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THE CANADIAN STEEL INDUSTRY - A PATTERN OF GROWTH

by

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SUMMARY

This paper describes the establishment and growth of the Canadian primary iron and steel industry within the context of Canadian economic development. An analysis is presented of the reasons for success or failure of individual enterprises, of the factors which beneficially influenced the Canadian iron and steel industry as a whole, and of the future development of the industry. Finally, Canadian circumstances are described which might be of assistance to countries now considering the development of their own primary iron and steel industries, particularly in determining the direction such developments should take.

The ingredients which entered into the successful establishment of the Canadian primary iron and steel industry were: government incentives in the form of moderate tariff protection, the provision of bounties, municipal grants of land and exemption from local taxes; the availability of good quality, imported raw materials; the maintenance of a political and economic climate conducive to the attraction of foreign capital; imported technology; and imported skills in the initial stages; all brought together by dynamic and resourceful entrepreneurs. The most important consideration in determining the location of successful Canadian steel plants has been the size, nature and location of the present and future market for primary steel shapes and for secondary products made principally of steel. It is Canadian experience that the main emphasis in considering the establishment of a primary iron and steel industry should be on markets rather than on resources or other factors. Although resources are important, a domestic self-sufficiency of raw materials used in making iron and steel is not necessarily a pre-requisite to starting a primary iron and steel industry.

### Introduction

1. Canadian economic history dates back to the 16th century and the beginning of discovery and settlement of North America by Europeans. The vast lands and resources, to be developed during the following 450 years, were inhabited by only a sprinkling of native peoples. Before 1763, the political and economic influence in what is now Canada and most of the eastern and northern United States came from the two powerful European nations, Britain and France. In 1763, Britain gained control of nearly all French-dominated territory which included the interior heartland of the continent (i.e. St. Lawrence River Valley, Great Lakes and the Mississippi river basin). By 1783, the British colonies in what is now the eastern United States won political independence with the end of the American Revolution. British territories to the north remained as separate units, politically independent of each other but all governed by Britain. With the Act of Union passed by the British parliament in 1840, what are now the provinces of Quebec and Ontario become politically associated. In 1867, Britain passed the British North America Act granting self-government to a Canada composed of the four provinces of Quebec, Ontario, Nova Scotia and New Brunswick. With Confederation, a central government was established patterned after the British system with the important distinction that the provinces retained considerable autonomy. Manitoba became a province of Canada in 1870 followed by British Columbia in 1871, Prince Edward Island in 1873, Saskatchewan and Alberta in 1905 and Newfoundland in 1949. Extensive northern lands remain under direct control of the central government.

2. Canada comprises the complete northern half of North America except for that part occupied by Alaska and Greenland. The southern boundary of Canada borders on the United States and stretches nearly 4,000 miles from the Atlantic to the Pacific Oceans. Its area of over 3.8 million square miles makes Canada the world's second largest country. This immense size, while encompassing many resources and seeming to afford much scope for settlement, imposes many burdens and limitations because much of the land is rocky, mountainous and poorly drained or is unattractive to people. Only a small part of the country is developed or partly developed; the occupied farmland is less than eight per cent

of the total. The population of Canada will exceed 19 million people before the end of this year, of which over 34 per cent are in Ontario and about 29 per cent in Quebec, 27 per cent in the four western provinces and 10 per cent in the four Atlantic provinces. Only about 40,000 persons are settled in the northern territories. Most of Canada's population is concentrated in a 100 to 200 mile wide belt along the southern border with the heaviest concentration in southern Ontario and Quebec along the St. Lawrence River and Great Lakes. This, in large degree, is Canada's industrial heartland.

3. The Canadian primary iron and steel industry, since its birth 68 years ago, has become the world's 12th largest steel industry. Total steel ingot and castings capacity doubled during the period 1939 to 1949 and doubled again during the period 1950 to 1960. It is now in the order of 8.6 million tons a year, over four times greater than at the start of World War II. Eighty-three per cent of total steel capacity is owned by four integrated producers; the remaining 17 per cent is scattered across Canada in 45 plants, many of which are of considerable regional or national importance. Not only does Canada have the world's 12th largest steel industry but it has the 8th highest per capita production and the 5th highest per capita consumption. In terms of per capita consumption, Canada is exceeded only by the United States, Sweden, West Germany and Czechoslovakia.

4. This paper describes the establishment and growth of the Canadian primary iron and steel industry within the context of Canadian economic development. An analysis is presented of the reasons for success or failure of individual enterprises, of the factors which beneficially influenced the Canadian iron and steel industry as a whole, and of the future development of the industry. Finally, Canadian circumstances are described which might be of assistance to countries now considering the development of their own primary iron and steel industries, particularly in determining the direction such developments should take.

#### Review of Canadian Economic Development

5. Much of the stimulus for economic development in Canada, since the 16th century, has originated with the export of raw materials and foodstuffs and the import of manufactured goods and development capital. An abundance of land and natural resources, relative to labour, an inherent political and commercial stability to encourage an inflow of foreign capital, accompanied by a satisfactory



transportation and communications network and sufficient external demand, have all helped give Canada a comparative advantage in the export of many raw materials. The development of natural resources for the export market has set the pace of economic growth. The development of other sectors towards a more balanced economy has been primarily a process of diversification around the export base. Diversification has been greatest where the development and supply requirements of the resource industries could be met with goods of domestic manufacture. Additional diversification has been attained by the further processing of all or part of the resources exported; in this area, foreign tariffs have frequently presented a difficult hurdle or deterrent. With growth of the size of the domestic market and level of income, particularly during the present century, further diversification has been realized by the establishment of domestic industries to produce consumer goods. It is within this general framework that Canadian economic development has taken place.

6. The 19th century industrialization of Europe and the United States required large resources of nearby coal and access to abundant supplies of iron ore. Coal was the dominant locational factor in this period because of the large tonnages required per ton of steel output. With the technological developments of the 20th century, countries seeking to industrialize had a wider range of choice. New energy sources such as electricity, petroleum and natural gas became available; coal utilization became much more efficient; the number and types of raw materials available increased remarkably; modern transportation media were developed; and many new industrial processes evolved. Partly because of the two World Wars in the 20th century, Canada turned to increasing its industrial self-sufficiency. Canada has now attained considerable stature as an industrialized nation but not at the expense of the export of raw and semi-processed natural resources which still amount to about two-thirds of all exports. In material terms, Canada has one of the world's highest living standards but this prosperity depends on her ability to find export markets for raw and semi-processed materials and foodstuffs.

