces of the contra-flow type—another essential but expensive innovation. From here the ingots were cogged down in a slabbing mill to the various sized billets required, and then sent to the immediately-adjacent merchant and plate mills for rolling into standard merchant bars, flats, rounds, squares, angles, tees, as well as numerous agricultural sections. These producer products, usually totalling less than one-third (or about 18,000 tons) of the steel that "Scotia" finished in the years immediately prior to 1912, were shipped to several, largely export, mar-

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kets. Some went to steel manufacturers in New Glasgow, while the rest was sold to Maritime and central Canadian industrialists, wholesalers, and construction firms.

But the majority of the finished steel moved directly over some four miles of tramways and railway tracks to enter other divisions within the Trenton metallurgical complex. For example, from 1908 to 1910, almost 30,000 tons of railway axles were produced annually to meet federal government contracts and foreign demand. This almost singular dependence on railway markets accounted for about one-half of "Scotia's" 60,000 ton steel-working capacity. The remaining 20 per cent or 12,000 tons was used in the forge plant to make highly specialized marine products for various Canadian shipyards, in the spike shop, and in the nut and bolt division. These were traditional, apparently stable markets, but increasingly subject to pressure from competing central Canadian companies which, because they were located close to Hamilton's steel makers and larger markets, were benefitting from various external (localization and urbanization) economies (see Figure 10).⁶¹

Recognizing this growing competitive challenge, "Scotia's" management began devising, as early as 1909, a new strategy of expanded vertical integration based on entering the highly-competitive and now risky Maritime railway car manufacturing business.⁶² If its steel could not be used as extensively in traditional product lines, then new outlets such as railway car building must be found. Competing Maritime firms existed in Amherst and Halifax, and the Canadian Car and Foundry Company of Amherst was in process of being taken over by Montreal interests. National Steel Car in Hamilton was also a competitor. Nevertheless, "Scotia" was looking beyond the

Canadian market to supplement sales, and had secured several pre-war contracts in Russia and France. Its Board of Directors was also considering setting up railway car manufacturing plants in Europe, but with the outbreak of war, these overseas plans never materialized. To capture extra-regional markets, never secure at the best of times, "Scotia" was competing against companies in central Canada with a decided locational advantage. With the profitability of its iron ore and coal mining operations falling and additional, expensive technologies needed to produce iron and steel, "Scotia's" metallurgical works at Trenton faced the additional burden of competing for internal financial resources that were becoming increasingly scarce in the immediate pre-war years. In such a context, the focus of the Eastern Car Company and "Scotia's" various metal-working divisions on highly competitive, extra-regional markets again emphasizes just how difficult it was for the company to overcome the difficulty of manufacturing at the margin of the Canadian space economy.

"Scotia" and the Issue of Fragmented Integration

On the eve of the First World War, the Nova Scotia Steel and Coal Company was the largest vertically-integrated coal, iron and steel company in Canada. Its industrial structure comprised primary, secondary, and tertiary functions and employed thousands of men and a few women who were the majority labour force in such places as Sydney Mines, Trenton, and New Glasgow. Its "sphere of operations" ranged throughout eastern Canada, reached down the eastern seaboard of the United States, and stretched across the Atlantic to western European industrial markets. Since its inception in the early 1870s, company officials consciously and consistently pursued an aggressive strategy of expansion

through vertical and spatial integration. When the local resources of Pictou County and mainland Nova Scotia proved insufficient in the 1890s for iron and steel making operations, "Scotia" cast its net further afield. It moved its steel-making operations to Sydney Mines where it drew in Cape Breton's coal and Newfoundland's off-shore iron ore to meet internal production needs. It also entered what became in time the all-important, ever-expanding, revenue-earning export markets.

