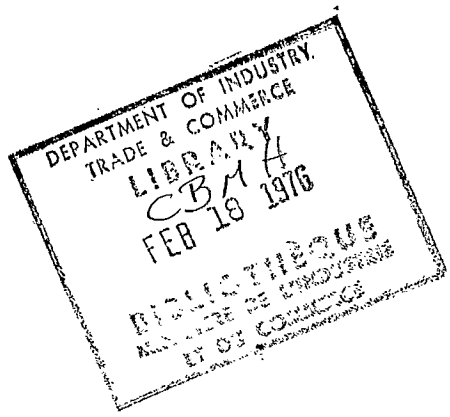
Report of

THE CANADIAN FERROUS FOUNDRY INDUSTRY

1974 National Survey

Industry, Trade and Commerce
Industrie et Commerce



THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT OF THE 1974 NATIONAL SURVEY

FOREWORD

This report is the result of a cooperative effort by the Canadian ferrous foundry industry, the Ministries of Industry of eight Provincial Governments and the Federal Department of Industry, Trade and Commerce. It is presented as the statistical summation of the data gathered during 1974, reflecting the conditions of the industry in 1973. The method of presentation has a two-fold approach; to inform the Canadian ferrous foundrymen and specialists in the industry of the results of the study, and secondly, to present a study of the industry to government and other interested people not directly associated with the industry.

The need for such a study had been expressed many times by Canadian foundrymen but the timing, method of procedure and the co-ordinating responsibility were always major impediments. Recognition should be given to the Ontario Chapter of the Gray and Ductile Iron Founders' Society for initiating this action and to the Ontario Government Ministry of Industry and Tourism for the support given, both to the foundry industry and to the Department of Industry, Trade and Commerce through the assistance of their Computer Programmers, to assist in the production of this report. Recognition should also be given to all those in the various Provincial Ministries of Industry who contributed to the gathering and processing of this information before presenting it to the Department of Industry, Trade and Commerce. Of equal importance were the efforts of all those in the Department of Industry, Trade and Commerce who contributed toward the collation of the data and the preparation of this report. Recognition is given to D.I. Gallagher and Associates, Consultants, of Toronto, Ontario for guidance in computer programming the data for analysis. Finally, special recognition should be given to all those in the foundry industry who gave their valuable time and effort to supply this data, without which this report would not have been possible.

OTTAWA, March, 1975.

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SUMMARY

The ferrous foundry industry is fundamentally important to virtually every segment of industry, from the processing of resource materials to manufacturing of industrial and consumer goods depends directly or indirectly on iron or steel castings.

This industry, fragmented into approximately one hundred and eighty-five manufacturing plants across Canada, is a direct employer of over twenty-two thousand people.

There is currently a serious shortage of manpower in the industry, both skilled and unskilled, resulting in reduced production potential. The average age of the skilled employee is over forty-five and replacements are not readily available due to the lack of training facilities in some areas and the general reluctance of young people to take the necessary apprenticeships where available. The average age of the unskilled worker is in the mid-twenties, and the rate of turnover in this group is very high. These employment problems indicate a general reluctance to work in a foundry principally due to the environmental conditions, even though the pay is comparable to or better than other industry sectors.

The ferrous foundry industry is a major consumer of energy. Of the 150 iron foundries and twenty-six steel foundries surveyed, total values of energy purchased for 1971, 1972, and 1973 respectively, were $21.7 million, $24.6 million and $32.0 million. While these figures encompass all forms of energy available to industry, the foundry industry is especially dependent on coke and electricity. In 1973 coke represented 49% and electrical energy represented 33% of total energy costs.

During the years 1971 to 1973, ninety-four iron and twenty-two steel foundries spent a total of $46.9 million on environmental control, and have indicated that over the next three to five years they expect to spend a further $24.6 million. The bulk of this money has been for control of atmospheric pollution, with some small portion to combat water pollution and noise.

Traditionally the foundry industry has been labour intensive. However, the demands for greater tonnage of higher quality castings, combined with high cost and shortage of labour, has forced a change towards a capital intensive industry. Many foundries have recently undergone extensive modernization programs. Other foundries are currently implementing, or planning new facilities. During the period 1971 to 1973 the ferrous foundry industry spent $77 million on modernization and expansion programs. Indications are that a further $180 million will be spent over the next three years.

During 1973, the industry produced 1.35 million tons of iron and 240,000 tons of steel castings, with a combined sales value of approximately $535 million. Domestic sales within a three hundred mile radius of the producing plants, account for 71% of total iron and 53% of total steel casting sales.

Major domestic markets in order of size are shown below, as a percent of total tonnage produced in 1973:

IRON CASTING PRODUCTION

MARKET	%
Motor Vehicle Equip.	39
(Municipal Governments &	
(Construction	26
Agricultural Equipment	6.3
Mining Equipment	5.6
Others	23.1

STEEL CASTING PRODUCTION

MARKET	%
Railway Equipment & ops.	35
Mining Equipment	14
Motor Vehicle	14
Construction	5.8
Machinery/Tools	4.1
Others	40.8

Export sales during 1973 amounted to $72 million for iron castings and $11 million for steel castings. Approximately 99% of all exports were to the U.S.A., and are predominantly high volume, low unit cost items. Iron casting exports represent 16% and steel castings 9% of total tonnage produced. The following table shows the major export markets as a percentage of total:

IRON CASTING EXPORTS	
MARKETS	%
Motor vehicle Equipment	66
Agricultural Equipment	14
Municipal Governments and construction	6
Others	15

STEEL CASTING EXPORTS	
MARKETS	%
Motor Vehicle Equipment	35
Construction and municipal	29
Mining	12
Others	24

Of the thirty-five iron and ten steel foundries reporting, $2.75 million was spent in 1973 on all forms of research and development, representing approximately 0.5% of total industry sales. Of this sum, approximately 63% was for product development. Many foundries rely on other branches of their corporate structure to supply results of research projects, for which a fee, or royalty is paid.

Many of the statistics reported in the body of this report, and the attached appendices, are not compatible with figures reported by Statistics Canada. Some of the major differences that have been identified in the annual statistics are as follows:

- Statistics Canada collect data primarily to contribute information to the report on the Gross National Product; not necessarily as a tool for foundry management.
- Statistics Canada's method of collecting the data is by mailing out a questionnaire and requesting a prompt and accurate reply. This method can produce varying results depending on the respondent.

- Statistics Canada's method of classifying a company by its major activity. By this process, several foundries, both large and small, are not necessarily included in the iron foundry report. In the case of the steel foundries, they are classed as part of the basic steel industry and their identity lost.
- Classification of castings for export or import is for rough castings only. If a foundry classifies a casting as a component part of an assembly or, if any machine work is done to it, it loses its identity as a casting and is not recorded as such.

This report is aimed at offering information as a tool for management. The questionnaires were completed largely on the basis of personal interview. All ferrous foundries were solicited, regardless of their major manufacturing activity. Exports, as defined in this report, are those products that go from the foundry directly to a foreign buyer, regardless of classification or machine work done on them. There has been no attempt in this report to rationalize the differences between these figures and those supplied by Statistics Canada.

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OBSERVATIONS AND CONCLUSIONS

1. Despite two and one-half centuries of development, the ferrous foundry industry still suffers many of the problems and constraints typical of small industry. This is due to fragmentation and its heterogeneous nature. With the exception of a few large foundries, most are operating with obsolete equipment and techniques.
2. Considerable funds are being invested to modernize the industry, yet it remains basically labour intensive. Labour shortages are critical in such specialized categories as the skilled trades, technical and managerial levels.
3. Environmental control demands have diverted large sums of money from modernization programs, which, in the longer term would have alleviated these environmental problems, and at the same time would have increased the industry's efficiency.
4. In recent years the industry has spent large sums on modernization and expansion programs and will probably continue to do so. The cyclical nature of the industry and historically poor return on investment does not attract investors, thus making modernization difficult to achieve. Those who have modernized have generally realized a better return on investment.
5. Over the past three years, the ferrous foundry industry experienced serious price increases and material shortages in both raw materials and energy. Ferrous scrap varied from a low of $40.00 per ton, to over $150.00 per ton at the high point. Pig iron rose from a national average of $64.00 per ton to its present level of $150.00 per ton. Energy in all forms has increased in price, but comparative figures, on a unit cost basis, are not available since only total cost figures were supplies in this report. Availability of materials and energy presented a more serious problem than cost escalation over this period. Scrap, pig iron and coke were

in very short supply and for a short period, threatened the operations of many foundries. While the shortages of scrap and to some extent, pig iron have been alleviated for the present, coke supply continues to be a problem. Availability of these critical materials could have a profound influence on the orderly growth of the industry in the future.

6. Almost 99% of total export trade is with the U.S.A. This trade is predominantly in the high volume, low unit cost, low profit items; and frequently in the tariff-free categories such as automotive and farm equipment. Efforts to increase exports outside the tariff-free categories have been hampered by U.S. Customs rulings such as the classification of ductile iron as steel castings, thereby incurring a higher tariff. Charges for engineering drawings and patterns are also assessed, and included as part of the dutiable value of the casting. A rough casting is classified as an end-use component rather than a casting for U.S. tariff purposes. Canadian tariff regulations classify these products as "castings", regardless of end-use. Measures such as illustrated above have frequently prohibited Canadian foundries from competing on an equitable basis in the U.S.A. Transportation costs have made the castings non-competitive on most other markets.

7. Annual statistics relating to the ferrous foundry industry are inadequate. Information provided by Statistics Canada is:
   - combined with other industry for total loss of identify (as with the steel foundries),
   - incompletely reported (as with the iron foundries excepting producers of pipe and fittings),
   - produced so long after the fact, it is only of historical value.

8. Lack of co-ordination and co-operation at the management level is one of the major problems of the industry. The steel foundries are represented by the "Steel Casting Institute of Canada". The iron foundry group, having no official organization, can

only present their individual views to governments, often without the opinions of other iron and steel foundries. This situation does not allow presentation of a consistent, comprehensive statement of the industry's problems.

9. Basic and applied research is virtually non-existent in the Canadian ferrous foundry industry. Combined spending in these two categories in 1973 was reported as $1.24 million, or approximately 0.2% of total sales. An additional 0.3% of total sales was reported expended for product and process development. Most Canadian foundries utilize results of foreign technology, often paying royalties for its use. This is due in part to lack of funds and expertise, and failure to investigate a co-ordinated approach to the development of technology.

10. The foundry industry has developed to serve the needs of a local region. The limiting factors discouraging major expansion efforts were the size of these markets, or the transportation costs to more distant markets. Availability of skilled manpower posed another constraint in that the older manufacturing techniques depended heavily on large numbers of skilled tradesmen. In some areas of Canada to-day, many of these constraints still exist. The local markets are small and distances present expensive transportation costs for both raw materials and finished castings. Large pools of skilled labour do not exist in these areas and the volume of business does not permit extensive modernization to reduce dependance on skilled labour. The opportunity for expansion and modernization of regional foundries varies in proportion to reasonable access to markets.

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PART I

INTRODUCTION

A foundry is a manufacturing establishment where a molten metal, or metal alloy is formed to a predetermined shape by pouring it into a shaped container, or mould and allowing it to solidify. These moulds are usually constructed from sand, although other types of material are commonly used. The products of the ferrous foundry industry include all grades of iron and steel castings. Casting is the most versatile and economical method of forming products of iron and steel for an extensive range of applications and most sectors of the economy have a direct or indirect need for this product.

The growth of the Canadian ferrous foundry industry has been closely aligned to the growth and development of the manufacturing industries in Canada. Les Vieilles Forges, established in 1729, was the first Canadian iron foundry, and operated continuously until 1846, a few miles north of Trois Rivières, Quebec. In 1844, a second iron foundry, St-Anselme Ltée., was established on the Etchemine River, and operates continuously to this day. In 1856, Beauchemin et Fils, started an iron foundry at Sorel, Quebec and in 1929 it was converted to a steel foundry and operates today as Sorel Steel Foundries Ltd.

The development of the railways in Canada saw the first major expansion of the ferrous foundry industry. The late nineteenth and early twentieth century saw the establishment of numerous iron and steel foundries, many of which are still in operation today.

The first world war placed an unprecedented demand on the industry and this resulted in the establishment of many small family owned foundries whose failure rate throughthe 1930's was high. The advent of the second world war again produced a demand for castings which

exceeded the industry's capacity to produce and resulted in further expansion. At this juncture a new element was added to the growth pattern of the industry. The manufacturers of finished products wanted to assure a continued source of quality castings, thus the number of captive foundries grew. The idea of captive foundry capacity was not new to Canada, as early as 1913, a steel foundry was built in Montreal as a captive producer to Canadian Car and Foundries Co. This foundry is still in operation today as Canadian Steel Foundries, Division of Hawker Siddeley Canada Ltd.

Since 1940, a number of competitive technological developments have forced the ferrous foundry industry into new markets and new methods of production to improve their quality and competitiveness. One of these developments was the advancement of welding techniques to produce quality components at lower cost to replace both iron and steel castings. Another was the development of new forging techniques and improved forgability steels. Substitute materials in the form of plastics and non-ferrous metal alloys have also posed serious competition to ferrous castings.

The post-war demand for industrial and consumer goods and the expansion of manufacturing industries in Canada assisted foundry industry capacity to grow in absolute terms, however the number of iron foundry establishments has decreased substantially over the past twenty years. Substantial capital expenditures have been made to modernize many of the remaining foundries to ensure their growth and continued competitiveness.

In terms of numbers of foundry establishments, both the iron and steel foundry industry is concentrated in southern Ontario and Quebec as shown in Chart 1, Appendix II.

Concentration in terms of production capacity presents essentially the same pattern, for the foundry group as shown in Chart No. 2-A. This group is largely situated in southern Ontario and represents approximately 74% of total iron foundry production capacity, which includes almost 100% of malleable iron foundry capacity. Quebec

represents approximately 16% of total capacity. All of the provinces have an iron foundry industry of some degree, but the heterogenious nature of the industry in terms of plant size, geographic distribution and products produced makes an exact comparison analysis very difficult. Plant sizes in the iron foundry group ranges from very modern, multi-million dollar establishments to very small antiquated shops.

The largest concentration of steel foundry production capacity as shown in Chart 2-B is in Quebec and all within one hundred miles of Montreal. The Prairie Provinces follow a close second with Ontario third. To obscure individual foundry figures, the steel foundry group of Western Canada is considered as a single unit wherever necessary. However, wherever possible, British Columbia is shown separately from the Prairie Provinces.

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PART II

PURPOSE AND PROCEDURE

THE NEED FOR A STUDY OF THE FOUNDRY INDUSTRY

Statistics Canada, in their various monthly and annual reports, report on certain aspects of the iron and steel foundry industry. However, it is not their role to identify and analyze any of the problems of the industry, nor do they produce foundry statistics in detail. Because of the terms of reference in classifying industry, large sections of the iron and steel foundry industry (particularly captive foundries) are not covered, or are included with other industry groups. For example, the steel foundries are classed with the basic steel mills, consequently, apart from showing tons of steel castings produced and shipped, identity is merged with the much larger statistics of the steel mills.

The lack of statistical information and a need to identify the numerous problems of the industry led a group of iron foundry managers to investigate the possibility of a survey of the industry. The objective would be the identification of major problem areas within the industry and the development of possible solutions.

METHOD OF APPROACH

In June, 1973, a group of Iron Foundry Managers in Ontario requested the Ministry of Industry and Tourism of Ontario to conduct a study of the Iron Foundry Industry. Subsequent discussions with officials of the Department of Industry, Trade and Commerce in Ottawa resulted in a decision being made to conduct a co-ordinated national study of the sector. A series of meetings was held at the Department of Industry, Trade and Commerce in Ottawa, attended by members of the Iron and Steel Foundry Industry, representatives from the various Provincial Ministries of Industry and the Iron and Steel Division of the Resource Industries and Construction Branch, Department of Industry, Trade and Commerce.