7. Canada's manufacturing sector, between 1870 and 1957, grew steadily and impressively at an average annual compounded growth rate of 4.2 per cent (Figure 1), with the growth of secondary manufacturing generally exceeding the growth of

primary manufacturing: During this period, the rate of growth of the iron and steel products industry<sup>1/</sup> slightly exceeded that of all manufacturing, with 20 to 25 per cent of its total value of output coming from the primary iron and steel industry<sup>1/</sup> sector.

3. The Canadian primary iron and steel industry employs about 36,000 people, pays an annual salary and wage bill of \$194 million, and about \$30 million a year in federal corporate income taxes - nearly one-third that paid by all metallurgical and metal fabricating industries. The four integrated producers have total assets of \$820 million and shareholders' investment of \$550 million. The cost at plant of raw materials used by the primary iron and steel industry is about \$360 million a year to which another \$375 million in value is added in the manufacturing process. Only two industries - the pulp and paper and non-ferrous smelting and refining industries - add more value in the manufacturing process than does the primary iron and steel industry. It has the sixth largest selling value of factory shipments at \$780 million. These are some of the primary benefits of the primary iron and steel industry - to which must be added a multitude of secondary benefits.

#### The Formation and Growth of the Canadian Steel Industry

9. The formation and growth of the Canadian steel industry can best be described and analysed by breaking it into four main periods:

The Abortive Period - Pre 1879.

The Period of Birth - 1879 - World War I.

The Period of Stagnation - World War I to World War II.

The Period of Growth - Post World War II.

#### The Abortive Period (Pre 1879)

10. Prior to 1879, there were several attempts to establish iron and steel works in Quebec, Nova Scotia and Ontario, all based on small blast furnaces using local ores and charcoal or coke. A wide range of relatively simple castings was produced to meet the needs of settlers, the agricultural and timber industries, and a small but diversifying manufacturing sector. Most requirements of this type of goods,

<sup>1/</sup> The primary iron and steel industry consists of iron and steel plants producing pig iron, crude steel and primary shapes such as billets, blooms, rails, bars, rods, plate, sheet, structurals, etc. The iron and steel products industry also includes most consumers of primary iron and steel including iron foundries, and manufacturers of agricultural implements, hardware items, machine tools, machinery, wire products, sheet metal products, etc.

however, continued to be imported. During the 20 to 30 year period preceding 1879, at least 10 small blast furnace plants were operated throughout Quebec at various locations along or near the St. Lawrence and Ottawa Rivers. In Nova Scotia, at least six small blast furnace plants were established at various locations. All of these 16 ventures were financially unsuccessful and the plants were closed within a few years, although three of them survived until the very early 1900's. Similar circumstances surrounded all attempts to establish primary iron and steel facilities in Ontario during this period. Paralleling the attempts to establish primary plants based on indigenous iron ore, was the construction of several rolling mills and forges in Ontario, Quebec and Nova Scotia. These plants were based principally on the use of imported pig iron or scrap and they met with some measure of success. Primary steel shapes, such as billets and rods, were also imported for the production of a wide range of products for the railways as well as for many hardware items. Although most failed, two survived to form the basis of part of Canada's present steel industry.

11. Economic historians suggest that the reasons for the lack of success of the industry's survival and growth in the pre-1879 period were: (a) an inadequately protective tariff schedule (b) a small and dispersed domestic market (c) the high level of imports from larger, well-established foreign plants. To these reasons, the authors would add (d) technological difficulties, particularly those associated with the attempted use of indigenous ores of low-grade, poor quality and limited quantity. In respect of the then existing level of tariffs on imported steel products, the establishment of a level sufficiently high to ensure the survival of domestic iron and steel plants might well have been harmful, overall, to a young, developing country requiring large per capita investments in the form of imported goods, particularly manufactures.

#### The Period of Birth (1879 to World War I)

12. In 1879, the National Policy of protective tariffs and bounties on production introduced a period that up to World War I included the establishment of three of today's four large integrated producers of iron and steel. The new tariff schedules were designed primarily to encourage and protect domestic manufacturing. Although producers of pig iron and crude steel received a measure of protection, a higher level of tariffs was provided steel rolling mills which relied largely on imported



steel ingots, billets and other services for further processing. In 1883, the central government established a bounty on pig iron produced from domestic ores; this bounty was extended to domestic steel ingots and billets in 1894 and, in 1897, to domestic pig iron produced from imported ores. In 1904, bounties were provided for wire rods produced in Canada. In 1906, the tariff schedule was reviewed and modified, although an adequate degree of protection for the infant iron and steel industry was retained. In 1912, all forms of bounties were withdrawn. From 1879 to World War I, there were several blast furnace plants built in Ontario and Nova Scotia. Of the ten blast furnace facilities in these two provinces at the turn of the century, six failed. One, in Ontario, remains in operation as a small producer of pig iron for iron foundries and three developed into large integrated producers of iron and steel. It is of interest to examine the circumstances surrounding the establishment and growth of the three successful integrated operations.

13. (a) In Nova Scotia, the integrated iron and steel operations of what is now Dominion Steel and Coal Corporation (DOSCO) had their origins in this period, based partly on the successful operation of a forge plant established in 1872 that utilized purchased scrap iron, coal and charcoal. During the 1879 to World War I period, to supply this plant, production commenced of steel ingots from imported pig iron and some scrap, then of pig iron from local iron ore, coal and limestone. The unfortunate over-evaluation of local ores, one of the causes of failure of many of the blast furnace operations in the period preceding 1879, was fortuitously compensated by the discovery of the now famous Wabana iron ore deposits of Bell Island, Newfoundland. Subsequently, the inadequacy of local coal resources became of concern, leading to the purchase of extensive coal deposits near Sydney on the coast of Cape Breton Island and the eventual relocation of the company's blast furnaces at Sydney. Concurrently, during this same period, a bold entrepreneur who controlled sizeable coal deposits near Sydney established an integrated steel facility at Sydney as a means of increasing coal sales. Coke, pig iron and crude steel production began in 1901. A weakening of the steel billet market and the introduction of a federal bounty on the production of wire rod brought about the establishment of a wire rod mill in 1904 and a rail mill was established in 1905. With a big domestic demand for rails and a European

export market, the company did well during this period. It acquired or constructed manufacturing plants to produce wire, rods, bars, rails, etc., in both the Nova Scotia and Quebec-Ontario market areas.