In an important and perceptive article that focuses mainly on "Scotia's" strategies to remain economically viable during and after the First World War, L. Anders Sandberg argues that the Nova Scotia Steel and Coal Company "...promoted disarticulation [defined according to Samir Amin as the lack of integration between various economic sectors at a global or regional scale] by producing coal, iron, and semi-manufactured steel for external markets rather than for internal growth."⁶³ He further suggests that once the company's economic difficulties became clearly apparent before the close of the war, "Scotia" survival strategy focused more and more on seeking ways of reducing costs at the expense of technological development and improved worker's salaries. The company is also faulted for not pursuing regional steel markets in the face of competition from the Hamilton-based Steel Company of Canada.

The evidence presented in this paper suggests that forces of fragmentation associated with the Maritime space economy shaped "Scotia's" strategy to de-emphasize internal growth in favour of external markets, contributing to the company's eventual demise. In 1912, "Scotia" was supposedly at the height of its powers as an industrial corporation, but the anatomy of the urban-industrial landscape created by "Scotia" reveals

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much about the "regional problem" that would plague the Maritimes throughout the 20th century. So dissected, this landscape points to the problem of fragmented integration. It is clear that "Scotia" had a highly articulated strategy of vertical and spatial integration, but features of fragmentation surrounding the company's production and marketing strategies demonstrate that "Scotia" encountered many obstacles within the region that reduced its profits and placed it at a cost disadvantage when operating beyond the Maritimes in the increasingly-competitive, extra-regional marketplace.

The company's markets for iron and steel industrial and construction materials in the Maritimes were relatively small and highly dispersed. Strong linkages were developed and maintained with neighbouring Pictou County iron and steel companies to create a small but important industrial complex, but the possibility of developing linkages elsewhere in Nova Scotia and in New Brunswick and Prince Edward Island was held back by the limited number and capacity of regional metal-working firms. Very few of these firms bought substantial amounts of industrial materials to capture extra-regional markets on a consistent basis: the Enterprise and Fawcett stove foundries of Sackville, New Brunswick developed Canada-wide distribution networks; and various engineering and transportation equipment firms in Amherst (Robb Engineering and Canadian Car and Foundry, for example) and Saint John responded to markets beyond the region, but these were exceptions to the rule. The limited number of Maritime metal-working firms was oriented mainly to regional demands in the resource (forestry, fishing, mining) industries and to limited residential needs, such as new steel frame construction. For this reason, and to use its plant's relatively small capacity as efficiently as possible, "Scotia"

sought export markets for industrial materials in Quebec and Ontario and developed expertise in manufacturing railroad equipment for national (largely Canadian government) markets. However, the declining comparative advantage and quality of "Scotia's" coal and iron ore resources in the immediate pre-World War I era; technical difficulties that increased the cost of both mining and manufacturing; and loss of price setting dominance—all seriously eroded "Scotia's" profit margin and its ability to invest continuously after 1912 in the technological improvements that Sandberg argues were essential—especially for the Trenton steel works—to stave-off external competition. As Sandberg so clearly reveals, "Scotia's" increasing emphasis on part-time and other labour-saving strategies and technological neglect after 1912 were both inadequate to sustain viability.

The initial advantages that "Scotia" once enjoyed as Canada's major mining and manufacturing company, giving it early access to central Canadian, American and European markets despite its location at the edge of a core-periphery space economy, were greatly diminished on the eve of the First World War. The cumulative force of hinterland fragmentation offered "Scotia" little flexibility at this time for creating new strategies where internal economies of vertical integration could sustain the expenses of unprofitable divisions to compete against the rising industrial capacity and strength of central Canada. Neither control of all phases of production nor the cost advantages associated with tidewater location—for so long promoted as all-important in the strategy and structure of the company—were sufficient to ensure the long-term success of the Nova Scotia Steel and Coal Company in this peripheral region. As a consequence, urban development was held in check by the deteriorating strength of

"Scotia's" once substantial economic prowess.

Acknowledgements

The research for this paper was supported by a grant from the Social Sciences and Humanities Research Council of Canada. The maps were drafted by Ole Heggen, Department of Geography, University of Victoria.