The objective of these meetings was:

Identification of some of the major problems in the industry.

Drafting of a questionnaire that would be acceptable to the industry and at the same time produce sufficient information to properly analyze the industry.

Decision on a method of collection of the data and preparing a report.

A questionnaire was developed by the Department of Industry, Trade and Commerce (Exhibit I, Appendix I). It was decided that provincial officials would collect the data requested in the questionnaire on the basis of a personal interview with foundry management. The completed questionnaires were to be forwarded to the Iron and Steel Division of the Department of Industry, Trade and Commerce for collation, analysis and preparation of a report.

STATISTICAL COMPARISON

Statistics Canada collects statistics and reports on the foundry industry in a series of publications. Catalogue No. 41-226 is an annual report on iron foundries and is part of the annual census of manufacturers. This report deals with manpower, materials and energy costs. It shows quantity and values of shipments. From an industry point of view, one of the major problems with this report is that all iron foundries do not participate in the survey of this industry. This is due to the problem created by classifying a company by its major activity, regardless of the fact that it might include a very large foundry. Consequently, statistics from some large and small foundries are not included here. The second problem is the time lag of more than two years before publication. A third problem is that integrated companies are not able to provide separate data for each activity at the one location.

Catalogue 41-004 is a monthly publication on iron castings and cast iron pipe and fittings. While this publication does reach the public in a reasonably short period of time, the major problem is that the iron castings portion, other than pipe and fittings, is only shown in total. Again, it does not list all of the foundries, nor is there any breakdown as to size of castings, market areas, geographical distribution or other

details. Inclusion of steel pipe and fittings further complicates the situation. Changes can be made in this catalogue if the industry requests it. The information is gathered but not reported.

Catalogue 41-001 is a monthly publication that shows the production and tonnage of steel castings. It gives no further commodity details of the steel foundry industry.

Catalogue No. 65-004, "Exports by Commodities" and Catalogue 65-007, "Imports by Commodities", show figures in hundredweights and thousands of dollars for imports and exports. However, these figures are further complicated in two ways:

(a) They only show the value for raw castings delivered as such. If the casting is classified in any other manner, or has been machined, it becomes an end-use component and is so identified. The identity of the casting is then lost and is not reported as an export or import of castings.

(b) The value of the imports is not necessarily the actual value, but value for duty, consequently, the value can be adjusted upwards or downwards from its actual value.

In summary, the information available from Statistics Canada on the foundry industry is incomplete and in many cases somewhat confusing. This should not be construed as a criticism of that group, since when consideration is given to the reason for the data collection, and in some cases the poor quality of response, the staff of Statistics Canada does an excellent job. A major reason for collecting the data is to compile figures to contribute to the Study on Gross National Product. It is not done to be used as a tool for foundry management. The method of collecting the data and the quality of the replies also leaves much to be desired. The questionnaires are mailed to the various companies and a prompt and accurate reply is requested. The demand on the Manager's time to complete these reports frequently leaves him less than enthusiastic, hence a degree of cooperation may be laching. In other instances, the Manager does not see the completed questionnaire to verify the figures, since completion is done by the Accounting Department or some other service department within the company. This can lead to a further deterioration of the quality of the reply.

There is a requirement for the continuous publication of an effective set of foundry statistics, that can be used as a tool by foundry management. One of the objectives of this report is to highlight this need and to investigate methods of implementation.

Many of the statistics presented in the various charts and tables of this report will vary considerably from those published by Statistics Canada. In view of the above explanations, this is to be anticipated. Wherever possible, an explanation of the differences will be given.

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PART III

GENERAL STATEMENT OF RESULTS

The above-mentioned questionnaires were distributed to the provincial government offices early in April, 1974, with October 31, 1974 set as the completion deadline. There were 150 iron foundry and 26 steel foundry replies, as shown in Chart No. 1. It should be noted that these numbers represent plant establishments rather than companies, since one company might represent two or more establishments. On the basis of the number of companies that responded to this enquiry and the amount of detail offered, the results were considered very satisfactory. The number of replies represent 95 per cent of the total industry.

Detailed analysis of the survey will be shown in the following sections and supported by charts in the appendices. Some of the more important highlights of the study could be outlined as follows:

(a) There is a serious labour shortage with high turnover in the industry. The data reported shows that the total industry employs 22,000 people in all categories. The foundries report an ongoing shortfall of several hundred people, usually in the skilled categories.

(b) The industry had a record production year in 1973. This represented an iron foundry plant utilization of 80.88% of capacity with a total production of 1,352,820 tons of iron castings. Production of 240,048 tons of steel castings, represented 82.61% utilization of stated steel casting capacity.

(c) Large environmental control expenditures resulted in ninety-four iron foundries spending a total of $42,514,000, over the past few years. Further estimates by seventy-six foundries indicate that within the next three to five years they will spend a further $16,218,000. An expenditure of $4,370,000 was reported by 22 steel foundries, 18 of which report further expenditures of $8,335,000 over the next few years.

(d) The demand for improved quality and greater productivity in the industry coupled with the unavailability and high cost of labour, has contributed to more capital spending. Technological advancements during the past decade, such as automatic and semi-automatic moulding has reduced the demand for skilled moulders. Improved material handling methods for both raw materials and finished products have further reduced the labour demand. Technological advances in moulding sands and in sand handling and re-claiming facilities have all contributed to improved quality and productivity.

Expansion and modernization of programs in the industry have resulted in considerable sums of capital being spent. In the years 1971, 1972 and 1973, the iron foundries spent a total of $66,247,000. During this period, the steel foundry industry reported spending $10,381,000. These costs do not include the costs for environmental controls as shown on page 15. Future expenditures through the years 1974, 1975 and 1976 are estimated to be considerably higher than they have been in previous years. Figures reported for the iron foundries show that over the next three years, predicted capital expenditures are $126,242,000. The steel foundries estimates their spending to the end of 1976 will be $54,338,000. These figures cannot be considered conclusive since several companies did not report.

In addition to the above capital expenditures, substantial capital is currently being spent, or planned, for new foundry facilities which were not covered by this survey.

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PART IV

PRODUCTION DETAILS

GENERAL INFORMATION

Before considering the specifics of production, marketing, and capitalization of the industry, a few general remarks on ownership, available production and foundry societies are appropriate.

OWNERSHIP

The question of ownership was divided into four categories:

privately owned by Canadians,

publicly owned - Canadian controlled,

subsidiary of a Canadian company,

subsidiary of a foreign company.

Chart No. 3A and 3B shows the distribution of ownership and tonnage produced in 1973 for both the iron and steel foundries. Due to the fact that a total tonnage breakdown by province, or region, would reveal individual company positions, only the Canadian totals are offered here. A total of 133 of the 150 foundries reporting are Canadian controlled and are either privately or publicly owned, or subsidiaries of Canadian companies. In terms of tonnage this represented 74.2% of 1973 production.

For the steel foundries, 16 of the 26 reporting are Canadian owned. The Canadian ownership represented approximately 40% of total steel foundry tonnage production for 1973.

DEFINITION OF FOUNDRY CLASSIFICATIONS

For the purposes of this report, a "captive" foundry is one whose total production is used within the corporate structure to make or be incorporated into other products that are sold by the corporation. A "jobbing" foundry is one that does custom founding for other clients and uses none of this production capacity to

manufacture castings for their own consumption. A third category is a foundry that is partially "captive" and partially "jobbing". Chart No. 4A and 4B shows the available tonnage for jobbing and captive work. The numbers presented are those reported by 145 iron foundries and 26 steel foundries.

FOUNDRY SOCIETIES

Foundry societies exist in Canada, but with the exception of the Steel Casting Institute of Canada, and the Canadian Cast Iron Soil Pipe Association, all of them are chapters of either U.S. or British Societies. Most of these societies are technically oriented. The Steel Casting Institute of Canada; The Gray and Ductile Iron Founders' Society; and The Canadian Cast Iron Soil Pipe Association, are primarily management-oriented. However, they do have technical divisions. Unfortunately, there is no Canadian association of foundry managers that can speak for the iron foundry industry. At the time of writing this report, an effort is being made to form a Canadian iron foundry association.

MANPOWER

The industry is a comparatively large employer of manpower as shown below:

	No. of Foundries	EMPLOYMENT BY YEAR 1968	1973	1978
Iron Foundries	150	14,344	15,064	13,607
Steel Foundries	26	4,196	5,644	6,786
Total	176	18,540	20,708	20.393

The increased volume of production between 1968 and 1973 is shown in Appendix III, produced from Statistics Canada figures. This resulted in an increased demand for manpower as shown above. Modernization programs underway, or contemplated in the iron foundries, will make greater use of automated equipment, reducing the demand for manpower by 1978. The figures presented above are as these 176

foundries reported them, however, only the 1973 figures can be considered reasonably accurate as shown on Charts No. 5-A and 5-B.

Since 1968 several foundries have ceased operations, consequently the manpower employed in those foundries was not reported. There are a number of foundries that are either under construction, or in the planning stages, which will require additional manpower by 1978. Details of these new foundries are not known but employment will be increased by several hundred.

Foundry size and distribution, in terms of number of employees, is shown on Chart 6A and 6B. It will be noted that of the 150 reporting iron foundries, 82 foundries, or 55% of the total, employ 50 or fewer people. Only 13 iron foundries or 8.7% of the total employ more than 250 people. Of the 26 reporting steel foundries, six of them or 23 per cent employ fewer than 50 people and six of them employ more than 250 people.

In comparison with many other industries, the foundry is not a particularly attractive environment in which to work. Consequently most foundries in Canada report difficulty in obtaining labour, both skilled and unskilled. In response to the question, "Does a labour shortage exist?", 126 iron and 21 steel foundries replied affirmatively, while only 24 iron and 5 steel foundries indicated little or no problem. The reasons given for the labour shortage was remarkably uniform from coast to coast and fell into six broad categories to which each respondent offered one or more suggestions as shown below:

	REPLIES AS A % OF THE NO. OF FOUNDRIES	
	STEEL (21)	IRON (126)
General Labour Shortage	28.6	29.5
Unemployment Insurance Benefits	19.0	27.7
Working Conditions	28.6	24.1
Lack of Motivation (Don't want to work)	38.1	21.4
Low Wages	4.8	15.2
Miscellaneous or Unspecified	28.6	23.2

Wages were not a common reason for labour shortage. In general, most foundry workers are paid on a par with other industry in the region and incentive programs for production workers are very common. Working conditions however, still leave much to be desired in many Canadian foundries, although considerable sums of money have been spent to improve the working environment, such as atmospheric improvement, noise abatement, better material handling and improved safety programs.

While the question was not asked in the survey, both Quebec and Ontario attempted to establish the average age of foundry employees in the various categories. It is interesting to note that in the categories of managerial, technical, and skilled labour, average ages run upwards from 45 years of age whereas in the unskilled category, where most of the attrition exists, the average is less than 30 years of age.

PRODUCTION

In the foundry industry, as in many other industries, there are three terms that are commonly used, frequently interchangeably and in the minds of many people, meaning essentially the same thing. These are maximum plant capacity, production and shipments. For the purpose of this study, capacity is defined as "Tonnage of finished castings, both captive and commercial, assuming a normal mix, that the foundry would be prepared to ship on an economical basis, using existing facilities, in one calendar year."

Production would represent the actual number of tons of acceptable castings produced, whether for shipment, or inventory. Chart No. 2A and 2B shows the tonnage capacity and production for 1973, by province, as reported by both the iron and the steel foundries. In many cases, steel castings were made by iron foundries and iron castings were made by steel foundries. Where a foundry reported more than fifty per cent of their production as iron castings, although they make steel, they were classified as an iron foundry, and the reverse for the steel foundries.

By using broad category definitions as to the grades of iron and steel, an attempt was made to determine the tonnage produced in each of these categories. The iron foundry categories were gray, nodular, malleable, white and alloy irons. For the steel foundries, the categories were carbon, low alloy, manganese, and high alloy steels. By definition, high alloy steels are those grades which contain a total alloy content, including carbon, of eight per cent or greater, but excluding manganese and abrasion resistant steels.

In the case of iron foundries, many foundries make one grade of iron only, the most common being gray iron. Gray iron represented approximately 63% of all iron castings produced, as shown on Chart No. 7A, followed by nodular, 27%; alloy, 4%; malleable, 4%; and white iron, 2%. Steel foundries, by and large, were much more flexible, with most foundries producing more than one grade within these category definitions. The most commonly produced grade was carbon steel, which represented 74% of production as shown on Chart No. 7B, followed by low alloy steel, 13%; manganese steel, 10%; and high alloy steel, 3%.

MELTING

A fairly wide range of melting facilities are available to the foundry industry. These include the coke fired cupola; the electric arc furnace; the coreless induction electric furnace; the channel induction electric furnace; the rotary oil or gas fired furnace, and the reverbatory coal or gas fired furnace. Most foundries tend to use one system only, however, a number of foundries do have more than the one system of melting. Sometimes these systems are used independently of each other, but frequently they are used as a duplexing operation, especially in the iron foundries, to increase their melt capacity, where the iron is melted in one unit and refined

in the second. The numbers of systems are shown below:

MELTING SYSTEM	IRON FOUNDRIES	STEEL FOUNDRIES	TOTAL
No. of Fdries. Reporting	150	22	172
Cupola	114	-	114
Electric Arc	7	22	29
Coreless Induction	24	6	30
Channel Induction	5	1	6
Rotary	6	-	6
Reverbatory	8	-	8

MOULDING AND CASTING

Moulding is the practice of ramming sand or some other material around a model of the part to be made. The mould is made in two parts, the upper and lower, or the "cope" and "drag". The model, or pattern, is then removed. Models of the interior of the casting, called "cores" which are also made of sand, are set into the mould cavity. The cope is then placed on the drag and the completed mould is ready to receive the cast metal. Due to the different shrink allowances from one alloy to another, it is not always possible to use the pattern for making all grades of iron or steel without suitably altering the pattern.

The exception to the moulding system described above is the "permanent" mould, which is made of some durable material, usually cast iron or steel and the cavity is machined into this material. The most common types of permanent moulds are those used for centrifugally casting pipe, although many other forms are used.

A wide range of moulding practices are used in both the iron and steel foundries. These include:

(a) the cope and drag method where each half of the mould is made at separate stations. The cores are inserted and the mould closed at a third station. This type of

moulding is usually done on machines. Where the part to be cast is too big for machine moulding, or in some older foundries making small castings, the mould is made on the floor, or bench, by hand ramming, or by the use of sand slingers.

(b) match-plate moulding is a variation of (a) where all operations can be completed at the one station.

(c) floor moulding is a cope and drag principle, but for large castings, generally too big for machine moulding, or quantities too small to warrant the cost of expensive machine moulding patterns. These are frequently made manually by crews of moulders, although in some shops sand slingers are used to throw the sand at high velocity onto the pattern.

(d) "Pit-moulding"; Very large castings, generally too big to mould on the floor, due to their height or their mass, are made in a pit dug into the foundry floor. The mould is then assembled in the pit and the casting, once poured, may sit several days, or weeks to cool, before it is removed.

(e) Shell moulding is essentially a cope and drag system. The mould is made by sprinkling a fine resin-coated sand onto a heated pattern and allowed to bake to some pre-determined thickness to form a "shell". The excess sand is then dumped off, the cores placed in the shell and both halves closed. This system is used for relatively small parts where reasonably good dimensional accuracy is required and the volume required is generally high.