(b) Besides being well situated for ocean shipment of products to foreign markets, the Sydney location afforded favourable raw material assemblage costs. A property grant and a 30-year exemption from local taxes were further inducements to locate at Sydney and, indeed, important encouragements to the survival of the enterprise during the period. The relatively irregular and high ash and sulphur content of the coal and the high phosphorus and silica content of Wabana ore resulted in operating problems not commonly encountered and these features, although manageable, have remained a burden to this day. A common location of raw material sources and smelting facilities, and complementary market area and range of product, led to a merger of the two Sydney facilities into what is now the Dominion Steel and Coal Corporation (DOSCO). DOSCO, with a present annual capacity of one million tons of steel ingots and castings, still relies heavily on the output of rails and track material, rods and bars, billets and a wide range of rod and wire products. The two main market factors responsible for the establishment of the enterprise at Sydney - the domestic rail market and the general export market - have not brought about a growth or diversification equal to that of the other three large integrated producers in Canada. The market in the Atlantic Provinces for iron and steel products is small and the relatively large markets in central Canada are from 1,000 to 1,300 miles away. The company received important assistance in competing in the central Canada market through a general federal government policy of providing transportation subsidies on the shipment to central Canada of products originating in the Maritime Provinces. The domestic rail market is now small and intermittent and the export market remains highly competitive.

14. In Ontario, during the 1879 to World War I period, the federal bounty on pig iron production induced the establishment of eight blast furnace facilities at various locations. Five were unsuccessful, mainly because the principal locational factor in their establishment was proximity to local iron ore supplies rather than coal or market availability. Also, the domestic ores known at that time were usually difficult to smelt and relatively poor in quality compared with the less costly and better quality ores available from the Great Lakes region of

the United States. This situation, which placed a difficult economic burden on the new enterprises, was recognized in 1897 by an important and far-reaching change in the bounty provisions - the extension of the bounty to pig iron produced from imported iron ores. Since that time, the United States has been the major source of iron ore for the Canadian primary iron and steel industry despite the fact that Canada, since World War II, has become a major world producer of iron ore. It is appropriate to note, also, that the United States supplies most of the coking coal and some of the limestone used in Canadian primary iron and steel plants.

15. (a) The Steel Company of Canada Limited (STELCO), now Canada's largest integrated steel company with an annual capacity of 3.1 million tons of steel ingots and castings, also had its corporate beginnings in the period 1879 to World War I. STELCO resulted from a merger of several companies with primary and secondary steel producing facilities in the southern Ontario area and the Montreal area of Quebec. Of the three principal companies involved in the merger, one was a rolling mill enterprise which had been established at Montreal in the pre-1879 period to process imported primary steel; another was a rolling mill enterprise established in Hamilton, Ontario, by American businessmen at the very beginning of the 1879 to World War I period, also to process imported primary steel; and the third, and most important, was a primary iron and steel enterprise established by American businessmen in Hamilton, Ontario, in 1895. The circumstances surrounding the establishment of this successful primary facility are interesting and revealing. Until this enterprise commenced the successful production of blast furnace pig iron in 1896 and open hearth steel in 1900, Ontario imported most of its primary steel requirements.

(b) Why did this enterprise succeed, when the many previous attempts to establish blast furnace plants based on local iron ores had failed? Hamilton had a good harbour, well located within the Ontario market, for the assembly of the necessary raw materials. There was access to the then known Ontario iron ores as well as to the United States iron ores via the Great Lakes and the recently enlarged Welland Canal. Coking coals were available at reasonable cost from mines in the American states of Pennsylvania and West Virginia. The American businessmen sponsoring the enterprise were provided a free plant site, a long-term exemption from local taxes and a cash bonus if facilities of a certain kind and value were

established by a certain date. When the enterprise, in its starting period, ran into difficulties from technical incompetence and the unsuitability of the domestic iron ores, American experts were brought in and the plant switched to iron ore imported from the United States. As one of the inducements for the establishment of the plant had been the federal bonus on the manufacture of pig iron from domestic iron ores, the extension of the bonus to cover pig iron made from imported iron ores at this very period of the company's difficulty with domestic iron ores was most timely. The enterprise relied heavily on the railway market but was more diversified and offered a wider range of finished goods than its Canadian competitors.

16. The third integrated iron and steel producer which had its origins during the period was The Algoma Steel Corporation, Limited, (Algoma), whose present annual capacity is 1.8 million tons of steel ingots and castings. In 1899, an American entrepreneur established the Algoma enterprise at Sault Ste. Marie, Ontario, based on domestic and imported iron ores, imported coal and imported limestone. The federal bonus on production of pig iron; a federal contract for steel rails; the suitability of the Sault Ste. Marie location to serve western and northern railway expansion and for the importation of raw materials; all combined to make a success of the enterprise.

17. By the outbreak of World War I, Canadian pig iron production had reached 916,000 tons a year and crude steel production had grown from a negligible 27,000 tons to over 1 million tons a year. It was not by coincidence, however, that three of Canada's four integrated producers of primary iron and steel had their origins in the seven year period at the beginning of this century. There was encouragement from the federal government's National Policy which established moderate tariffs on imports of steel items made in Canada and, very shortly thereafter, provided a bounty on pig iron produced from domestic and imported iron ores and on steel ingots. This encouragement, combined with such local municipal incentives as land grants and freedom from local taxes for extended periods; the availability of coal quality, imported iron ore, coking coal and limestone; imported capital, technology and skills; all brought together by dynamic and

resourceful American entrepreneurs, brought into being Canada's primary iron and steel industry, to serve a growing domestic market for certain basic iron and steel products. The ingredients were: government incentives, imported raw materials, imported capital, imported technicians, and dynamic leadership.