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3. This paper builds upon material presented in map form by the author, "Industrialization and the Maritimes," in Donald Kerr, Deryck Holdsworth, and Susan Laskin, eds., *Historical Atlas of Canada: Addressing the Twentieth Century* (Toronto, 1990), vol. III, Plate 24. See also James Cameron, *The Industrial History of the New Glasgow District* (New Glasgow, 1960); idem, *A Century of Industry: The Story of Canada's Pioneer Steel Producer* (n.p., 1983); Craig Heron, "The Great War and Nova Scotia Steelworkers," *Acadiensis*, 16 (Spring 1987), 3-34; idem, *Working in Steel: The Early Years in Canada, 1883-1935* (Toronto, 1988); Kris Inwood, "Local Control, Resources and the Nova Scotia Steel and Coal Company," *Historical Papers of the Canadian Historical Association* (1986), 254-82; L. D. McCann, "The Mercantile-Industrial Transition in the Metals Towns of Pictou County, 1857-1931," *Acadiensis*, 10 (Autumn 1981), 29-64; idem and Jill Burnett, "Social Mobility and the Ironmasters of Late Nineteenth Century New Glasgow," in Larry McCann, ed., *People and Place: Studies of Small Town Life in the Maritimes* (Fredericton, 1987), 59-78; and L. Anders Sandberg, "Dependent Development, Labour and the Trenton Steel Works, Nova Scotia, c. 1900-1943," *Labour/Le Travail*, 27 (Spring 1991), 127-62.
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 14. Ian McKay, "The Crisis of Dependent Development: Class Conflict in the Nova Scotia Coalfields, 1872-1876," *Canadian Journal of Sociology*, 13 (1988), 16.
 15. These conclusions are based on a detailed analysis of various primary and secondary sources. For every urban place in the Maritimes in 1911, a complete business profile was developed from the records of the R. G. Dun and Company's Mercantile Agency Reference Book, including the type of business and financial assets. This profile was supplemented with a wide variety of other sources that provided information on the major market areas of the principal businesses of the community. The results of this analysis demonstrate that the majority of the largest businesses that dominated the economic base of the towns and cities, particularly those in the smaller (less than 10,000 population), were largely oriented to the export market, supporting the idea of minimal internal integration within the regional urban system. For further evidence of the export *mentalité* of the Maritimes, see L.D. McCann, "shock Waves in the Old Economy: The Maritime Urban System during the Great Transformation, c. 1967-1939," in G. deBenedetti and R. Lamarche, ed., *The Maritime Urban System in the New Economy* (Moncton, 1994), 1-34.
 16. Ken Cruikshank, "The People's Railway: The Intercolonial Railway and the Canadian Public Enterprise Experience," *Acadiensis*, 16 (Autumn 1986), 78-100.