While machine moulding has been in existence for many years in the form of squeeze-jolt, roll-over, sand slingers and other machines, they are all essentially single station machines with a low production rate. In large production shops, several machines would be required to maintain a high volume of production. During the past decade,

there has been a substantial amount of development in semi-automatic and fully automatic cope and drag machines. These machines, however, have their limitations in terms of the initial cost of the machines, the size of castings they can produce, minimum volume of work they must have to operate them economically, the cost of metal patterns and to some extent their lack of flexibility in being able to switch patterns quickly. For those companies that can use them, there is no doubt that there has been significant productivity improvements.

Paralleling the development in moulding machines in recent years has been the development in moulding sands. Green sand moulding is still the most common system used, but synthetic sands such as the resin-coated sands for shell moulding and the various "air-set" or "no-bake" systems are gaining in popularity where they can be economically used.

Any one foundry can, and frequently does use more than one moulding practice or sand system. An attempt was made in this survey to list the details of the various moulding and sand systems but the results in total were too sketchy to offer more than the basic information shown in Charts No. 8A and 8B. These charts show that of the 150 iron foundries reporting, 108 use cope and drag; 114 use match plate and 101 use floor moulding. The "other" category represents various automatic and semi-automatic moulding systems. For the steel foundries the cope and drag and the floor moulding represents a slightly higher percentage of use than the iron foundries, while the usage of match plate is somewhat lower.

Forward planning for either modernization, or plant expansion, must consider the market in terms of maximum casting size before considering what equipment to purchase. The question has been asked by many foundry people, "Where is the large volume business in terms of casting size?" Charts No. 9A and 9B show the distribution of foundries in terms of the maximum size of castings they can make,

as reported in the returned questionnaires. Due to the problem of disclosure, it is not possible to offer a chart showing tonnage production in each of these categories. However, in total, it is interesting to note the following:

	0-100 lb.		0-1,000 lb.		0-5,000 lb.		0-10,000 lb.		Over 10,000	
FOUNDRIES	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons
IRON	25	111,656	58	727,448	34	275,112	16	49,484	17	243,024
STEEL	1	24	5	112,248	6	14,664	5	7,680	9	105,396

Note that this chart does not mean 60% of all iron castings are under 1,000 lbs., or that 53% of all steel castings are over 1,000 lbs. It does state, however, that 60% of all iron castings are produced by foundries whose maximum size of casting is only 1,000 lbs. and 53% of all steel castings are produced by foundries which are capable of producing castings in excess of 1,000 lbs.

The availability of skilled pattern makers has been of concern to the industry for many years. The trend in recent years is to discontinue the use of an in-house pattern shop to make new patterns. Sixty-six iron foundries and twelve steel foundries indicated they still maintain a pattern shop to produce new patterns, whereas seventy-six iron foundries and twelve steel foundries use their pattern shops for repairs only, and purchase new patterns from custom pattern shops.

In some areas of Canada it was felt that some foundries had to go long distances for their patterns and this would add appreciably to the cost of a casting. The question was asked how far companies had to go for their patterns and what this added to the cost. Only forty-four iron foundries replied, with two of them stating they had to go more than 300 miles. Of this group, one stated that it added to the cost of the casting by two percent only. Six steel foundries responded, all of them stating that they could get their patterns locally.

Quality Control is a continuing problem in the foundry industry. Whether captive, or commercial jobbing, all foundries strive one way or another to maintain top quality castings. However, it is not all foundries that install the necessary equipment to determine the level of this quality. Many foundries depend on visual inspection only. This is especially true among the iron foundries. Charts No. 10A and 10B shows the numbers of foundries, and distribution, of those employing some form of mechancial testing, non-destructive testing, and laboratory facilities. It should be pointed out, however, that the foundries reporting are not necessarily the same foundries in every category. Indeed very few foundries would be in each of the categories shown in this chart. For those who do not have the necessary testing facilities within their plant, most felt that it could be done locally, if required.

RAW MATERIALS AND ENERGY

The ferrous foundry industry is subject to severe production cyclical demands as shown on Graphs in Appendix III. Ferrous scrap, coal and fossil fuels are in demand worldwide and during the peak cycles of production, the foundry industry must compete for these commodities. The current demand cycle started in mid 1971 and by mid 1973 it was approaching a crest. The demand for scrap was worldwide and resulted in the U.S. placing a limitation on the export of scrap. Canada is a net importer of scrap and this severe demand on the available sources of ferrous scrap resulted in spiralling costs. In response to the requirements of the Canadian iron and steel industry for ferrous scrap, the Canadian Government applied the Export Controls Act. This resulted in the reduction of exports of ferrous scrap, except for those cases where it could be shown the material was not required by Canadian consumers. The consumption and values of ferrous scrap is shown in Charts No. 11A and 11B for the years 1971, 1972 and 1973. Because the upward spiral of prices started in late 1973, the 1973 prices are not a true reflection of the cost of doing business through the latter part of 1973 and into 1974. By mid 1974,

the price for scrap in most areas was double what it was at mid 1973. At the time of writing this report, there is some indications that the price of scrap is falling. As of January 1, 1975, the U.S.A. removed the export limitations on scrap, and Canada substantially liberalized scrap export controls.

Pig iron was traditionally more expensive than ferrous scrap and for many years almost double the price. With the increased cost of scrap in late 1973 and 1974, pig iron became cheaper by comparison. However, the cost of producing pig iron also increased, consequently, the price of pig iron started to climb in late 1973 and 1974, but did not reach the equivalent price of scrap until somewhat late in 1974. At the time of writing this report in late 1974, and early 1975, the business cycle for the foundry industry is stabilizing. Pig iron, however, continues to be in very short supply. The consumption and cost, in thousands of dollars, for pig iron is shown on Charts No. 12A and 12B for 1971, 1972 and 1973.

At the time the questionnaire was being prepared, in early 1973, the foundry industry was faced with its first wave of fuel shortages. In addition, due to the upswing of the business cycle over the periods 1971 to 1973, the shortage of foundry coke became severe. When the question was asked "Does the current energy shortage affect your operations?", 46 iron foundries and 5 steel foundries said that it did, whereas 104 iron foundries and 21 steel foundries replied negatively. When we consider that 114 of the 150 iron foundries reporting use a cupola as their primary melting facility, we question how many of these foundries consider coke as a form of energy, as opposed to a bulk raw material such as scrap and pig iron, since only 46 of them reported they were effected by the shortage. Consumption of coke in tons by province is shown on Chart No. 13.

The total cost of energy by province for the years 1971, 1972 and 1973 are shown in Charts Nos. 14A; 14B and 14C for the iron foundries, and Charts Nos. 15A; 15B and 15C for the steel foundries.

It should be pointed out, however, that these figures are only approximations. Some foundries did not offer their total cost of energy, and with some integrated companies it was too difficult to break the foundry consumption of energy from their total energy costs. In these cases they offered approximations only. The ferrous foundry industry is a large consumer of energy, especially coke and electricity. In 1973 the total energy costs were approximately $32,000,000.

TRANSPORTATION

The cost of transportation is a very significant factor in the purchase price of ferrous castings due to their high weight to value ratio. No attempt was made to determine these costs, since in many cases the shipping cost of finished castings is paid by the customer on receipt of delivery. The method of transportation, both of raw materials and finished products was of interest to many members of the Steering Committee. Chart Nos. 16A and 16B show the normal methods of transportation in both the receival of raw materials and the shipment of finished castings. It will be noted that in the case of iron foundries, most of them receive by road transport and approximately half use rail transport. Among the steel foundries, the numbers that use both road and rail for the receipt of raw materials is approximately equal. For the shipment of finished castings, almost all foundries use road transport, while some use rail as well. A few foundries depend on other means of transport such as ships, aircraft, and various other means.

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PART V

SALES AND MARKETS

In order to compare the size of one industry with another, various common denominators can be used, viz., total employment; quantities of goods produced, or dollars of annual sales, to name but a few. This study endeavoured to determine the size of the industry in terms of dollars of annual sales. Response from across the country was extremely good with only very few companies declining to offer statistics. For those foundries which did not supply sales figures, estimated figures were used. To arrive at an estimated sales figure the following calculations were made: a) combination of tonnage production figures as supplied in the questionnaire; b) Statistics Canada figures; c) comparison of other foundry sales figures in the same line of business; d) some up-dated older reports were used. In presenting these figures, as shown in Charts No. 17A and 17B, it should be understood that they are not exactly as reported, but have been adjusted to show the increased estimates. The margin of error between the figures as presented and the true figures, is probably less than five percent. It does indicate, that total ferrous foundry industry sales, for 1973, was in the order of $535 million. A distribution of the iron and steel foundry industry, in terms of annual dollar sales value for 1973 is shown on Charts No. 18A and 18B.

Of interest to many foundry marketing people is the extent of the market in terms of distance from the foundry. Of the 144 iron foundries reporting to this question, with a total sales of $410,384,000., 71%, or $291,800,000 is sold domestically less than 300 miles from the production source; as shown on Chart No. 19-A. Export sales amount to 17.6% or $72,270,000. The balance, 11.4% or $46,314,000. is sold domestically, more than 300 miles from the production source.

The twenty-four steel foundries reporting to this question, also shown on Chart No. 19-B indicate that of the $121,579,000 total sales, 52.8% or $64,199,000 is sold domestically, less than 300 miles from the production source. Export sales amount to 8.9% or $10,831,000. The balance, 38.3%, or $46,549,000 is sold domestically, more than 300 miles from the production source.

Many foundries in Canada have single, or proprietary product lines, or manufacture a product identifiable to one industry alone. These include, among others, such items as waste and vent cast iron pipe, iron pressure pipe for water distribution systems, automotive engine blocks, ingot moulds, highway transport tractor fifth wheels, etc. Across Canada, eighty-five iron foundries reported shipping 755,671 tons of iron castings and nine steel foundries reported shipping 117,958 tons of steel castings in these special categories. In both iron and steel foundries, this represented approximately 50% of total production during 1973.

In order of importance the domestic market for the iron foundry group in 1973 was motor vehicle equipment 38.9% of total tonnage produced; municipal governments and construction 25.9%; agricultural equipment 6.3% and the mining industry, 5.6% as shown in Chart No. 20A. While the automotive requirements are high as a percentage of total production, it is largely captive business by foundries operated by the major automobile manufacturers.

Exports of iron castings in 1973 amounted to 219,300 tons, or 16% of total production, as shown in Chart No. 21A, as opposed to 17.6% of total sales dollars.

The domestic market for the steel foundry group in 1973, was railway 35% of total tons produced; mining equipment 13.5% and motor vehicle equipment 13.5%, as shown in Chart No. 20B.

Exports of steel castings in 1973 amounted to 22,152 tons or 9.2% of total production as shown in Chart No. 21B, as opposed to 8.9% of total sales dollars.

Most foundries handle their sales through their own sales force, as reported by eighty-five iron foundries and twenty-one steel foundries. Twenty-two iron foundries and ten steel foundries use manufacturers' agents and several foundries use other means separately, or in addition to the other systems, as shown on Chart No. 22.

It should be noted that for the iron foundry industry 86% of the tons exported are in three industries, which are in order of size, motor vehicle market, 65.8%; construction and agriculture equipment 14.5%; and municipal governments, 6.1%. These three markets represent high volume, low unit cost. In the steel foundry export market 64.4% of total tons exported are in two market areas, the motor vehicle market, 35.5% and the municipal and construction industry, 28.92%. This again represents high volume and relatively low unit cost per ton.

In response to the question on seasonal production, it would appear that most foundries in Canada, both iron and steel, are not greatly effected by a seasonal pattern of either production or sales. Of those indicating they have peak periods of production, the summer and autumn represent the peak periods for the iron foundry industry, whereas the spring and summer represent the peak periods for the steel foundries. Iron foundry sales for those reporting would vary as much as 40% between the low and high periods of the year and production vary as much as 29 percent. Figures on this variance were not offered by the steel foundries.

RESEARCH AND DEVELOPMENT

As a percentage of total sales dollars, very little money is devoted to research and development among the Canadian iron and steel foundries. In terms of pure research, five iron and two steel foundries spent a combined total of $120,000 in 1973. For applied research eleven iron foundries and six steel foundries spent a total of $904,000

For product development, thirty-five iron and ten steel foundries spent a combined total of $1,728,000. Many foundries pay associated companies in the corporate structure to supply their research and development. Thirty-four iron foundries and nine steel foundries indicated that this is how their research is obtained. In addition to the above, eighteen iron foundries and eight steel foundries reported that they spent a combined $1,095,000 as payment for the use of patents and as royalties. This leaves 116 iron and 17 steel foundries without any form of research program.

There are a number of Federal Government programs to aid a company financially in its' own research and development program. While these programs are designed to assist one company or, under special contractual arrangements, a small group of companies in a similar field, working on a specific project, they are not available to industry associations or societies as a group. These programs are administered by various departments or agencies of the Federal Government such as Industry, Trade and Commerce; National Research Council, etc.

THE CANADIAN FERROUS FOUNDRY INDUSTRY

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PART VI

CAPITAL EXPENDITURES

MODERNIZATION AND EXPANSION

Traditionally the ferrous foundry industry has been subjected to very wide swings in production cycles. The cyclical nature of the business, plus small return on the investment, tended for many years to keep the foundry industry as a labour intensive, low productivity type of business. With few exceptions, very little was spent on capital equipment in the form of either new plants, or modernization programs. A combination of factors such as plant obsolescence, increasing material and labour costs, very poor return on investment and demands for higher quality castings created conditions leading to plant closures in the iron foundry group. Most of the closures over the years were the small, family-owned companies. In the last three or four years, however, this list includes some of our bigger foundries such as Canadian Ingersoll-Rand Company Limited; International Harvester Limited; Auto Specialties Mfg. Co. (Canada) Limited, to name a few. The number of failures in the iron foundry industry over the past 15 years has been rather severe. Statistics show that the numbers of iron foundries have decreased from 327 in 1955, to 219 in 1965, to about 180 in 1970. The most recent count shows in the order of 165 iron foundries in Canada. This loss of production capacity, coupled with an increase in demand since 1971, has created a shortage of iron casting capacity in Canada, that has not been paralleled since the last World War.

The steel foundry industry, by comparison, has not experienced this attrition rate and only two small steel foundries went out of business in the past few years, one of them as a result of a disasterous fire.

In recent years qualified foundry labour has been very difficult to obtain. The cost of labour, as well as the costs and shortage of materials has forced more automation into the foundry industry. In addition, the consumers of castings are constantly demanding higher quality. The combination of increased costs has convinced most foundries that modernization and expansion programs are long overdue. This was recognized over five years ago when many foundries started to take steps to modernize their plant and improve their productivity. In the years 1971 to 1973 inclusive, as shown in Charts No. 23A and 23B, the iron foundries spent $66,247,000 on plant capital expenditures and the steel foundries spent $10,381,000.

Forecasts for capital expenditures as shown in Charts No. 24A; B; C and D for the iron foundry industry from 1974 to 1976 inclusive, indicates a further capital expenditure of $126,242,000. Expenditure forecasts as shown in Charts No. 25A; B; C and D, for the steel foundry industry, in the same time period are $54,338,000. These figures, are incomplete since a number of companies did not answer the question, stating that they were still considering a major expansion program and had not yet estimated their costs.

In addition to the above, there are a number of new foundries either under construction or in the planning stages which were not covered by this study. In total, they would add many millions of dollars to the figures of capital expenditure.

An analysis of the capital expenditure figures as shown in Chart Nos. 23; 24 and 25, shows that the heaviest expenditures are by the largest foundries. Ontario and Quebec represent the bulk of the expenditure for the next three years as they did in the previous three. This information was gathered during the summer and early autumn of 1974. Since that time, the market for automotive industry castings has softened considerably and some foundries are not currently positive concerning future spending as they were a year earlier.