#### The Period of Stagnation (World War I to World War II)

18. One million tons of crude steel were produced in 1915, 655,000 tons of rolled steel products were made, of which 40.5 per cent were in the form of plates, sheets and bars, 35.4 per cent were rails, 18.9 per cent were rods and the remainder were other primary products. The reliance on the railway industry and hardware items was substantial. World War I stimulated a further expansion of the Canadian primary iron and steel industry to a level which was to remain excessive for the next 20 years. The difficulties in the Canadian industry during the period stand as a warning to other countries of the penalties of over-expansion. Wartime expansion and the problems of post-war reconversion to peacetime production brought financial difficulties, particularly since the railway market had passed its peak. Furthermore, during the 1920's the types of steel most in demand - sheets for automobiles and structurals for construction - in Canada were either not made domestically or only made in small quantities and imports increased. The Hamilton, Ontario, enterprise was in a better position because of its proximity to the main Canadian market and its lesser reliance on railway orders. The Sydney and Sault Ste. Marie enterprises were heavily dependent on the railway market and encountered financial difficulties even prior to the Great Depression of the 1930's. In addition, these two enterprises were distant from the main Ontario and Quebec markets. While the capacity of the Canadian industry remained static during the period between the two World Wars, the neighbouring steel industry in the United States substantially increased in capacity.

#### The Period of Growth (Post World War II)

19. To meet the World War II demand for a more diverse range of primary steel products than was previously available, the Canadian industry expanded capacity considerably and steel output increased from 1.4 million tons in 1939 to an annual average of about 2.8 million tons in the war years to 1945. Unlike the period of decline after World War I, the period since 1945 has been one of almost continuous growth and diversification, until last year crude steel production

reached 7.2 million tons. This recent unprecedented growth in primary steel production resulted from an expansion of the secondary manufacturing industry and a trend to national self-sufficiency in steel rolling mill products. In 1950, for instance, Canada produced about 65 per cent of its primary steel requirements. In 1962, nearly 90 per cent of the primary steel shapes required were produced domestically. The diversification of the range of primary steel products has been principally for hot and cold rolled plates, sheet and strip, and coated flat-products such as tinsplate and galvanized products. Increases in the size ranges and tonnages of structurals, rods and bars, and alloy steels have also been important. Rails and track material have declined in importance. The installation of mills to produce these products and the expansion of blast furnaces and steel plants has required an investment of over \$1,000 million since 1950.

20. These investments have been made without government incentives to companies other than by the maintenance of a free enterprise system conducive to corporate aggressiveness aimed at maintaining and expanding the market for corporate products. Other factors encouraging growth have been the near doubling of population since the start of World War I; the high rate of primary resource development, notably in the oil and gas industry; and expansion of secondary manufacturing for the domestic market. Domestic tariffs have played a decreasing incentive role in the Canadian iron and steel industry as their effective level of protection has diminished over the years. The Canadian iron and steel industry is now technically advanced and competitive. It is oriented principally to the domestic market, although exports have commenced to grow.

21. During the post World War II period, the three integrated producers, DOSCO, STELCO and Algoma, which had their origins in the pre-World War I period, seized every available market opportunity to expand their plants and increase their range of products. In addition, Canada's fourth integrated primary producer, Dominion Foundries and Steel Limited (DOFASCO) became one of the "Big Four" in Canadian Steel. DOFASCO had started as a small steel foundry in Hamilton, Ontario, in 1913. It began producing some plate in the 1920's and by 1939 had increased its annual capacity to 200,000 tons. Because of its location in Canada's principal market area and its progressive and aggressive management, DOFASCO prospered. It installed its first blast furnace in 1951; it now has three. In 1954, the company became the first in North America to install basic oxygen steelmaking vessels.



It also installed several rolling mills for the production of flat rolled sheet and strip, and coated products such as tinplate and galvanized sheet. The company's crude steel capacity is now 1.2 million tons a year. This successful company has developed as a market-oriented enterprise. To date, all coking coal and iron ore requirements have been purchased, primarily from the United States. By 1965, a larger portion of its iron ore will come from a new Canadian source in which it has a financial interest.

22. Besides the four integrated primary iron and steel producers, there are several relatively small primary steel companies in Canada producing steel ingots from scrap melted in electric furnaces. One of particular interest is Atlas Steels Company which established a plant in southern Ontario in 1928 to produce alloy and specialty steels. Market proximity and favourable power rates were the main locational factors. Atlas is now the largest producer of alloy and specialty steels in the British Commonwealth with an annual capacity of over 170,000 tons. The company was the first in North America to install a continuous casting plant. It is building a second plant, also with a continuous casting facility, on the St. Lawrence River east of Montreal to produce stainless steel. Improved transportation facilities for the export market and low power costs were the determining locational factors.

23. An interesting development since World War II has been the establishment of four primary steel plants, based on scrap metal, in the four western Canadian provinces of Manitoba, Saskatchewan, Alberta and British Columbia. Because of its distance from the centres of heavy industry in central Canada, Western Canada has a large measure of inherent protection from shipments of steel products from the four large integrated producers of central and eastern Canada. This measure of protection for the western Canadian market, accompanied by the growing development of primary resources (mining, petroleum, natural gas), construction and some manufacturing in all four provinces, encouraged the establishment of four scrap melting plants. Each has an annual ingot capacity of about 100,000 tons, used mainly for the production of a wide range of merchant mill products for local consumption. Although one of the plants was built in 1918, the other three have been built since World War II. One plant is more limited in range of products than the other three and produces flat rolled products

primarily for pipe manufacture. Although off-shore imports do offer competition to the most westerly of the four plants, three of the plants have become well established and the fourth is in the midst of the attempt to establish itself. Two of the four plants have installed continuous casting units.