 17. For discussion of the mobility of these factors of production see, for example, Christopher Armstrong and H. V. Nelles, "Getting Your Way in Nova Scotia: 'Tweaking' Halifax, 1909-1917," *Acadiensis*, 5 (Spring 1976), 105-161; James D. Frost, "The 'Nationalization' of the Bank of Nova Scotia," *Acadiensis*, 12 (Autumn 1982), 3-38; L. D. McCann, "'Living a Double Life': Town and Country in the Industrialization of the Maritimes," in D. Day, ed., *Geographical Perspectives on the Maritime Provinces* (Halifax, 1988), 93-113; Ian McKay, "Strikes in the Maritimes, 1901-1914," *Acadiensis*, 13 (Autumn 1983), 3-38; and Phillip J. Wood, "'Barriers' to Capitalist Development in Maritime Canada, 1870-1930: A Comparative Perspective," in Peter Baskerville, ed., *Canadian Papers in Business History*, Vol. I (Victoria, 1989), 34-67.
 18. T. W. Acheson, "The Maritimes and 'Empire' Canada," in Bercuson, *Burden of Unity*, 87-114.
 19. L. D. McCann, "Metropolitanism and Branch Businesses in the Maritimes, 1881-1931," *Acadiensis*, 13 (Autumn 1983), 111-25.
 20. This section draws on information from McCann, "Mercantile-Industrial Transition," but also adds considerable new materials on the material and product flows portrayed in Figure 4 that are essential for interpreting how resource fragmentation influenced "Scotia's" changing spatial strategies of vertical integration.
 21. Nova Scotia, Department of Mines, *Report...for the Year 1896* (Halifax, 1896), 75.
 22. "Scotia" held five coal leases in Pictou County before World War I. See Public Archives of Nova Scotia [hereafter PANS], "Coal Leases," RG 21, Vol. 4.
 23. Charles Cantley, "A Sketch of the Development and Present Operations in the Iron and Steel Industry of Nova Scotia," *Transactions of the Canadian Mining Institute*, 16 (1913), 328.
 24. "Scotia's" strategies to secure iron ore are discussed in PANS, "An Appreciation of Robert E. Chambers," *Thomas Cantley Papers*, MG 1, No. 167, Folder 2; "Bounties," *The Iron Age*, 25 October 1906, 1074-5; W. J. A. Donald, *The Canadian Iron and Steel Industry* (New York, 1915), 112; *Monetary Times*, 5 Aug. 1904, 106; and the various Annual Reports of "Scotia" produced during the 1890s.
 25. Markets for "Scotia's" pig iron are discussed in *Nova Scotia Steel and Forge Company and Nova Scotia Steel Company, Report of Directors ...* [various years in 1890s]; Donald, *Canadian Iron and Steel Industry*, 327; and R. M. Guy, "Industrial Development and Urbanization of Pictou County to 1900" (unpublished M. A. Thesis, Acadia University, 1962), 122.
 26. Nova Scotia, Department of Mines, *Report...for the Year 1896* (Halifax, 1896), 75-6.
 27. Cantley, 328-32.
 28. *Ibid.*, 329.
 29. Discussion of Weberian least cost theory can be found in Peter E. Lloyd and Peter Dicken, *Location in Space: A Theoretical Approach to Economic Geography*, 2nd ed. (New York, 1977), 120-7; and Robert Kennelly, "The Location of the Mexican Steel Industry," in R. H. T. Smith et al., eds., *Readings in Economic Geography* (Chicago, 1968), 126-57.
 30. Michael Staveley, "Newfoundland: Economy and Society at the Margin," in McCann, *Heartland and Hinterland*, 271-2.
 31. *Maritime Mining Record*, 22 Nov. 1899, 10.
 32. L. Anders Sandberg, "The Closure of the Ferrona Iron Works, 1904," *Acadiensis*, 14 (Autumn 1984), 98-104.
 33. PANS, RG 21, Vol. 25(d); and P. T. McGrath, "The Manufacture of Iron and Steel in Cape Breton," 2 (1901), 582-3.
 34. Inwood, "Local Control," 254-82.
 35. Cantley, 349-50.