ENVIRONMENTAL CONTROL

One of the most significant costs that has seriously affected the foundry industry is that of environmental control expenditures to improve the working conditions and reduce the effects of the foundry on the environment. It has frequently been stated that the cost of environmental control has been the reason for many foundries going out of business. This may be an over-simplified statement, but in many cases it has probably been the deciding factor on an otherwise marginal operation. The cost is high with very little return on investment. It is a social cost and return on investment is in the form of better working conditions and improved labour relations that aids productivity. Improved community relations are an added benefit in many cases, especially in built-up urban areas. Chart No. 26 shows the cost to the end of 1973 and the anticipated cost for the next three to five years. These figures are not conclusive, especially those of future estimates, since some foundries did not give figures although they stated that they would be spending a considerable sum of money to overcome the environmental problems. In some cases, consideration was being given to building new foundries or modernizing the existing foundry as an alternative to controlling obsolete facilities. It was the intention of the survey to show these costs as over and above the figures quoted for capital equipment. This is assumed to be the case in this report.

In response to the general question at the end of the survey questionnaire, many foundrymen from coast to coast, both iron and steel, requested more uniform regulations for environmental control. Some asked that the rules in some regions be clarified because the present regulations are too ambiguous.

At the time of writing this report, Environment Canada is in the process of preparing a report on air polution in the ferrous foundry industry, which will be released later this year. The next step will be the development of National emission guidelines for the ferrous foundries based on a co-operative undertaking between Environment Canada, the Provincial authorities and the industry.

THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT OF THE 1974 NATIONAL STUDY

APPENDIX I

The Questionnaire used to gather the Data Incorporated in this Study.

Industry, Trade and Commerce | Industrie et Commerce

1974 FERROUS FOUNDRY SURVEY

CONFIDENTIAL (when completed)
CONFIDENTIEL (une fois rempli)

ENQUÊTE DE 1974 SUR LA FONTE DES MÉTAUX FERREUX

NOTE: Do not write in shaded areas. *N.B.: Ne pas écrire dans les espaces ombrés*

PART — *PARTIE 1* **CORPORATE STRUCTURE — *ORGANISATION DE LA SOCIÉTÉ***

1. Company name — *Nom de la société*

Telephone — *Téléphone*

Head office address — *Adresse du siège social*

Telex — *Télex*

Postal code — *Code postal*

Foundry address(es) — *Adresse(s) de la (des) fonderie(s)*

Executive officers — *Administrateurs*	Titles — *Titres*
Officer to contact — *S'adresser à:*	Person interviewed — *Personne interviewée*

2. Is this company: — *Votre société est-elle*

1 ☐ Privately owned? *Privée?*
2 ☐ Publicly owned? *Une société dont les actions sont offertes au grand public?*
3 ☐ Wholly owned subsidiary of a Canadian company? *Une filiale en propriété exclusive d'une société canadienne?*
4 ☐ Wholly owned subsidiary of a foreign company? *Une filiale en propriété exclusive d'une société étrangère?*

Name and address of perent company, if any
Nom et adresse de la société mère, s'il y a lieu

Neme of subsidiary companies, if any — *Noms des filieles, s'il y a lieu*

3. Is your foundry — *La production de votre fonderie est-elle*

1 ☐ Totally captive — *Entièrement destinée à une autre société?*
2 ☐ Totally jobbing — *Entièrement destinée à vos propres clients*
3 ☐ Partially captive — *Partiellement destinée à une autre société?*

4. If partially captive, what capacity percentage is available for custom work?
Dans ce demier cas, quel pourcentage de la capacité de production est ordinelrement réservé à vos propres clients?

5. List any foundry associations of which your company is e membar
S'il y a lieu, de quelle(s) association(s) de fondeurs votre société est-elle membre?

MANPOWER — *MAIN-D'OEUVRE*

6. Number of people employed in the foundry operetion *Nombre de personnes trevelllent à la fonderie*	1968	1973	1978 Forecast *Prévision*
1 Menagerial — *Personnel de gestion*			
2 Clerical and supervisory — *Commis et superviseurs*			
3 Technicel (Engineers & Technicians) — *Personnel technique (ingénieurs et techniciens)*			
4 Mouldars — *Mouleurs*			
5 Millwrights — *Mécaniciens d'outillage*			
6 Pattern makers — *Modaleurs*			
7 Production (all other categories) — *Production (toutes les autres catégories)*			

7. In your plant, are you training:
Dans votre usine, êtes-vous en train de former:

	Yes *Oui*	No *Non*
Moulders (other then machine operators)? *Des mouleurs (autres que mécaniques)?*	☐	☐
Pattern makers — *Des modeleurs?*	☐	☐

8. Does a labor shortage exist?
Votre société connaît-elle une pénurie de travailleurs? ☐ Yes *Oui* ☐ No *Non*

If yes, to what extent and in which categories — *Dans l'affirmative, dans quelle mesure et dans quelles catégories d'employés?*

9. Are there any specific problems associated with obtaining reliable labour?
L'embauchage d'employés dignes de confiance vous pose-t-elle des problèmes? ☐ Yes *Oui* ☐ No *Non*

Elaborate — *Veuillez préciser*

PART — *PARTIE 2* FOUNDRY DETAILS — *DÉTAILS SUR LA FONDERIE*

Definition of "CAPACITY".
Tonnage of finished castings, both captive and commercial, assuming a normal mix, that the foundry would be prepared to ship on an economical basis, using existing facilities, in one calendar year.
Définition de "CAPACITÉ DE PRODUCTION"
Le tonnage des moulages finis qui sont produits pour le compte d'une autre société ou pour divers clients, si l'on présume une production suffisamment mixte, qu'une fonderie peut être en mesure d'expédier de façon économique et au moyen des installations existantes dans une année civile.

10. What is your maximum plant capacity per month? *Quelle est la capacité de production maximale de votre usine par mois?* Tons — *Tonnes* ____

11. What is the average plant production per month? *Quelle est la production moyenne de votre usine par mois?* Tons — *Tonnes* ____

12. Iron and Steel grades made / *Quels types de fer et d'acier fabriquez-vous*

		% of — *du* Total
IRON — *FER*	1 Grey *Fonte grise*	
	2 Ductile *Font ductile*	
	3 Malleable *Font malléable*	
	4 White *Fer-blanc*	
	5 Alloy *Alliage*	
STEEL — *ACIER*	6 Carbon *Au carbone*	
	7 Low Alloy *Alliage à faible teneur*	
	8 Manganese *Au manganèse*	
	9 High Alloy *Alliage à haute teneur*	

Specify any specialty or preferred grades — *Fabriquez-vous des produits spécialisés ou d'un type préféré?*

13. Melting facilities — *Installations pour la fonte*	Type ✓	Size or capacity rating in tons per hour *Appréciation de la taille ou capacité en tonnes par heure*
1. Cupola — *Cubilot*		
2. Electric arc — *Arc électrique*		
3. Coreless induction — *Induction sans noyau*		
4. Channel induction — *Induction à canaux*		
5. Rotary (gas or oil fired) — *Four rotatif (chauffé au gaz ou au pétrole)*		
6. Reverboratory — *Four à réverbère*		
7. Other (specify) — *Autres (préciser)*		

Sand — *Sable*	Sand System(s) used *Type de sable utilisé*	Sand reclaim System *Méthode de récupération du sable*
Moulding *de moulage*		
Core *à noyauter*		
Coated *à enduit*		

Describe coating facilities for coated sand — *Décrire les installations destinées au sable à enduit.*

14. Moulding practices used *Techniques de moulage*	✓	Type	Model *Modèle*	Size — *Dimensions*	Numbers of units of each *Nombre d'unités de chaque moule*
1 Cope and drag *En châssis*					
2 Matchplate *Sur plaque — modèle*					
3 Pit *En fosse de coulée*					
4 Floor *A plat*					
5 Shell *En carapace*					
6 Permanent mould *En moule permanent*					
7 Other — *Autres*					

15. What is the size range of your castings?
Quelle est la série de dimensions de vos moulages?

Maximum (lbs) | Minimum (lbs)

16. Do you have heat treating facilities? ☐ Yes *Oui* ☐ No *Non*
Avez-vous des installations de traitement par la chaleur?
If yes, how many units of each? —
Dans l'affirmative, donnez le nombre d'unités de chacune

Electricity *Electricité* | Gas — *Gaz*

Oil — *Pétrole* | Other — *Autres*

17. If heat treating facilities are not available in plant, are they available locally? ☐ Yes *Oui* ☐ No *Non*
Si votre usine n'est pas pourvue d'installations de traitement par le chaleur, sont-elles disponibles dans votre région?

18. Does the foundry have its own pattern shop for:
La fonderie a-t-elle son propre atelier de moulage pour:
New patterns *Les nouveaux modèles* ☐ Yes *Oui* ☐ No *Non*
Repairs only *Les réparations seulement* ☐ Yes *Oui* ☐ No *Non*

19. If pattern shops are not within reasonable distance, how far must you go for patterns? (miles)
S'il n'y a pas d'atelier de modelage à une distance raisonnable, où pouvez-vous obtenir des modèles (milles)

20. What does this distance add to the cost of your patterns as a percent of pattern cost? (approx.)
Quelle augmentation du coût de vos modèles cette distance occasionne-t-elle, en pourcentage du coût des modèles? (approximative)

21. Checklist of testing and inspection facilities used — *Liste des installations d'essai et d'inspection utilisées*

MECHANICAL TESTING *ESSAIE AVEC DÉFORMATION MÉCANIQUE*	NDN-DESTRUCTIVE TESTING *ESSAI SANS DÉFORMATION*	LABORATORY FACILITIES *LABORATOIRES*
1 ☐ Tensile — *de traction*	5 ☐ Radiography — *Radiographie*	9 ☐ Chemical — *Chimique*
2 ☐ Impact — *de résilience*	6 ☐ Die penatrant — *Rayons pénétrant la matrice*	10 ☐ Spectrograph — *Spectrographe*
3 ☐ Bend — *de flexion*	7 ☐ Soner	11 ☐ Sand — *Sable*
4 ☐ Other — *Autres* _____	8 ☐ Other — *Autres* _____	12 ☐ Other — *Autres* _____

22. If testing facilities are not in the foundry, can it be done locally? ☐ Yes *Oui* ☐ No *Non*
Si votre fonderie n'est pas pourvue d'installations d'essai, le travail peut-il être fait dans votre région.

23. Not withstanding price, are you able to get sufficient quantities of ferrous scrap and pig iron to keep your plant operating satisfactorily?
Indépendamment du prix, êtes-vous capable d'obtenir assez de ferraille et de fer en saumons pour assurer un fonctionnement satisfaisant de votre usine?

	Yes-*Oui*	No-*Non*	N/A *Néant*
Scrap — *Ferraille*	☐	☐	☐
Pig iron — *fer en saumons*	☐	☐	☐

24. List below total tonnage (all grades) and values purchased
Indiquer ci-dessous le tonnage total (toutes les catégories) et valeur d'achats

Year *Année*	Tons — *Tonnes*		Value — *Valeur* ($,000)	
	Scrap — *Ferraille*	Pig iron-*Fer en sau.*	Scrap — *Ferraille*	Pig iron-*Fer en sau.*
1. 1971				
2. 1972				
3. 1973				

25. Does the current energy shortage affect your operations? ☐ Yes *Oui* ☐ No *Non*
La pénurie d'énargie actuelle affecte-t-elle votre exploitation?
Elaborate — *Veuillez préciser*

26. Total cost of energy ($,000) *Coût total de l'énergie*	Electricity *Electricité*	Oil *Pétrole*	Gas *Gaz*	Coal *Charbon*	Coke	Other *Autres*
1. 1971						
2. 1972						
3. 1973						

27. Normal method of transportation (√)
Moyen de transport habituel

Method *Moyen*	Raw material *Matières premières*	Finished Product *Produits finis*
1. Road *Route*		
2. Rail *Chemin de fer*		
3. Ship *Bateau*		
4. Air *Avion*		
Other — *Autres* 5.		

28. Do you feel that customers' quality demands will cause you to modify your methods of production or foundry practices? ☐ Yes *Oui* ☐ No *Non*
Croyez-vous que les exigences des clients en matière de qualité vous obligeront à changer vos méthodes de production ou vos techniques de font?
Elaborate — *Veuillez préciser*

What has been the impact on your company for the demands for environmental control?
Quels effets ont eus sur votre société les exigences en matière de protection de l'environnement?

29. How much have you spent, to date, on this equipment?
Combien avez-vous dépensé jusqu'ici pour l'équipement nécessaire?

30. Give an estimate of future costs
Quelle est votre estimation des coûts à venir?

What would be the impact of these costs?
A votre avis, quels seront les effets de ces coûts?

31. Are you faced with demands for future action in this area? ☐ Yes *Oui* ☐ No *Non*
Avez-vous encore des mesures à prendre pour satisfaire aux exigences dans ce domaine?

Elaborate — *Veuillez préciser*

PART – *PARTIE 3* **MARKETING – *COMMERCIALISATION***

32. What were the annual values of foundry sales, f.o.b., at your plant, in $,000?
Quelle a été, en milliers de dollars, la valeur annuelle des ventes f.o.b. de fonte de votre usine?

1971	1972	1973

Definition of "EXPORT SALES"

Sales that go directly from the foundry to the foreign customer. They do not include sales to a domestic customer who might include them into articles or equipment, destined for foreign markets.

Définition de "VENTES D'EXPORTATION"

Les ventes qui sont expédiées directement de la fonderie aux clients de l'étranger. Elles ne doivent pas comprendre les ventes faites aux clients du pays qui pourraient les ajouter à des articles ou du matériel destinés aux marchés étrangers.

33. What is the extent of your market? (%)
Quelle est l'importance de votre marché? (%)

Local (Less than 300 miles) *Local (moins de 300 milles)*	
National (More than 300 miles, in Canada) *National (plus de 300 milles au Canada)*	
Export – *d'exportation*	

Indicate any trade names used by your company.
Indiquer toutes les marques de commerce utilisées par votre société.

34. Check any major, single product lines used
Cocher toute série principale de produit utilisée

		% of total production *% de la production total*
1. Soil pipe – *Tuyaux d'égout*	☐	
2. Pressure pipe – *Tuyaux résistants*	☐	
3. Pipe fittings – *Raccords de tuyaux*	☐	
4. Engine blocks – *Blocs moteurs*	☐	
5. Other – *Autres* _____	☐	

35. Is your company interested in: – *Votre société s'intéress-t-elle aux*

	Yes-*Oui*	No-*Non*
Jobbing contracts – *Contrats à forfait*	☐	☐
New product lines – *Nouvelles séries de produits*	☐	☐

36. Present method of selling – *Méthode de vente actuelle*

☐ Direct sales by company employed salesmen
Ventes directes par des vendeurs au service de la société

☐ Manufacturer's agent
Représentant de fabricant

☐ Other (specify)
Autres (préciser) _____

37. Check the usual or preferred markets for your castings in terms of sectors below and list the percentages of shipments.
Indiquer les marchés habituels et préférés pour vos moulages, parmi les secteurs ci-dessous et, dans chaque cas, indiquer le pourcentage des expéditions totales

		✓	% of total shipments *% des expéditions totales*	% of total shipments exported *% du total des exportations*
1.	Automotive (Primary and secondary market) *Produits de l'automobile (marchés primaire et secondaire)*			
2.	Aircraft industry *Construction aéronautique*			
3.	Agricultural implements *Instruments aratoires*			
4.	Construction industry *Industrie de la construction*			
5.	Municipal castings *Moulages à l'usage des municipalités*			
National resources and extractive industry *Industrie de l'extraction et transformation des ressources naturelles* 6.	Mining equipment and machinery *Outillage et équipement miniers*			
7.	Pulp and paper mill equipment and machinery *Outillage et équipement d'usine de pâtes et papiers*			
8.	Forest products machinery *Outillage d'exploitation des produits forestiers*			
9.	Petrochemical industry *Industrie pétrochimique*			
10.	Railway (operations) *Chemin de fer (exploitation)*			
11.	Railway (cars and locomotives) *Chemin de fer (wagons et locomotives)*			
12.	Shipbuilding *Construction maritime*			
13.	Machinery and tools *Machines et outils*			
14.	Other manufacturing *Autres marchés manufacturiers*			
15.	Miscellaneous uses *Usages divers*			

38. To which countries do you export?
Vers quels pays exportez-vous?

39. Are you interested in increasing your export sales? Yes-*Oui* ☐ No-*Non* ☐
Aimeriez-vous augmenter vos ventes à l'exportation?