24. Although considerable interest exists for the establishment of primary facilities based on indigenous iron ores, it is noteworthy that all these successful enterprises have based their operations on scrap metal and some purchased pig iron, preferring to grow and diversify with the growing market although it is still relatively small. Local iron ores of varying qualities do exist in Western Canada and may be brought into use when the market situation and improved technology warrant their development. One recent development has been the utilization of by-product iron residues from a large lead-zinc mine, smelted with low-cost power, to produce pig iron for sale. One of the factors responsible for bringing this project to fruition was the establishment of provincial government bounties on the production of pig iron from local iron-bearing materials. This enterprise will eventually become a producer of primary steel at such time as market conditions warrant it.

25. The remaining 39 plants across Canada, varying in size from 1000 to 235,000 net tons per year of steel ingots and/or castings, either serve local markets, specialty markets, or form part of larger primary or manufacturing establishments. They are all based on pig iron or scrap metal raw materials, with most of the resultant product composed of steel castings and alloy steel castings for sale or internal use or both. The dates at which these plants were built show no particular pattern, although most originated between 1879 and World War I. The controlling locational factors have been markets and low power costs, with the former being the most important.

#### Outlook

26. The outlook for the Canadian primary iron and steel industry is for continued growth with production forecast at 10.5 million tons for the year 1970 and 12 to 14 million tons a year by 1980. The growth of the industry will be largely dependent on the domestic market and this, in turn, will depend on a high level of consumer demand and a high level of capital investment. And, in a trading

nation such as Canada, the maintenance of high levels of consumer demand and capital investment are closely related to a high level of exports, particularly of crude and semi-processed materials in which Canada has comparative advantages. Market oriented western plants will further strengthen their position in the western Canada market by producing a wider range of products. Because of the stated policy of the Quebec provincial government, there may be a new integrated steel producer established along the St. Lawrence River, a location which is well suited to the assembly of all basic raw materials. Still to be resolved for such a plant are: the market in terms of the sizes and shapes which might be competitively produced, the scale of operations, and the technical composition of the proposed plant. Because of the importance of the Quebec market area to Canada's most easterly integrated steel facility at Sydney, Nova Scotia, the precise location and character of any new steel facility in the Quebec market area will have a direct bearing on the economic well-being of the Sydney plant.

27. Despite areas of regional uncertainty, such as that created by the projected new Quebec steel facility, the Canadian steel industry overall is expected to grow and prosper in the years ahead. The evidence of this lies partly in the industry's readiness to recognize and adopt technological improvements in an endeavour to remain technologically and economically competitive with domestic and foreign competitors, particularly those forming part of the gigantic steel industry located in the United States along the southern border of Canada.

#### Summary and Conclusions

28. This brief examination of the pattern of growth of the Canadian primary iron and steel industry suggests that those developing countries which are now contemplating the establishment of their own primary iron and steel industries, might obtain something of value from a critical analysis of both the projects which succeeded and the projects which failed during the history of development of the Canadian industry. In each instance, there appears to be certain common recurring features.

29. The failure of Canadian iron and steel enterprises during the early period in Canadian history seems to have been brought about by: (a) the small size and dispersion of the market (b) the absence of adequate tariff protection from

foreign steel (c) the high level of imports from larger, well established foreign plants, and (d) technological difficulties, particularly those associated with the use of indigenous ores of low-grade, poor quality and limited quantity. One might add to the causes of failure the absence of certain factors which beneficially influenced later success.

30. The success of Canadian iron and steel enterprises which began at the turn of the century stems largely from (a) the National Policy of moderate tariff protection (b) the early government bounties on pig iron made from either domestic or imported iron ores and bounties on steel ingots (c) local municipal incentives in the form of land grants and tax exemption (d) the availability of good quality, imported iron ore, coking coal and limestone (e) the availability and willingness of imported capital to invest in Canada (f) the availability of imported technology and imported skills, in the beginning (g) the leadership of dynamic and resourceful entrepreneurs both domestic and foreign (h) a location convenient to the market to be served (i) an adequate market to support each new enterprise.

31. Analysis of the establishment in the western provinces of Canada of those primary iron and steel plants of more recent origin, indicates that market considerations were the dominant governing locational factor. Possibly the present overriding importance of this one factor will in future largely determine the location of new iron and steel facilities in Canada.

32. The motivating force in establishing a steel industry may be economic, social or political. In most countries, all three forces are important to some degree and affect the final decision. No matter what the motivating force may be or what may be the political-industrial relations within an area or country, one of the most important objectives in establishing a steel industry within an area or country should be the provision of primary and secondary steel products at prices lower or equivalent to those currently in existence. Moderately higher price levels may be tolerable, however, when the establishment of a steel facility is considered within a broader plan of economic development by which, in time, a sufficiently large integrated facility can evolve that would achieve economies because of scale of operations. Under such conditions, it might be appropriate

for government policy to promote the establishment of a steel plant by such techniques as selective tariffs or by the more positive techniques of tax incentives and bounties.<sup>1/</sup>

33. When considering steel plant location, it is the authors' belief, based principally but not only on Canadian experience, that the most important consideration is the size, nature and location of the present and future market for primary steel shapes and for secondary products made principally of steel. The main emphasis should be on markets rather than on resources or other factors. Although resources are important, a domestic self-sufficiency in the raw materials used in making iron and steel is not necessarily a pre-requisite to starting a primary iron and steel industry.<sup>1/</sup>

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<sup>1/</sup> Elver, R.B., Jones, T.H. and Walsh, J.H., Technical and Economic Factors in the Choice of Steel Plant Location, Mineral Resources Division, Department of Mines and Technical Surveys, Ottawa, Canada, MR 66 (1963).

**Table: Production of Crude Steel in Canada by Province, 1895 to 1962**  
 (thousands of net tons)

	1895	1900	1905	1910	1915	1920	1925	1930	1935	1940	1945	1950	1955	1960	1962
Nova Scotia	"	"	300e	350e	"	"	282	332	335	623	590	665	583	797	602
Quebec	"	"	"	"	"	"	12	51	39	74	109	72	99	170	213
Ontario	"	"	150e	450e	"	"	529	717	660	1,512	2,117	2,527	3,718	4,605	5,953
Manitoba	-	-	-	-	-	"	19	21	18	40	44	69	84	94	101
Saskatchewan	-	-	-	-	-	-	-	-	-	-	-	-	-	(e)	(e)
Alberta	-	-	-	-	-	"	-	9	0.4	0.4	13	0.7	5	63	70
British Columbia	-	-	-	-	-	"	0.5	1	2	5	5	30	46	71	87
<b>TOTAL</b>	25	29	451	822	1,030	1,232	842.5	1,131	1,054.4	2,254.4	2,878	3,383.7	4,535	5,309	7,170

Source: Dominion Bureau of Statistics, Primary Iron and Steel, annual and various miscellaneous publications of the Department of Mines and Technical Surveys, Ottawa.