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36. R. E. Chambers, "A Newfoundland Iron Deposit," *Journal of the Canadian Mining Institute*, 1 (1896), 234-242; and *idem*, "The Wabana Iron Mines of the Nova Scotia Steel and Coal Co., Ltd.," *Journal of the Canadian Mining Institute*, 14 (1911), 43-55.
37. Nova Scotia Steel and Coal Company, *Report of the General Manager ... 1905-1912*.
38. Nova Scotia Steel and Coal Company, *Scotia*, 14-5; and *idem*, *Prospectus: Issue of £1,850,000 4½ per Cent. First Mortgage Debenture Stock* (London, 1909), 3-4.
39. Inwood, "Local Control," 266-7.
40. Nova Scotia, Department of Mines, various Annual Reports, 1901-1912.
41. H. V. Nelles, *The Politics of Development* (Toronto, 1974), 125-31; and D. F. Walker, "Transportation of Coal into Southern Ontario, 1871-1921," *Ontario History*, 63 (1971), 15-30.
42. The quotation and specific data are from Inwood, "Local Control," 265-6. Trends of "Scotia's" role in the coal industry are also discussed in James Cameron, *The Pictonian Collieries* (Kentville, 1974); *Maritime Mining Record*, 20 Feb. 1901, 12; and Nova Scotia Steel and Coal Company, *Report of the General Manager ... 1909*, 10.
43. Dalhousie University Archives [hereafter DUA], Thomas Cantley to Messrs. Pilling and Crane of Philadelphia, 22 January 1901, Hawker-Siddeley Papers, MS 4-88.
44. Material on the "Brazilian Scheme" is developed from two very comprehensive reports: DUA, "Report [of Harvey Graham]," and "Preliminary Report on Brazilian Iron Ores," *Hawker Siddeley Papers*, MS 4-106.
45. Cantley, 335.
46. "Scotia" was a major property owner, owning "about 8,000 acres of freehold lands in Nova Scotia, situate[d] at or in the vicinity of the various works of the Company, including a large number of town-site lots and 650 dwelling-houses all occupied by its employees at Sydney Mines." Nova Scotia Steel and Coal Company, "Prospectus," 4.
47. These observations on the social geography of Sydney Mines are based on field work conducted over several years, 1980-1989.
48. Inwood, "Local Control," 267-72.
49. Cantley, 331.
50. The difficulties of producing iron and steel are discussed in Cantley, 334; Inwood, "Local Control," 272; and McGrath, "Manufacture of Iron and Steel," 571-85. On North American standards, see John N. Ingham, *Making Iron and Steel: Independent Mills in Pittsburgh, 1820-1920* (Columbus, Ohio, 1991); Peter Temin, *Iron and Steel in Nineteenth Century America: An Economic Enquiry* (Cambridge, Mass., 1964); Chandler, *Scale and Scope*, 127-40; and *idem*, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), 259-69 and 360-2.
51. Nova Scotia Steel and Coal Company, *Scotia*, 21.
52. PANS, "Markets for Pig Iron, 1904-08," Thomas Cantley Papers, MG 3, No. 525.
53. Data measuring the assets of metal-working businesses in the various towns and cities were calculated for 1911 from R. G. Dun and Company, *Mercantile Agency Reference Book*, 1911.
54. I. M. Drummond, ed., *Progress Without Planning: The Economic History of Ontario, 1867-1939* (Toronto, 1987); Heron, *Working in Steel*; and Temin, *Iron and Steel*.
55. D. Kerr, "The Geography of the Canadian Iron and Steel Industry," *Economic Geography*, 35 (1959), 151-63.
56. These factors are discussed more fully in McCann, "Mercantile-Industrial Transition," 111-6.
57. *New Glasgow et al., Nova Scotia's Industrial Centre* (New Glasgow, 1916), 53-5.
58. McCann, "Living a Double Life," 101-2.
59. Cameron, *Industrial History*, chap. 5; and Nova Scotia Steel and Coal Company, *Report of the General Manager... 1905-1912*.
60. Discussion of the operation of the Trenton works is based on an analysis of material cited in Cantley; Charles E. Goad, "Insurance Plan of New Glasgow, 1910;" and Nova Scotia Steel and Coal Company, *Report of the General Manager... 1905-12*. For an excellent discussion of technological and mechanical decline and the apparent exploitation of part-time employment conditions in the metallurgical plant after 1912, see Sandberg, "Dependent Development," 136-45.
61. D. F. Walker, "Industrial Development Planning: The Example of Saltfleet Township," *Plan Canada*, 11 (1972), 217-27.
62. PANS, "Eastern Car Company," MG 1, No. 398; Cameron, *Industrial History*, chap. 7.
63. Sandberg, "Dependent Development," 129. Amin's definition is from his book, *Accumulation on a World Scale*, (New York, 1974), vol. 1, 17.