Elaborate – *Préciser*

40. Do you have any restrictions to exporting by:
Etes-vous assujettis à des restrictions d'exportations en raison

	Yes-*Oui*	No-*Non*
Licencing agreements *D'accord de licence*	☐	☐
Corporate policy *D'une politique de la société*	☐	☐

Elaborate — *Préciser*

41. Do you have seasonal patterns of:
Y a-t-il des variations saisonnières dans:

	Yes-*Oui*	No-*Non*
Production *Votre production*	☐	☐
Sales — *Vos ventes*	☐	☐

42. How long do peak periods last? (weeks)
Quelle est la durée des périodes de pointe (en semaines)?

1. Spring — *Printemps* ☐☐
2. Summer — *Été* ☐☐
3. Autumn — *Automne* ☐☐
4. Winter — *Hiver* ☐☐

43. Does your firm have a complementary low season activity?
Votre société connaît-elle une faible activité saisonnière complémentaire?

☐ Yes *Oui* ☐ No *Non*

Elaborate — *Préciser*

44. How large is the percentage difference between high levels of activity and relatively quiet seasons?
Quelle est la différence, en pourcentage, entre les périodes de pleine activité et les saisons relativement calmes?

For sales — *Pour les ventes* ☐☐☐
For products — *Pour la production* ☐☐☐

45. Is there a corresponding seasonal variation of: — *Y a-t-il une variation saisonnière correspondante des:*

	Yes-*Oui*	No-*Non*
Raw Material prices — *Prix des matières premières*	☐	☐
Selling prices — *Prix de vente*	☐	☐

Please describe — *Veuillez préciser*

PART — *PARTIE 4* FINANCE — *FINANCES*

46. Estimate how much you spent on capital equipment in terms of production facilities. ($,000)
Donnez une estimation de la somme que votre société a dépensée en biens d'équipement pour la production. ($,000)

1. 1971 ☐☐☐☐☐☐
2. 1972 ☐☐☐☐☐☐
3. 1973 ☐☐☐☐☐☐

47. Estimate your planned or anticipated capital expenditures: ($,000)
Donnez une estimation des sommes que vous projetez ou prévoyez dépenser en frais d'immobilisations.

1. 1974 ☐☐☐☐☐☐
2. 1975 ☐☐☐☐☐☐
3. 1976 ☐☐☐☐☐☐

48 Estimate the research and development expenditures for 1973. ($000)
Donner une estimation des sommes dépensées en 1973 pour la recherche et le développement. ($000)

Pure research *Recherche pure* | Applied research *Recherche appliquée* | Product development *Mise au point de produit*

49 Do you have access to the results of Research and Development conducted by an affiliated firm? Yes-*Oui* ☐ No-*Non* ☐
Votre société a-t-elle accès aux fruits des travaux de recherche et de développement effectués par une filiale?

If yes, name of affiliate — *Dans l'affirmative, nom de la filiale*

Address — *Adresse*

Terms of participation — *Conditions de participation*

50 Do you make use of patents for which a royalty or other fee is paid? Yes-*Oui* ☐ No-*Non* ☐
Votre société utilise-t-elle des brevets pour lesquels elle doit verser une redevance ou un droit quelconque

If yes, give amount paid during 1973
Dans l'affirmative, indiquer le montant versé en 1973

Can you offer any other information or comments that would assist us is helping your company?
Pouvez-vous nous fournir d'autres renseignements ou formuler des observations qui nous permettraient d'aider votre société?

Date completed — *Terminé le*

THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT ON THE 1974 NATIONAL SURVEY

APPENDIX II

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CHART/TABLEAU NO. 1

RESPONDENTS TO THE FOUNDRY SURVEY 1974

REPONDANTS AU SONDAGE SUR LES FONDERIES EN 1974

IRON FOUNDRIES: FONDERIES DE FONTE

British Columbia	12	Colombie - Britannique
Alberta	8	Alberta
Saskatchewan	2	Saskatchewan
Manitoba	7	Manitoba
Ontario	72	Ontario
Quebec	38	Québec
New Brunswick	7	Nouveau - Brunswick
Nova Scotia	4	Nouvelle - Ecosse
Total	150	Total

STEEL FOUNDRIES: FONDERIES D'ACIER

Quebec/Atlantic	7	Québec/Atlantique
Ontario	9	Ontario
Prairies	4	Prairies
British Columbia	6	Colombie - Britannique
Total	26	Total

CHART/TABLEAU NO. 2-A

IRON FOUNDRY CAPACITY AND PRODUCTION 1973

CAPACITE ET PRODUCTION DES FONDERIES DE FONTE 1973

PROVINCE	NO. DE FONDERIES NO. OF FOUNDRIES	CAPACITE DE PRODUCTION PRODUCTION CAPACITY TONS/TONNES	PRODUCTION TOTAL TOTAL PRODUCTION TONS/TONNES
Colombie Britannique British Columbia	12	50,664	39,384
Alberta - Saskatchewan	10	55,764	50,256
Manitoba	7	30,840	23,844
Ontario	72	1,238,124	999,240
Quebec/Québec	38	267,720	216,312
New Brunswick Nouveau Brunswick	7	24,708	19,620
Nova Scotia Nouvelle Ecosse	4	6,012	4,164
TOTAL	150	1,673,832	1,352,820

Plant Utilization = 80.82%

Utilisation de l'usine

CHART/TABLEAU NO. 2-B

STEEL FOUNDRY CAPACITY AND PRODUCTION 1973

CAPACITE ET PRODUCTION DES FONDERIES D'ACIER 1973

REGION	NO. DE FONDERIES NO. OF FOUNDRIES	CAPACITE DE PRODUCTION PRODUCTION CAPACITY TONS/TONNES	PRODUCTION TOTALE TOTAL PRODUCTION TONS/TONNES
Quebec - Atlantic Atlantique	7	91,500	75,180
Ontario	9	86,412	71,208
Prairies	4	90,096	72,060
British Columbia Columbie Britannique	6	22,560	21,600
TOTAL	26	290,568	240,048

Plant Utilization = 82.61%

Utilisation de l'usine =

CHART/TABLEAU NO. 3-A

PROPRIETE DES FONDERIES DE FONTE ET PRODUCTION TOTAL EN 1973

IRON FOUNDRY OWNERSHIP AND TONS PRODUCED IN 1973

PROVINCE	ACTIONS PRIVEES PRIVATELY OWNED		ACTIONS PUBLIQUES PUBLICLY OWNED		FILIALE CANADIENNE CANADIAN SUBSIDIARY		FILIALE ETRANGERE FOREIGN SUBSIDIARY		TOTAL	
	NO.	TONNES TONS	NO.	TONNES TONS	NO.	TONNES TONS	NO.	TONNES TONS	NO.	TONNES TONS
Columbie Britannique British Columbia	8		-		4		-		12	39,384
Alta. - Sask.	7		2		-		1		10	50,256
Manitoba	5		-		1		1		7	23,844
Ontario	39		14		5		14		72	999,240
Quebec	26		2		9		1		38	216,312
Nouveau Brunswick New	4		3		-		-		7	19,620
Nova Scotia Nouvelle Ecosse	2		1		1		-		4	4,164
TOTALS	91	225,372	22	637,116	20	141,612	17	348,720	150	1,352,820
% of/de TOTAL	60.67	16.66	14.67	47.10	13.33	10.46	11.33	25.78	100	100

CHART/TABLEAU NO.3-B

PROPRIETE DES FONDERIES D'ACIER ET PRODUCTION TOTAL EN 1973

STEEL FOUNDRY OWNERSHIP AND TONS PRODUCED IN 1973

REGION	ACTIONS PRIVEES PRIVATELY OWNED		ACTIONS PUBLIQUES PUBLICLY OWNED		FILIALE CANADIENNE CANADIAN SUBSIDIARY		FILIALE ETRANGERE FOREIGN SUBSIDIARY		TOTAL	
	NO.	TONNES TONS	NO.	TONNES TONS	NO.	TONNES TONS	NO.	TONNES TONS	NO.	TONNES TONS
Quebec-Atlantic Atlantique	3		1		-		3		7	75,180
Ontario	3		1		2		3		9	71,208
Prairies - B.C.	4		-		2		4		10	93,660
TOTAL	10	19,812	2	62,400	4	13,380	10	144,456	26	240,048
% OF/DE TOTAL	38.46	8.25	7.69	26.00	15.38	5.57	38.46	60.18	100	100

CHART/TABLEAU NO. 4-A

IRON FOUNDRY JOBBING AND CAPTIVE PRODUCTION IN 1973: TONS

TRAVAUX A FORFAIT ET PRODUCTION ASSIGNEE DANS LES FONDERIES DE FONTE EN 1973: TONNES

PROVINCE	NO. OF/DE FDRIES.	TOTALLY JOBBING TRAVAUX ENTIEREMENT A FORFAIT	CAPTIVE PRODUCTION PRODUCTION ASSIGNEE	CUSTOM PRODUCTION by captive shops PRODUCTION HORS SERIE PAR ATELIERS INTEGRES	TOTAL
British Columbia Colombie - Britannique	12	34,404	4,344	636	39,384
Alberta - Saskatchewan	10	18,840	27,843	3,573	50,256
Manitoba	7	17,292	6,059	493	23,844
Ontario	72	374,280	582,460	42,500	999,240
Quebec-Québec	38	181,128	27,574	7,610	216,312
New Brunswick Nouveau - Brunswick	7	12,360	7,248	12	19,620
Nova Scotia Nouvelle - Ecosse	4	3,408	737	19	4,164
TOTAL	150	641,712	656,265	54,843	1,352,820

CHART/TABLEAU NO. 4-B

STEEL FOUNDRY JOBBING AND CAPTIVE PRODUCTION IN 1973: TONS

TRAVAUX A FORFAIT ET PRODUCTION ASSIGNEE DANS LES FONDERIES D'ACIER EN 1973: TONNES

REGION	No OF/DE FDRIES	TOTALLY JOBBING TRAVAUX ENTIEREMENT A FORFAIT	CAPTIVE PRODUCTION PRODUCTION ASSIGNEE	CUSTOM PRODUCTION by captive shops PRODUCTION HORS SERIE PAR ATELIERS INTEGRES	TOTAL
Quebec/Atlantic Québec/Atlantique	7	51,180	6,000	18,000	75,180
Ontario	9	3,324	24,454	43,430	71,208
Prairies	4	7,260	64,800	-	72,060
British Columbia Colombie - Britannique	6	7,920	8,736	4,944	21,600
TOTAL	26	69,684	103,990	66,374	240,048

CHART/TABLEAU NO. 5-A

IRON FOUNDRY DISTRIBUTION OF MANPOWER BY OCCUPATION IN 1974

LA REPARTITION DE LA MAIN - D'OEUVRE PAR OCCUPATION DANS LES FONDERIES DE FONTE EN 1973

PROVINCE	MANAGERIAL GESTION	CLERICAL/SUPERV. COMMIS/SURV.	ENG/TECH. ING/TECH	MOULDERS MOULEURS	MILLWRIGHTS MECAN-OUTILLAGE	PATTERN MAKERS MODELEURS	PRODUCTION PRODUCTION	TOTAL TOTAL
British Columbia Colombie - Britannique	23	46	7	90	15	8	227	416
Alberta - Saskatchewan	23	68	13	80	19	13	380	596
Manitoba	16	50	3	75	16	11	336	507
Ontario	212	938	220	973	889	293	7,177	10,702
Quebec - Québec	102	177	61	392	125	101	1,557	2,525
New Brunswick Nouveau - Brunswick	5	14	1	74	12	15	143	264
Nova Scotia Nouvelle - Ecosse	3	7	1	26	1	2	24	64
Total	384	1,300	306	1,710	1,077	443	9,844	15,064

CHART/TABLEAU NO.5-B

STEEL FOUNDRY DISTRIBUTION OF MANPOWER BY OCCUPATION IN 1973

LA REPARTITION DE LA MAIN - D'OEUVRE PAR OCCUPATION DANS LES FONDERIES D'ACIER EN 1973

REGION	MANAGERIAL GESTION	CLERICAL/SUPERV. COMMIS/SURV.	ENG/TECH. ING/TECH	MOULDERS MOULEURS	MILLWRIGHTS MECAN-OUTILLAGE	PATTERN MAKERS MODELEURS	PRODUCTION Other/Autre PRODUCTION	TOTAL TOTAL
Quebec/Atlantic Québec/Atlantique	68	330	50	141	107	54	1,492	2,242
Ontario	58	271	33	343	83	32	1,362	2,182
Prairies	15	59	8	24	14	11	308	439
British Columbia Colombie - Britannique	20	88	15	140	21	14	483	781
Total	161	748	106	648	225	111	3,645	5,644

CHART/TABLEAU NO. 6-A

IRON FOUNDRIES: SIZE DISTRIBUTION BY NUMBER OF EMPLOYEES

FONDERIES DE FONTE: REPARTITION EN IMPORTANCE SELON LE NOMBRE D'EMPLOYES

PROVINCE	NO. OF/DE FDRIES	NO. OF EMPLOYEES NO. D'EMPLOYES 1968	NUMBER OF FOUNDRIES IN 1973 EMPLOYING NOMBRE DE FONDERIES EN 1973 EMPLOYANT 0 - 10	11 - 50	51 - 100	101 - 250	+ 250	NO. OF EMPLOYEES NO. D'EMPLOYES 1973	NO. OF EMPLOYEES NO. D'EMPLOYES 1978
British Columbia Colombie - Britannique	12	353	-	10	2	-	-	416	414
Alberta - Saskatchewan	10	422	-	4	5	1	-	596	726
Manitoba	7	204	1	3	2	-	1	507	366
Ontario	72	11,257	5	27	16	15	9	10,702	9,106
Quebec/Québec	38	1,806	7	15	10	3	3	2,515	2,676
New Brunswick Nouveau Brunswick	7	240	1	5	-	1	-	264	254
Nova Scotia Nouvelle Ecosse	4	62	1	3	-	-	-	64	65
Total	150	14,344	15	67	35	20	13	15,064	13,607
% of/du Total	100	-	10	44.7	23.3	13.3	8.7	-	-

CHART/TABLEAU NO. 6-B

STEEL FOUNDRIES: SIZE DISTRIBUTION BY NUMBER OF EMPLOYEES

FONDERIES D'ACIER: REPARTITION EN IMPORTANCE SELON LE NOMBRE D'EMPLOYES

REGION	NO. OF/DE FDRIES	NO. OF EMPLOYEES NO. D'EMPLOYES 1968	NUMBER OF FOUNDRIES IN 1973 EMPLOYING NOMBRE DE FONDERIES EN 1973 EMPLOYANT 0 10	11 - 50	51 - 100	101 - 250	+ 250	NO. OF EMPLOYEES NO. D'EMPLOYES 1973	NO. OF EMPLOYEES NO. D'EMPLOYES 1978
Quebec/Atlantic Québec/Atlantique	7	1,826	-	-	1	3	3	2,242	2,368
Ontario	9	5,558	1	2	-	4	2	2,182	2,672
Prairies	4	337	-	1	1	2	-	445	730
British Columbia Colombie - Britannique	6	475	-	2	2	1	1	775	1,016
Total	26	4,196	1	5	4	10	6	5,644	6,786
% of/du Total	100	-	3.8	19.2	15.4	38.5	23.1	-	-