- nil
- " not available
- e estimated
- c combined with Manitoba



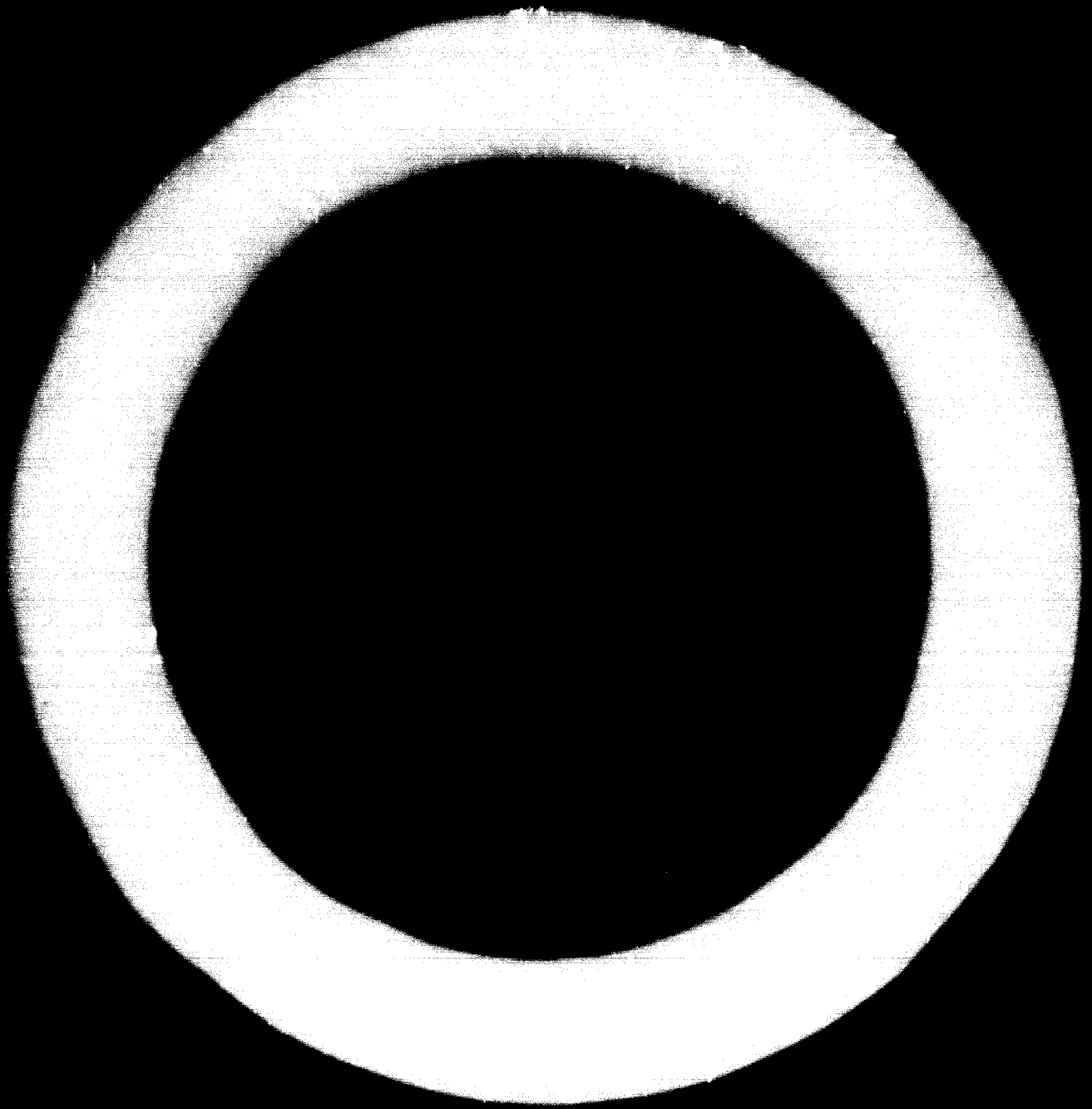
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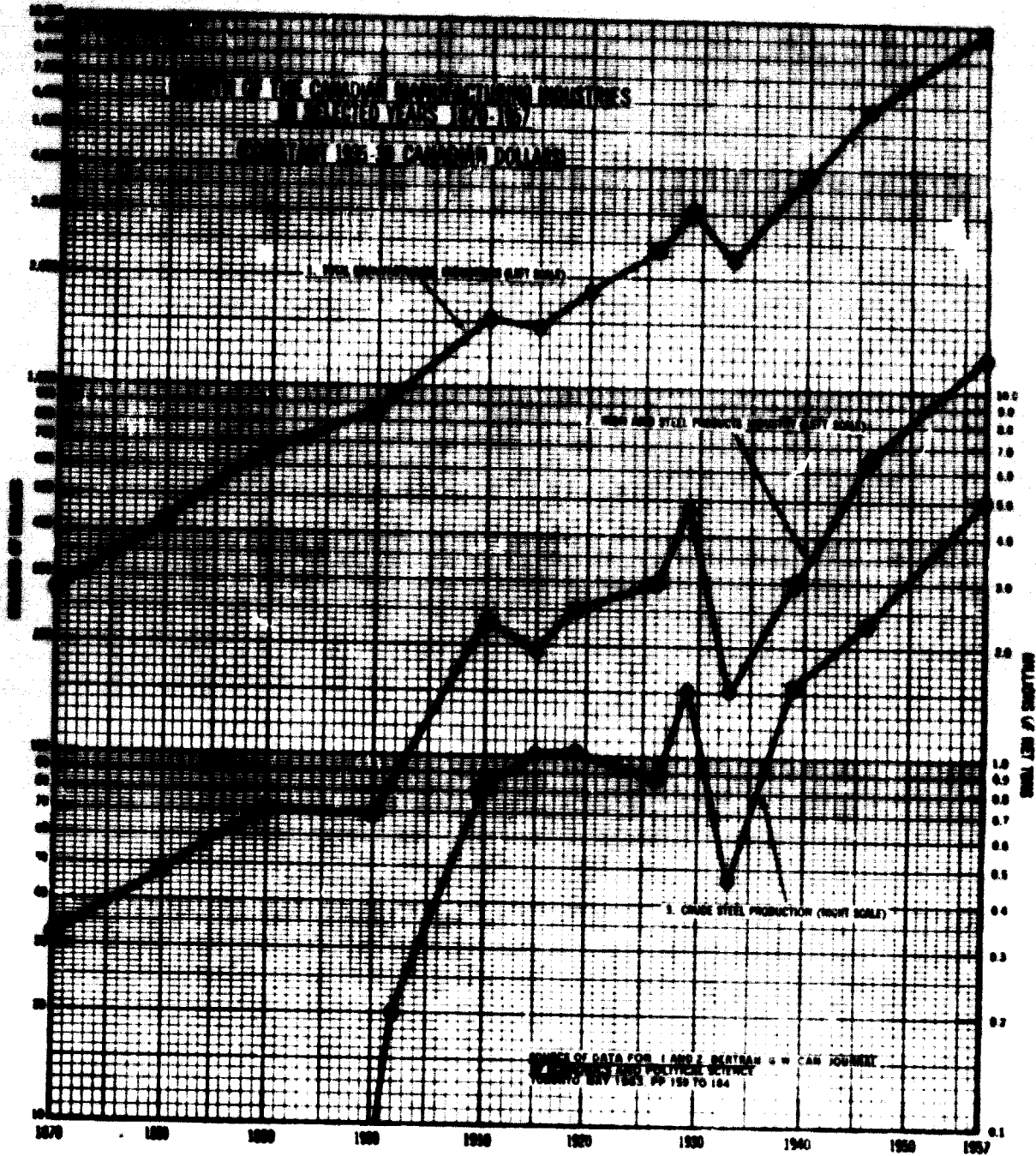
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1954. 11. 1954  
Technical Paper/A.13  
Figures