CHART/TABLEAU NO. 7-A

IRON CASTINGS BY CATEGORY PRODUCED IN 1973: TONS

PRODUCTION DE MOULAGE DE FONTE PAR CATEGORIES EN 1973: TONNES

PROVINCE	NO. OF FDRIES	GRAY FONTE GRISE	NODULAR NODULAIRE	MALLEABLE MALLEABLE	WHITE BLANCHE	ALLOY D'ALLIEE	TOTAL TOTAL	% OF/DU TOTAL
British Columbia Colombie Britannique	12	23,856	14,448	-	30	660	38,994	2.87
Alberta - Saskatchewan	10	22,542	27,217	-	300	102	50,161	3.69
Manitoba	7	14,244	8,790	-	60	750	23,844	1.76
Ontario	72	687,004	243,850	50,649	30	17,450	998,983	73.59
Quebec/Québec	38	95,729	79,271	-	10,732	24,333	210,065	15.47
New Brunswick Nouveau Brunswick	7	7,428	-	-	12,000	192	19,620	1.45
Nova Scotia Nouvelle Ecosse	4	4,154	-	-	-	-	4,154	0.31
Produced by Steel Foundries Fabriqués par des Fonderies d'acier	12	537	858	-	1	10,320	11,716	0.86
TOTAL	162	855,494	374 434	50,649	23,153	53,807	1,357 537	100.00
Percent of Total % du Total		63.02	27.58	3.73	1.71	3.96	100.00	

CHART/TABLEAU NO. 7-B

STEEL CASTINGS BY CATEGORY PRODUCED IN 1973: TONS

PRODUCTION DE MOULAGES D'ACIER PAR CATEGORIES EN 1973: TONNES

REGION	NO. OF/DE FDRIES	CARBON AU CARBONE	LOW ALLOY ALLIE FAIBLE TENEUR	MANGANESE MANGANESE	HIGH ALLOY ALLIE HAUTE TENEUR	TOTAL TOTAL	% OF/DE TOTAL
Quebec - Atlantic Québec - Atlantique	6	51,429	8,830	13,525	885	74,669	32.10
Ontario	6	46,362	9,242	2,364	2,917	60,885	26.17
Prairies	4	66,638	566	3,087	1,168	71,459	30.71
British Columbia Colombie Britannique	6	4,892	10,326	5,099	995	21,312	9.16
Produced by Iron Foundries Fabriques par les fonderies de fer	13	1,936	1,704	90	634	4,364	1.86
TOTAL	35	171,257	30,668	24,165	6,599	232,689	100.00
% OF/DE TOTAL		73.60	13.18	10.38	2.84	100.00	

CHART/TABLEAU NO.8-A

MOULDING PRACTICES USED IN IRON FOUNDRIES: 1973

TECHNIQUES DE MOULAGE EN FONDERIES DE FONTE: 1973

PROVINCE	EN CHASSIS COPE & DRAG	PLAQUE-MODELE MATCH-PLATE	FOSSE DE COULEE PIT	A PLAT FLOOR	EN CARAPACE SHELL	MOULE PERMANENT MOULD	AUTRES OTHERS
British Columbia Columbie Britannique	7	10	-	11	-	2	1
Alberta - Sask.	9	7	1	6	-	4	1
Manitoba	4	6	-	6	1	2	1
Ontario	45	54	10	43	12	4	12
Quebec	35	29	10	28	4	7	4
Nouveau/New Brunswick	5	4	-	5	1	1	2
Nouvelle Ecosse Nova Scotia	3	4	2	2	2	-	-
TOTAL	108	114	23	101	20	20	21

CHART/TABLEAU NO. 8-B

MOULDING PRACTICES USED IN STEEL FOUNDRIES: 1973

TECHNIQUES DE MOULAGE EN FONDERIES D'ACIER: 1973

REGION	EN CHASSIS COPE & DRAG	PLAQUE MODELE MATCH-PLATE	FOSSE PIT	A PLAT FLOOR	EN CARAPACE SHELL	MOULE PERMANENT MOULD	AUTRES OTHERS
Quebec - Atlantique Quebec - Atlantic	9	4	2	5	1	1	1
Ontario	7	7	-	8	4	-	-
Prairies	3	3	2	3	1	1	1
Colombie Britannique British Columbia	6	4	-	5	1	-	-
TOTAL	21	18	4	21	7	2	2

CHART/TABLEAU NO. 9-A

DISTRIBUTION OF FOUNDRIES BY MAXIMUM SIZE OF CASTINGS

REPARTITION DES FONDERIES PAR DIMENSIONS MAXIMALES DES MOULAGES

IRON FOUNDRIES/FONDERIES DE FER: 1973

PROVINCE	NO.OF/DE FDRIES	CASTING WEIGHT TO:LBS. DIMENSION DES MOULAGES DE:(LIVRES) 0-100	0-1000	0-5000	0-10,000	OVER PLUS DE 10,000
Colombie Britannique British Columbia	12	2	7	2	-	1
Alberta-Saskatchewan	10	-	5	4	1	-
Manitoba	7	1	5	1	-	-
Ontario	72	15	26	13	9	9
Quebec	38	3	11	11	6	6
Nouveau Brunswick New Brunswick	7	4	1	2	-	-
Nova Scotia Nouvelle Ecosse	4	-	2	1	-	1
TOTAL	150	25	57	34	16	17

CHART/TABLEAU NO.9-B

DISTRIBUTION OF FOUNDRIES BY MAXIMUM SIZE OF CASTINGS

REPARTITION DES FONDERIES PAR DIMENSIONS MAXIMALES DES MOULAGES

STEEL FOUNDRIES/ FONDERIES D'ACIERS: 1973

REGION	NO. OF/DE FDRIES	CASTING WEIGHT TO: LBS. DIMENSION DES MOULAGES DE: (LIVRES) 0-100	0-1000	0-5000	0-10,000	OVER PLUS DE 10,000
Quebec/Atlantic Atlantique	7	-	2	-	1	4
Ontario	9	1	2	3	1	2
Prairies	4	-	1	2	-	1
Colombie Britannique British Columbia	6	-	-	1	3	2
TOTAL	26	1	5	6	5	9

CHART/TABLEAU NO. 10-A

LIST OF TESTING AND INSPECTION FACILITIES USED

LISTE DES INSTALLATIONS D'ESSAI ET D'INSPECTION UTILISEES

IRON FOUNDRIES -- FONDERIES DE FONTE

	MECHANICAL TESTING--ESSAI MECANIQUE				NON-DESTRUCTIVE TESTING-ESSAI SANS DEFORMATION				LABORATORY -- LABORATOIRE			
PROVINCE	TENSILE TRACTION	IMPACT RESILIENCE	BEND FLEXION	OTHERS AUTRES	RADIOGRAPHY RADIOGRAPHIE	DIE PENETRANT TEINTURE PENETRANTE	SONAR ULTRA SONS	OTHERS AUTRES	CHEMICAL CHIMIQUE	SPECTOGRAPH SPECTOGRAPHIE	SAND SABLE	OTHERS AUTRES
British Columbia Colombie Britannique	2	2	3	1	-	1	-	1	1	1	5	1
Alberta-Saskatchewan	6	5	4	2	1	2	1	1	6	-	5	2
Manitoba	1	-	2	1	1	2	-	1	2	-	3	-
Ontario	30	11	18	21	8	19	5	8	35	7	45	8
Quebec/Québec	10	3	4	6	2	3	2	2	9	5	15	5
New/Nouveau Brunswick	1	-	-	-	-	2	-	-	1	1	1	-
Nova Scotia Nouvelle Ecosse	-	-	-	-	-	1	-	-	-	-	-	-
Total	50	21	31	31	12	30	8	13	54	14	74	16

CHART/TABLEAU NO. 10-B

LIST OF TESTING AND INSPECTION FACILITIES USED

LISTE DES INSTALLATIONS D'ESSAI ET D'INSPECTION UTILISEES

STEEL FOUNDRIES -- FONDERIES D'ACIER

REGION	MECHANICAL TESTING--ESSAI MECANIQUE				NON-DESTRUCTIVE TESTING-ESSAI SANS DEFORMATION				LABORATORY -- LABORATOIRE			
	TENSILE TRACTION	IMPACT RESILIENCE	BEND FLEXION	OTHERS AUTRES	RADIOGRAPHY RADIOGRAPHIE	DIE PENETRANT TEINTURE PENETRANTE	SONAR ULTRA SONS	OTHERS AUTRES	CHEMICAL CHIMIQUE	SPECTOGRAPH SPECTOGRAPHIE	SAND SABLE	OTHERS AUTRES
Que./Atlantic Atlantique	5	2	4	3	2	5	5	3	7	4	7	-
Ontario	7	6	6	1	6	7	4	2	8	5	8	-
Prairies/B.C. /C.B.	5	3	3	4	5	7	4	3	9	5	8	1
TOTAL	17	11	13	8	13	19	13	8	24	14	23	1

CHART/TABLEAU NO. 11-A

IRON AND STEEL SCRAP CONSUMPTION -- CONSOMMATION DE FERRAILLE

IRON FOUNDRIES -- FONDERIES DE FONTE

PROVINCE	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000
		1971			1972			1973	
Colombie Britannique British Columbia	9	28,131	1,106	9	26,624	1,218	9	34,462	2,258
Alberta-Saskatchewan	7	22,101	568	8	37,500	1,396	9	50,634	2,366
Manitoba	6	11,512	413	6	12,277	454	6	17,910	751
Ontario	58	501,086	20,165	61	561,724	21,709	63	658,336	33,281
Quebec	27	102,217	4,448	26	89,408	4,704	30	117,668	6,803
Nouveau Brunswick New	6	17,389	835	6	17,429	869	6	19,905	1,211
Nova Scotia Nouvelle Ecosse	3	2,182	75	3	2,453	92	3	2,729	154
TOTAL	116	684,619	27,610	119	747.415	30,442	126	901,644	46,824

total tonnage

CHART/TABLEAU NO.11-B

IRON AND STEEL SCRAP CONSUMPTION -- CONSOMMATION DE FERRAILLE

STEEL FOUNDRIES -- FONDERIES D'ACIER

REGION	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000
		1971			1972			1973	
QUEBEC/Atlantique Atlantic	6	54,307	2,180	7	56,738	2,206	7	61,646	3,147
Ontario	4	63,849	2,623	4	56,332	1,462	6	63,909	2,501
Prairies	3	11,190	947	3	8,235	478	3	10,443	745
British Columbia Colombie Britannique	6	12,883	689	6	14,007	1,668	6	16,204	1,153
TOTAL	19	142,229	6,439	20	135,312	5,814	22	152,208	7,546

CHART/TABLEAU NO.12-A

PIG IRON CONSUMPTION -- CONSOMMATION DE FONTE EN GUEUSES

IRON FOUNDRIES -- FONDERIES DE FONTE

PROVINCE	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000
		1971			1972			1973	
Colombie Britannique British Columbia	6	1,176	111	5	1,663	161	5	2,545	294
Alberta-Saskatchewan	6	6,561	567	7	5,971	539	7	19,168	844
Manitoba	4	2,090	160	4	2,405	195	5	4,674	367
Ontario	49	165,134	10,874	52	157,685	10,180	55	188,032	13,440
Quebec	21	27,095	1,546	23	39,396	2,201	27	47,206	3,113
Nouveau Brunswick New	4	1,299	101	4	1,370	106	5	1,734	135
Nouvelle Ecosse Nova Scotia	1	30	3	1	30	3	1	32	3
TOTAL	91	203,385	13,362	96	208,520	13,385	105	263,391	18,196

CHART/TABLEAU NO. 12-B

PIG IRON CONSUMPTION -- CONSOMMATION DE FONTE EN GUEUSES

STEEL FOUNDRIES -- FONDERIES D'ACIER

REGION	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000	NO. OF/DE FDRIES	TONNES TONS	$,000
	1971			1972			1973		
Quebec/Atlantique Atlantic	3	4,397	247	4	4,089	226	4	4,363	264
Ontario	2	8,601	382	2	8,495	402	4	9,486	480
Prairies	2	147	14	2	207	18	2	151	15
Colombie Britannique British Columbia	4	1,050	102	4	1,144	110	4	1,419	167
TOTAL	11	14,195	745	12	13,830	756	14	15,419	926

CHART/TABLEAU NO. 13

IRON FOUNDRY COKE CONSUMPTION IN 1973 AND FORECAST FOR 1975

CONSOMMATION DE COKE DES FONDERIES DE FONTE EN 1973 ET PREVISION POUR 1975

PROVINCE	CONSUMPTION 1973 CONSOMMATION 1973		FORECAST 1975 PREVISION 1975	
	NO. OF/DE FDRIES	TONS/TONNES	NO. OF/DE FDRIES	TONS/TONNES
British Columbia Colombie Britannique	3	1,792	3	2,250
Alberta-Saskatchewan	9	8,151	9	8,862
Manitoba	5	3,147	5	3,370
Ontario	47	212,050	48	246,404
Québec	29	34,574	29	46,298
Nouveau/New Brunswick	7	4,675	7	5,987
Nouvelle Ecosse Nova Scotia	4	955	4	1,410
TOTAL	104	265,344	105	314,581

CHART/TABLEAU NO.14-A

TOTAL ENERGY COSTS: $,000 FOR 1971

COUT TOTAL DE L'ENERGIE: $,000 POUR 1971

IRON FOUNDRIES: FONDERIES DE FONTE

	ELECTRICITY ELECTRICITE		OIL PETROLE		GAS GAZ		COAL CHARBON		COKE		TOTAL
PROVINCE	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000
British Columbia Colombie Britannique	6	37.5	-	-	5	19.1	-	-	4	254.8		311.4
Alberta-Saskatchewan	8	103.6	1	1.0	8	56.2	-	-	7	417.4		579.6
Manitoba	1	6.2	-	-	-	-	-	-	4	134.4		140.6
Ontario	58	4,129.3	35	292.5	51	1,411.7	4	501.0	47	9,037.2		15,395.6
Quebec	25	424.9	20	142.4	10	39.6	4	134.5	24	1,099.0		1,843.4
Nouveau New Brunswick	-	-	-	-	-	-	-	-	7	226.7		226.7
Nouvelle Ecosse Nova Scotia	1	0.6	1	3.0	-	-	-	--	3	51.7		55.3
TOTAL	99	4,701.7	57	438.9	74	1,526.6	8	635.5	96	11,221.2		18,552.6

CHART/TABLEAU NO.14-B

TOTAL ENERGY COSTS: $,000 FOR 1972

COUT TOTAL DE L'ENERGIE: $,000 POUR 1972

IRON FOUNDRIES: FONDERIES DE FONTE

	ELECTRICITY ELECTRICITE		OIL PETROLE		GAS GAZ		COAL CHARBON		COKE		TOTAL	
PROVINCE	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000
British Columbia Colombie Britannique	8	41.5	-	-	5	26.6	-	-	4	237.3		305.4
Alberta-Saskatchewan	8	112.0	1	1.0	6	61.0	-	-	7	439.0		615.0
Manitoba	2	11.5	-	-	2	2.1	-	-	4	133.4		147.0
Ontario	59	5,370.5	35	358.3	-	1,894.2	4	390.0	49	9,337.7		17,377.3
Quebec	25	476.4	20	140.5	51	56.2	4	134.5	24	1,384.5		2,196.1
Nouveau New Brunswick	-	-	-	-	10	-	-	-	7	249.2		249.2
Nova Scotia Nouvelle Ecosse	1	.7	1	3.1	-	-	-	-	3	54.9		58.7
TOTAL	103	6,012.6	57	502.9	74	2,040.1	8	524.5	98	11,836.0		20,949.7

CHART/TABLEAU NO. 14-C

TOTAL ENERGY COSTS: $,000 FOR 1973

COUT TOTAL DE L'ENERGIE: $,000 POUR 1973

IRON FOUNDRIES: FONDERIES DE FONTE

	ELECTRICITY ELECTRICITE		OIL PETROLE		GAS GAZ		COAL CHARBON		COKE		TOTAL	
PROVINCE	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$,000
British Columbia Colombie Britannique	9	56.3	1	.4	8	59.0	-	-	4	404.6		520.3
Alberta-Saskatchewan	8	143.1	1	1.0	8	60.3	-	-	8	522.1		730.1
Manitoba	3	75.9	1	5.0	2	7.0	-	-	5	226.2		314.1
Ontario	64	6,852.8	38	325.6	56	2,600.8	4	233.0	52	12,384.1		22,427.9
Quebec	25	550.9	22	172.9	11	68.5	4	211.5	28	1,771.9		2,777.7
New Brunswick Nouveau	-	-	-	-	-	-	-	-	7	317.6		317.6
Nova Scotia Nouvelle Ecosse	2	6.7	2	7.2	-	-	-	-	3	65.6		79.5
TOTAL	111	7,685.7	65	512.1	85	2,795.6	8	444.5	107	15,692.1		27,167.2

CHART/TABLEAU NO. 15-A

TOTAL ENERGY COSTS: $.000 FOR 1971

COUT TOTAL DE L'ENERGIE: $,000 POUR 1971

STEEL FOUNDRIES: FONDERIES D'ACIER

REGION	ELECTRICITY ELECTRICITE		OIL PETROLE		GAS GAZ		COAL CHARBON		COKE		TOTAL	
	NO.	$,000	NO.	$,000	NO.	$,000	NO.	$ 000	NO.	$,000	NO.	$,000
Quebec-Atlantic Atlantique	6	904.0	6	453.0	3	227.0	-	-	-	-		1,584.0
Ontario	7	676.0	1	4.0	7	300.1	-	-	-	-		1,048.1
Prairies	3	129.0	1	4.0	3	46.0	-	-	-	-		179.0
Colombie Britannique British Columbia	4	261.0	-	-	4	85.9	-	-	-	-		358.9
TOTAL	20	1,970.0	8	461.0	17	659.0	-	-	-	-		3,170.0

CHART/TABLEAU NO. 15-B

TOTAL ENERGY COSTS: $,000 FOR 1972

COUT TOTAL DE L'ENERGIE: $,000 POUR 1972

STEEL FOUNDRIES: FONDERIES D'ACIER

REGION	ELECTRICITY ELECTRICITE NO.	ELECTRICITY ELECTRICITE $,000	OIL PETROLE NO.	OIL PETROLE $,000	GAS GAZ NO.	GAS GAZ $,000	COAL CHARBON NO.	COAL CHARBON $,000	COKE NO.	COKE $,000	TOTAL NO.	TOTAL $,000
Quebec-Atlantic Atlantique	7	1,107.0	7	502.0	4	311.0	-	-	-	-		1,920.0
Ontario	7	697.0	1	4.0	7	394.2	-	-	-	-		1,152.2
Prairies	3	140.0	1	6.0	3	50.0	-	-	-	-		196.0
Colombie Britannique British Columbia	4	274.0	-	-	5	86.6	-	-	-	-		372.6
TOTAL	21	2,218.0	9	512.0	18	841.8	-	-	-	-		3,640.8

CHART/TABLEAU NO.15-C

TOTAL ENERGY COSTS: $,000 FOR 1973

COUT TOTAL DE L'ENERGIE: $,000 POUR 1973

STEEL FOUNDRIES: FONDERIES D'ACIER

REGION	ELECTRICITY ELECTRICITE NO.	ELECTRICITY ELECTRICITE $,000	OIL PETROLE NO.	OIL PETROLE $,000	GAS GAZ NO.	GAS GAZ $,000	COAL CHARBON NO.	COAL CHARBON $,000	COKE NO.	COKE $ 000	TOTAL NO.	TOTAL $,000
Quebec-Atlantic Atlantique	7	1,237.0	7	692.0	4	341.0	-	-	-	-		2,270.0
Ontario	9	1,020.0	2	45.0	9	492.4	-	-	-	-		1,616.4
Prairies	3	157.0	1	4.0	3	52.0	-	-	-	-		213.0
Colombie Britannique British Columbia	5	472.0	-	-	5	210.3	-	-	-	-		700.3
TOTAL	24	2,886.0	10	741.0	21	1,095.7	-	-	-	-		4,799.7

CHART/TABLEAU NO. 16-A

IRON FOUNDRIES: NORMAL METHOD OF TRANSPORTATION

FONDERIES DE FONTE: MOYEN DE TRANSPORT HABITUEL

PROVINCE	RAW MATERIALS - MATIERES PREMIERES					FINISHED PRODUCTS - PRODUITS FINIS				
	ROAD ROUTE	RAIL CHEMIN DE FER	SHIP BATEAU	AIR AVION	OTHER AUTRES	ROAD ROUTE	RAIL CHEMIN DE FER	SHIP BATEAU	AIR AVION	OTHER AUTRES
British Columbia Colombie - Britannique	10	10	-	-	1	12	6	-	-	1
Alberta - Saskatchewan	9	9	-	-	-	10	1	-	-	-
Manitoba	6	5	-	1	-	6	3	-	1	-
Ontario	72	29	2	1	-	72	17	1	-	-
Quebec - Québec	38	13	-	-	-	37	10	4	-	-
New Brunswick Nouveau - Brunswick	2	7	-	-	-	7	3	1	-	-
Nova Scotia Nouvelle - Ecosse	4	3	-	-	-	3	2	-	-	-
Total	141	76	2	2	1	147	42	6	1	1

CHART/TABLEAU NO. 16-B

STEEL FOUNDRIES: NORMAL METHOD OF TRANSPORTATION

FONDERIES D'ACIER: MOYEN DE TRANSPORT HABITUEL

REGION	RAW MATERIALS - MATIERES PREMIERES					FINISHED PRODUCTS - PRODUITS FINIS				
	ROAD ROUTE	RAIL CHEMIN DE FER	SHIP BATEAU	AIR AVION	OTHER AUTRES	ROAD ROUTE	RAIL CHEMIN DE FER	SHIP BATEAU	AIR AVION	OTHER AUTRES
Quebec/Atlantic Québec/Atlantique	6	7	-	-	-	7	6	3	-	-
Ontario	9	4	-	-	-	9	3	1	-	-
Prairies	2	4	-	-	-	3	-	-	-	-
British Columbia Colombie - Britannique	5	6	1	-	-	6	4	2	-	-
Total	22	21	1	-	-	25	13	6	-	-

CHART/TABLEAU NO. 17-A

ANNUAL VALUE OF FOUNDRY SALES: LA VALEUR ANNUELLE DES VENTES

IRON FOUNDRIES: FONDERIES DE FONTE

PROVINCE	1971 NO. OF/DE FDRIES	1971 $,000	1972 NO. OF/DE FDRIES	1972 $,000	1973 NO. OF/DE FDRIES	1973 $,000	TONS/TONNES
British Columbia Colombie Britannique	10	8,998	11	9,477	12	13,400	39,384
Alberta-Saskatchewan	9		9	11,289	10	13,445	50,256
Manitoba	5	3,509	6	3,696	7	9,301	23,844
Ontario	58	138,528	62	166,222	70	304,124	998,988
Québec	29	50,459	32	52,517	36	64,741	213,672
New Brunswick Nouveau Brunswick	4	3,331	5	3,647	7	4,581	19,620
Nova Scotia Nouvelle Ecosse	4	614	4	769	4	1,001	4,164
TOTAL	119	215,695	129	247,617	146	410,593	1,349,928

CHART/TABLEAU NO. 17-B

ANNUAL VALUE OF FOUNDRY SALES: LA VALEUR ANNUELLE DES VENTES

STEEL FOUNDRIES: FONDERIES D'ACIER

REGION	1971 NO. OF/DE FDRIES	1971 $,000	1972 NO. OF/DE FDRIES	1972 $,000	1973 NO. OF/DE FDRIES	1973 $,000	TONS/TONNES
Quebec/Atlantic Québec/Atlantique	7	39,495	7	40,622	7	45,958	75,180
Ontario	8	39,838	9	39,376	9	50,215	71,208
Prairies	3	6,119	3	5,042	3	6,409	7,260
British Columbia Colombie Britannique	6	16,304	6	18,772	6	21,593	21,600
TOTAL	24	101,756	25	103,812	25	124,195	175,248

CHART/TABLEAU NO. 18-A

DISTRIBUTION OF FOUNDRIES BY SIZE OF ANNUAL SALES IN 1973

REPARTITION DES FONDERIES SELON L'IMPORTANCE DES VENTES ANNUELLES EN 1973

IRON FOUNDRIES: FONDERIES DE FONTE

PROVINCE	NO. OF/DE FDRIES	ANNUAL SALES: VENTES ANNUELLES: $,000			
		0-500	501-1500	1501-3,000	OVER PLUS DE 3,000
British Columbia Colombie Britannique	12	6	2	3	1
Alberta-Saskatchewan	10	3	4	2	1
Manitoba	7	3	2	1	1
Ontario	70	20	18	11	21
Québec	36	18	8	4	6
New Brunswick Nouveau Brunswick	7	5	-	2	-
Nova Scotia Nouvelle Ecosse	4	3	1	-	-
TOTAL	146	58	35	23	30

CHART/TABLEAU NO. 18-B

DISTRIBUTION OF FOUNDRIES BY SIZE OF ANNUAL SALES IN 1973

DISTRIBUTION DES FONDERIES SELON L'IMPORTANCE DES VENTES ANNUELLES EN 1973

STEEL FOUNDRIES: FONDERIES D'ACIER

REGION	NO. OF/DE FDRIES	ANNUAL SALES: VENTES ANNUELLES: $ 000			
		0-500	501-1500	1501 - 3,000	OVER PLUS DE 3,000
Quebec/Atlantic Québec/Atlantique	7	-	1	1	5
Ontario	9	3	-	3	3
Prairies	3	1	-	1	1
British Columbia Colombie Britannique	6	-	3	1	2
TOTAL	25	4	4	6	11

CHART/TABLEAU NO. 19-A

THE EXTENT OF THE IRON FOUNDRY MARKET: $,000 IN 1973

L'ETENDUE DU MARCHE DES FONDERIES DE FONTE $,000 EN 1973

PROVINCE	DOMESTIC: LESS THAN 300 MILES DOMESTIQUE: MOINS DE 300 MILLES		DOMESTIC: MORE THAN 300 MILES DOMESTIQUE: PLUS DE 300 MILLES		EXPORT EXPORTATION		TOTAL	
	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000
British Columbia Colombie - Britannique	12	9,755	9	3,174	5	463	12	13,392
Alberta - Saskatchewan	10	6,909	9	6,462	1	70	10	13,441
Manitoba	7	5,075	4	3,352	4	870	7	9,297
Ontario	68	221.289	27	16,028	39	66,652	68	303,969
Quebec - Québec	36	45,605	24	15,464	16	3,658	36	64,727
New Brunswick Nouveau Brunswick	7	2,484	2	1,778	3	317	7	4,579
Nova Scotia Nouvelle Ecosse	4	683	2	56	1	240	4	979
Total	144	291,800	77	46,314	69	72,270	144	410,384
% of/du Total		71.1		11.3		17.6		100.0

CHART/TABLEAU NO. 19-B

THE EXTENT OF THE STEEL FOUNDRY MARKET: $,000 IN 1973

L'ETENDUE DU MARCHE DES FONDERIES D'ACIER: $,000 EN 1973

REGION	DOMESTIC: LESS THAN 300 MILES / DOMESTIQUE: MOINS DE 300 MILLES		DOMESTIC: MORE THAN 300 MILES / DOMESTIQUE: PLUS DE 300 MILLES		EXPORT / EXPORTATION		TOTAL	
	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000
Quebec/Atlantic Québec/Atlantique	7	19,034	6	23,707	6	3,211	7	45,952
Ontario	8	32,908	7	8,433	7	6,271	8	47,612
Prairies/B.C. Prairies/C.B.	9	12,257	9	14,409	5	1,349	9	28,015
Total	24	64,199	22	46,549	18	10,831	24	121,579
% of/de Total		52.8		38.3		8.9		100.0

NOTE: Due to the number and nature of the replies from the four western provinces, it was not possible to show the Prairies and British Columbia separately without revealing confidential figures.

En raison du nombre et de la nature des réponses obtenues des quatre provinces de l'Ouest, il a été impossible de fournir des données distinctes pour les Prairies et la Colombie-Britannique sans révéler des chiffres confidentiels.

CHART/TABLEAU NO. 20-A

THE USUAL OR PREFERRED MARKET

FOR IRON CASTINGS

TONS PRODUCED - 1973

LES MARCHES HABITUELS OU PREFERES

POUR LA FONTE

LE PRODUCTION EN TONNES - 1973

MARKET	BC/CB	ALTA/SASK	MAN.	ONTARIO	QUE	N.B.	NS/NE	TOTAL	MARCHE
Automotive	84	180	3,540	519,466	2,328	-	-	525,598	Automobile
Aircraft	-	-	-	72	24	-	-	96	Aéronautique
Agriculture	-	1,914	10,615	70,258	2,766	-	66	85,619	Agriculture
Construction & Municipal	17,711	42,730	3,900	143,829	133,395	4,824	3,874	350,263	Construction & Municipalités
Mining	13,992	204	307	14,139	35,765	12,000	66	76,473	Mine
Pulp and Paper	618	120	150	5,799	6,230	-	15	12,932	Pâtes & Papier
Forest	5,190	-	150	1,381	2,041	-	13	8,775	Forêts
Petrochemical	72	2,398	216	4,489	961	-	2	8,138	Pétrochimiques
Railway (Op & Equip.)	48	72	290	23,900	2,286	-	20	26,616	Chem. de Fer (Op. & Equip)
Shipbuilding	499	-	-	1,292	369	-	97	2,257	Const. Maritime
Machinery/Tools	144	1,436	607	21,585	9,704	-	-	33,476	Machines/Outils
Manufacturing/Other	846	1,173	4,070	180,467	14,733	1,272	12	202,573	Manufacture/Autre
TOTAL	39,204	50,227	23,845	986,677	210,602	18,096	4,165	1,332,816	TOTAL

CHART/TABLEAU NO. 20-B

THE USUAL OR PREFERRED MARKET

FOR STEEL CASTINGS

TONS PRODUCED 1973

LES MARCHES HABITUELS OU PREFERES

POUR LES MOULAGES D'ACIER

PRODUCTION EN TONNES 1973

MARKET	QUE/ATL	ONTARIO	PRAIRIE/BC/CB	TOTAL	MARCHE
Automotive	1,200	30,978	195	32,373	Automobile
Aircraft	-	-	-	-	Aéronautique
Agriculture	120	360	221	701	Agriculture
Construction & Municipal	4,373	678	5,048	10,099	Construction & Municipalités
Mining	16,322	4,952	11,132	32,406	Mine
Pulp and Paper	213	2,103	1,390	3,706	Pâtes & Papier
Forest	23	90	4,569	4,682	Forêts
Petrochemical	-	1,644	576	2,220	Pétrochimiques
Railway (Op & Equip)	38,703	21,411	1,242	61,356	Chem de Fer (Op & Equip)
Shipbuilding	956	210	365	1,531	Const. Maritime
Machinery/Tool	5,820	3,084	867	9,771	Machines/Outils
Manufacturing/Other	6,941	4,292	2,235	13,468	Manufacture/Autre
TOTAL	74,671	69,802	27,840	171,313	TOTAL