**FIGURES**





NEW FOUNDLAND

1 United Mill and Foundry Co. Ltd

NOVA SCOTIA

- 2 Ambrose - Enamel & Painting Products, Ltd
- 3 New Glasgow - Maritime Steel and Foundries Ltd (castings)
- 4 Dybbek - Dominion Steel and Coal Corp. Ltd (Sydney Works)
- 5 Troxen - Dominion Steel and Coal Corp. Ltd (Troxton Steel Division)

QUEBEC

- 6 Arcelor - Minerals Canada Alternative Co. Ltd
- 7 Beaumont - Union Carbide Canada Ltd (Naselle and Carbon Division) Chromium Mining & Smelting Corp., Ltd
- 8 Beaumont - Electric Reduction Co. of Canada, Ltd
- 9 Joliffe - Dominion Steel and Coal Corp. Ltd (Joliffe Steel Division) (castings)
- 10 LaSalle - Dominion Engineering Works Ltd (castings)
- 11 Mont-Joli - Quebec Iron Foundries Ltd (castings)
- 12 Montreal - Dominion Steel and Coal Corp. Ltd (Montreal Works) Quebec Machinery Canada Ltd (Canadian Steel Foundries Division) (castings) The Steel Co. of Canada, Ltd Canadian Steel Wheel Ltd
- 13 Noranda - Quebec Iron Foundries Ltd (castings)
- 14 S. Macdonald - Griffin Steel Foundries Ltd (castings)

NEW BRUNSWICK

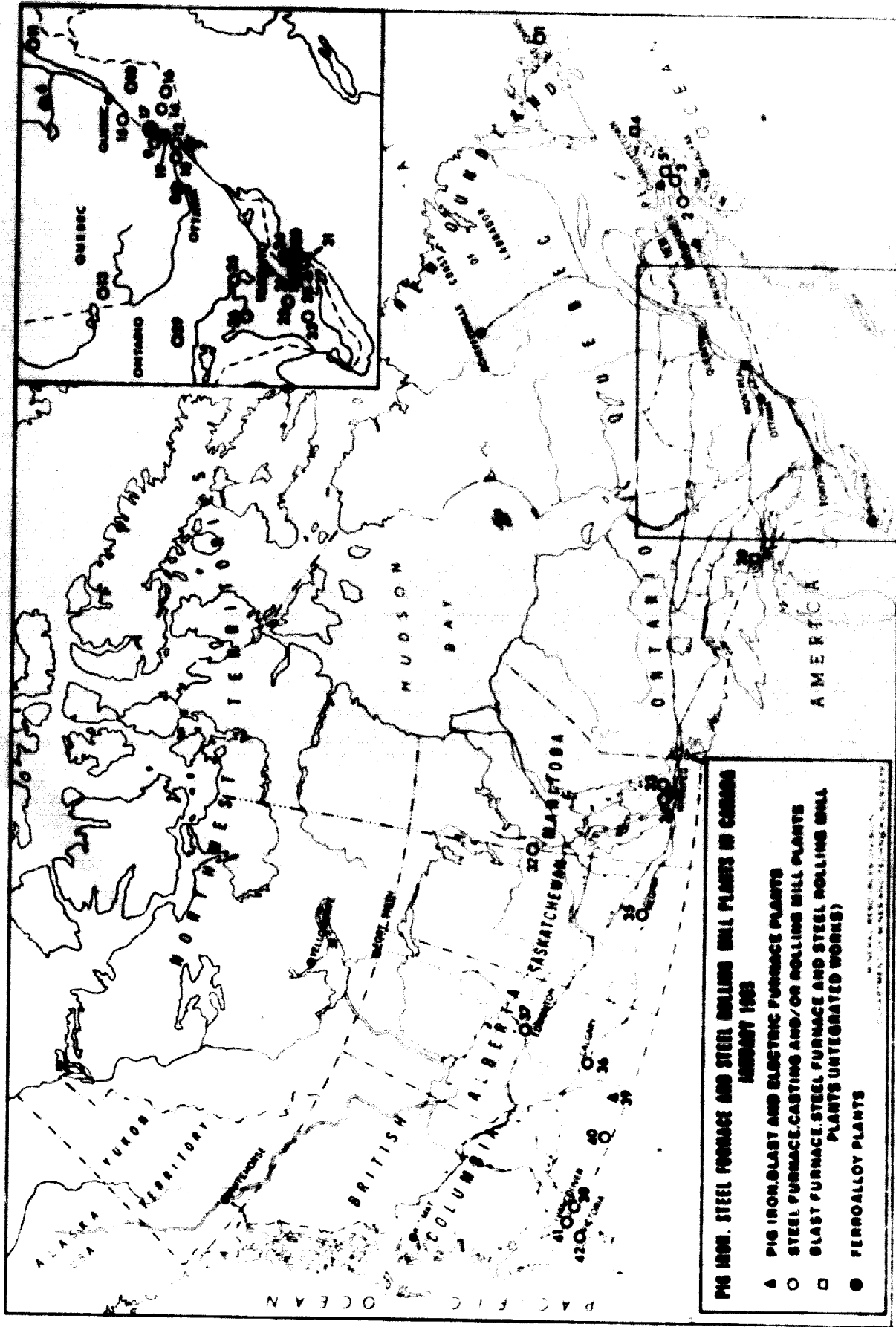
- 15 Beaumont - Dominion Steel and Coal Corp. Ltd (Beaumont Steel Division) (castings)
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ONTARIO

- 20 Chrysler - Service Company
- 21 Beaumont - Dominion Steel and Coal Corp. Ltd (Beaumont Steel Division) (castings)
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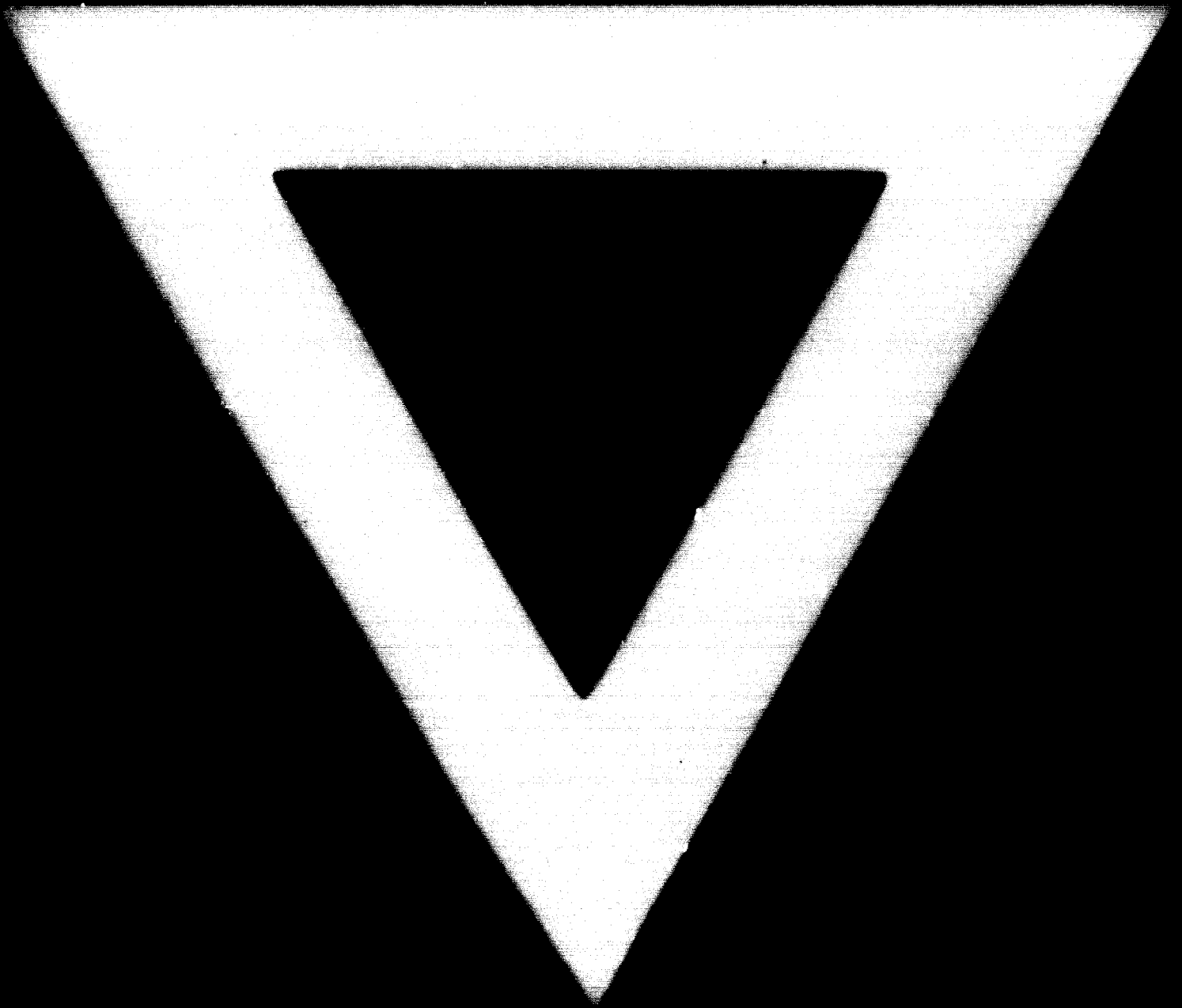
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**PIG IRON, STEEL FURNACE AND STEEL ROLLING MILL PLANTS IN CANADA  
 JANUARY 1963**

- ▲ PIG IRON, BLAST AND ELECTRIC FURNACE PLANTS
- STEEL FURNACE, CASTING AND/OR ROLLING MILL PLANTS
- BLAST FURNACE, STEEL FURNACE AND STEEL ROLLING MILL PLANTS (INTEGRATED WORKS)
- FERROALLOY PLANTS



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