CHART/TABLEAU NO. 21-A

EXPORT OF IRON CASTINGS - 1973

LES EXPORTATIONS DE MOULAGES DE FONTE 1973

TONS/TONNES

MARKET	BC/CB	ALTA/SASK	MAN	ONTARIO	QUE.	N.B.	NS/NE	TOTAL	MARCHE
Automotive	-	-	-	142,476	1,824	-	-	144,300	Automobile
Aircraft	-	-	-	-	-	-	-	-	Aéronautique
Agriculture	-	120	1,296	30,240	216	-	-	31,872	Agriculture
Construction & Municipal	324	-	432	9,168	2,124	336	972	13,356	Construction & Municipalités
Mining	1,320	-	-	2,484	1,704	960	-	6,468	Mine
Pulp and Paper	-	-	-	-	516	-	-	516	Pâtes & Papier
Forest	-	-	-	-	-	-	-	-	Forêts
Petrochemical	-	-	108	-	-	-	-	108	Pétrochimiques
Railway (Op & Equip)	-	-	-	2,676	-	-	-	2,676	Chem. de Fer (Op & Equip)
Shipbuilding	48	-	-	-	-	-	-	48	Const. Maritime
Machinery/Tools	-	-	300	4,572	2,460	-	-	7,332	Machines/Outils
Manufacturing/Other	204	-	900	9,564	1,836	120	-	12,624	Manufacture/Autre
TOTAL	1,896	120	3,036	201,180	10,680	1,416	972	219,300	TOTAL

CHART/TABLEAU NO. 21-B

EXPORT OF STEEL CASTINGS - 1973

LES EXPORTATIONS DE MOULAGES D'ACIER - 1973

TONS/TONNES

MARKET	QUE.ATL	ONTARIO	PRAIRIE/BC/CB	TOTAL	MARCHE
Automotive	36	7,824	-	7,860	Automobile
Aircraft	-	-	-	-	Aéronautique
Agriculture	1,140	60	-	1,200	Agriculture
Construction & Municipal	2,328	-	4,080	6,408	Construction & Municipalités
Mining	1,620	516	540	2,676	Mine
Pulp & Paper	-	900	96	996	Pâtes & Papier
Forest	-	-	144	144	Forêts
Petrochemical	-	60	-	60	Pétrochimiques
Railway (Op & Equip)	24	384	-	408	Chem. de Fer (Op & Equip)
Shipbuilding	-	-	-	-	Const. Maritime
Machinery/Tool	-	96	-	96	Machines/Outils
Manufacturing/Other	1,932	36	336	2,304	Manufacture/Autre
TOTAL	7,080	9,876	5,196	22,152	TOTAL

CHART/TABLEAU NO. 22

PRESENT METHOD OF SELLING - METHODE ACTUELLE DE VENTE

IRON FOUNDRIES - FONDERIES DE FONTE

DIRECT SALES BY COMPANY'S SALESMEN VENTES DIRECTES PAR LES VENDEURS DE LA SOCIETE		MANUFACTURER'S AGENT REPRESENTANT DU FABRICANT	OTHERS AUTRES	
British Columbia	5	1	5	Colombie Britannique
Alberta	6	2	2	Alberta
Saskatchewan	2			Saskatchewan
Manitoba	4		3	Manitoba
Ontario	40	13	25	Ontario
Quebec	21	5	13	Québec
New Brunswick	3		5	Nouveau Brunswick
Nova Scotia	4	1		Nouvelle Ecosse
Total	85	22	53	Total

STEEL FOUNDRIES - FONDERIES D'ACIER

Quebec/Atlantic	6	2		Québec/Atlantique
Ontario	7	6	2	Ontario
Prairies/B.C.	8	2	2	Prairies/C.B.
Total	21	10	4	Total

CHART/TABLEAU NO. 23-B

STEEL FOUNDRIES

CAPITAL EXPENDITURE

$,000 FOR 1971 - 1973

FONDERIES D'ACIER

CAPITALISATION

$,000 POUR 1971 - 1973

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

REGION	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
Quebec - Atlantic					
Québec - Atlantique	-	-	67	2,296	2,363
Ontario	153	-	280	2,984	3,417
Prairies - B.C./C.B.	100	1,250	400	2,851	4,601
TOTAL	253	1,250	747	8,131	10,381

CHART/TABLEAU NO. 23-A

IRON FOUNDRIES — FONDERIES DE FONTE

CAPITAL EXPENDITURES — CAPITALISATION

$,000 FOR 1971 - 1973 — $,000 1971 à 1973

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

PROVINCE	0-500	501-1500	1501-3000	OVER 3000 PLUS DE	TOTAL
British Columbia Colombie Britannique	550	100	585	96	1,331
Alberta-Saskatchewan	95	372	325	36	828
Manitoba	53	131	143	255	582
Ontario	645	1,686	4,382	48,346	55,059
Quebec/Québec	853	1,209	660	4,828	7,550
Atlantic/Atlantique	52	150	695	-	897
TOTAL	2,248	3,648	6,790	53,561	66,247

CHART/TABLEAU NO. 24-A

IRON FOUNDRIES

PROPOSED CAPITAL EXPENDITURES

$,000 FOR 1974 - 1976

FONDERIES DE FONTE

CAPITALISATION PROPOSEE

$,000 1974 à 1976

PROVINCE	COMPANY SALES $,000 FOR 1973 / LES VENTES DE LA SOCIETE $,000 EN 1973				
	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
British Columbia Colombie Britannique	660	410	320	160	1,550
Alberta-Saskatchewan	182	3,201	1,000	1,050	5,433
Manitoba	153	3,150	490	375	4,168
Ontario	2,805	2,887	23,043	50,467	79,202
Quebec/Québec	1 686	2,093	6,430	21,533	31,742
Atlantic/Atlantique	3,446	350	351	-	4,147
TOTAL	8,932	12,091	31,634	73,585	126,242

CHART/TABLEAU NO. 24-B

IRON FOUNDRIES

PROPOSED CAPITAL EXPENDITURE

$,000 FOR 1974

FONDERIES DE FONTE

CAPITALISATION PROPOSEE

$,000 POUR 1974

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

PROVINCE	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
British Columbia Colombie Britannique	225	115	250	30	620
Alberta-Saskatchewan	32	971	350	100	1,453
Manitoba	53	1,000	220	175	1,448
Ontario	500	979	3,880	9,516	14,875
Quebec/Québec	610	593	1,980	6,698	9,881
Atlantic/Atlantique	1,341	50	251	-	1,642
TOTAL	2,761	3,708	6,931	16,519	29,919

CHART/TABLEAU NO. 24-C

IRON FOUNDRIES

PROPOSED CAPITAL EXPENDITURE

$,000 FOR 1975

FONDERIES DE FONTE

CAPITALISATION PROPOSEE

$,000 POUR 1975

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

PROVINCE	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
British Columbia Colombie Britannique	275	225	50	65	615
Alberta-Saskatchewan	50	1,360	250	450	2,110
Manitoba	100	1,600	120	100	1,920
Ontario	1,115	973	12,138	18,019	32,245
Quebec/Québec	534	620	3,575	8,320	13,049
Atlantic/Atlantique	1,055	150	50	-	1,255
TOTAL	3,129	4,928	16,183	26,954	51,194

CHART/TABLEAU NO. 24-D

IRON FOUNDRIES

PROPOSED CAPITAL EXPENDITURE

$,000 FOR 1976

FONDERIES DE FONTE

CAPITALISATION PROPOSEE

$ 000 FOR 1976

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

PROVINCE	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
British Columbia Colombie Britannique	160	70	20	65	315
Alberta-Saskatchewan	100	870	400	500	1,870
Manitoba	-	550	150	100	800
Ontario	1,190	935	7,025	22,932	32,082
Quebec/Québec	542	880	875	6,515	8,812
Atlantic/Atlantique	1,050	150	50	-	1,250
TPTA:	3,042	3,455	8,520	30,112	45,129

CHART/TABLEAU NO. 25-A

STEEL FOUNDRIES

PROPOSED CAPITAL EXPENDITURES

$,000 FOR 1974 - 1976

FONDERIES D'ACIER

CAPITALISATION PROPOSEE

$,000 1974 à 1976

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

REGION	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
Quebec - Atlantic	-	500	-	15,844	16,344
Québec - Atlantique					
Ontario	672	-	2,130	20,065	22,867
Prairies - B.C./C.B.	150	900	4,100	9,977	15,127
TOTAL	822	1,400	6,230	45,886	54,338

CHART/TABLEAU NO. 25-B

STEEL FOUNDRIES

PROPOSED CAPITAL EXPENDITURES

$,000 FOR 1974

FONDERIES D'ACIER

CAPITALISATION PROPOSEE

$,000 1974

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

REGION	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
Quebec - Atlantic					
Québec - Atlantique	-	-	-	1,965	1,965
Ontario	97	-	1,350	2,807	4,254
Prairies - B.C./C.B.	50	400	100	2,327	2,877
TOTAL	147	400	1,450	7,099	9,096

CHART/TABLEAU NO. 25-C

STEEL FOUNDRIES

PROPOSED CAPITAL EXPENDITURES

$,000 FOR 1975

FONDERIES D'ACIER

CAPITALISATION PROPOSEE

$,000 1975

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

REGION	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
Quebec - Atlantic					
Québec - Atlantique	-	250	-	7,029	7,279
Ontario	110	-	380	9,246	9,736
Prairies - B.C./C.B.	50	200	2,000	4,800	7,050
TOTAL	160	450	2,380	21,075	24,065

CHART/TABLEAU NO. 25-D

STEEL FOUNDRIES

PROPOSED CAPITAL EXPENDITURES

$,000 FOR 1976

FONDERIES D'ACIER

CAPITALISATION PROPOSEE

$,000 1976

COMPANY SALES $,000 FOR 1973

LES VENTES DE LA SOCIETE $,000 EN 1973

REGION	0-500	501-1500	1501-3000	PLUS DE OVER 3000	TOTAL
Quebec - Atlantic					
Québec - Atlantique	-	250	-	6,850	7,100
Ontario	465	-	400	8,012	8,877
Prairies - B.C./C.B.	50	300	2,000	2,850	5,200
TOTAL	515	550	2,400	17,712	21,177

CHART/TABLEAU NO. 26-A

IRON FOUNDRY COSTS FOR ENVIRONMENT CONTROL

FRAIS D'EQUIPEMENT POUR LA PROTECTION DE L'ENVIRONNEMENT PAR LES FONDERIES DE FONTE

PROVINCE	COSTS TO THE END OF 1973 / COUTS JUSQU'A LA FIN DE 1973		FUTURE COSTS / COUTS A VENIR	
	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000
British Columbia / Colombie - Britannique	9	593	8	665
Alberta - Saskatchewan	7	285	8	1,065
Manitoba	2	210	5	1,430
Ontario	55	35,418	33	9,755
Quebec/Québec	18	5,913	19	2,965
New Brunswick / Nouveau Brunswick	3	95	1	228
Nova Scotia / Nouvelle Ecosse	-	-	2	110
Total	94	42,514	76	16,218

CHART/TABLEAU NO. 26-B

STEEL FOUNDRY COSTS FOR ENVIRONMENT CONTROL

FRAIS D'EQUIPEMENT POUR LA PROTECTION DE L'ENVIRONNEMENT PAR LES FONDERIES D'ACIER

REGION	COSTS TO THE END OF 1973 COUTS JUSQU'A LA FIN DE 1973		FUTURE COSTS COUTS A VENIR	
	NO. OF/DE FDRIES	$,000	NO. OF/DE FDRIES	$,000
Quebec/Atlantic Québec/Atlantique	6	1,895	5	2,375
Ontario	9	1,739	6	1,405
Prairies	3	330	3	655
British Columbia Colombie - Britannique	5	415	4	3,900
TOTAL	23	4,379	18	7,335

THE CANADIAN FERROUS FOUNDRY INDUSTRY

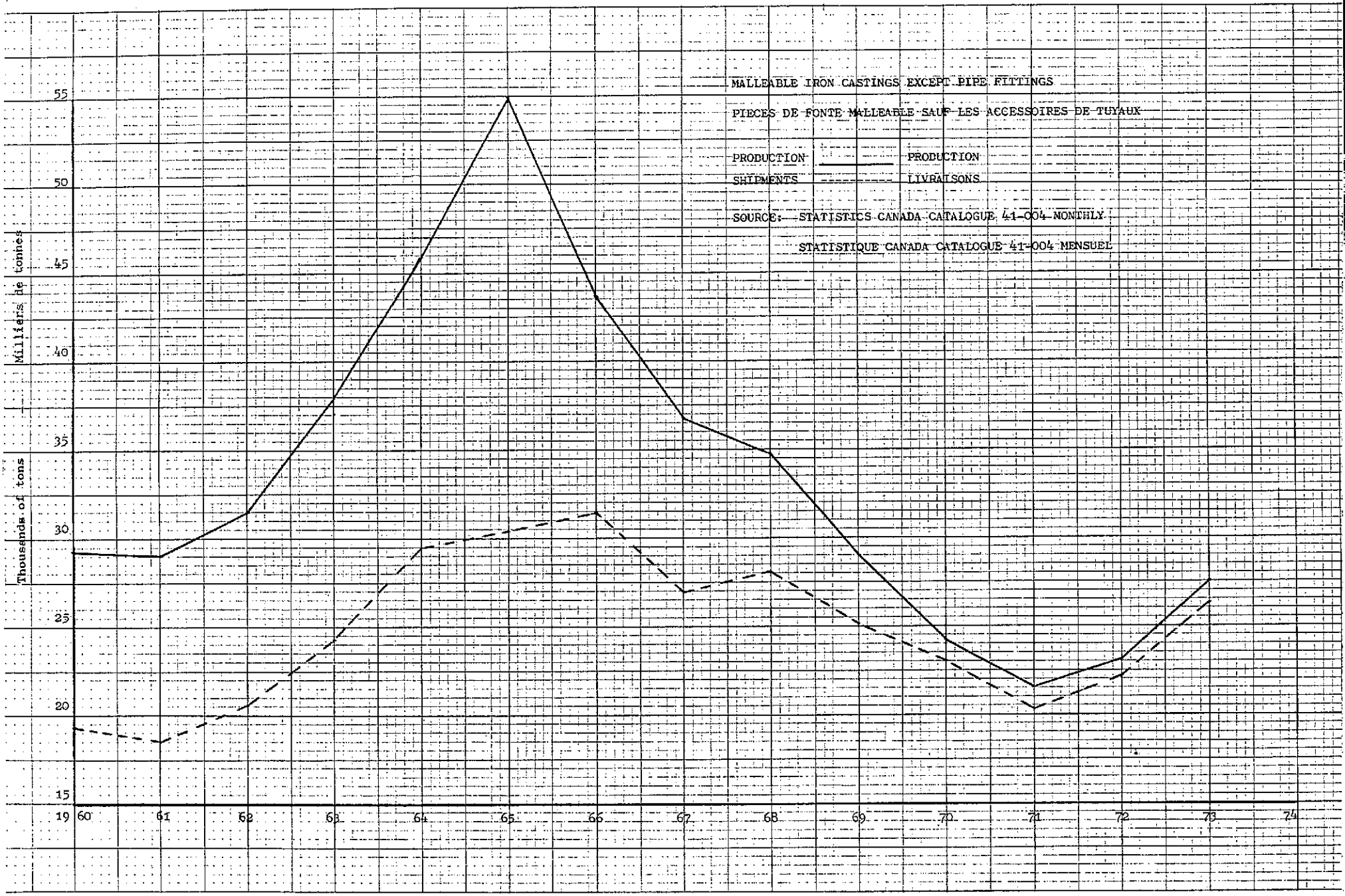
REPORT OF THE 1974 NATIONAL SURVEY

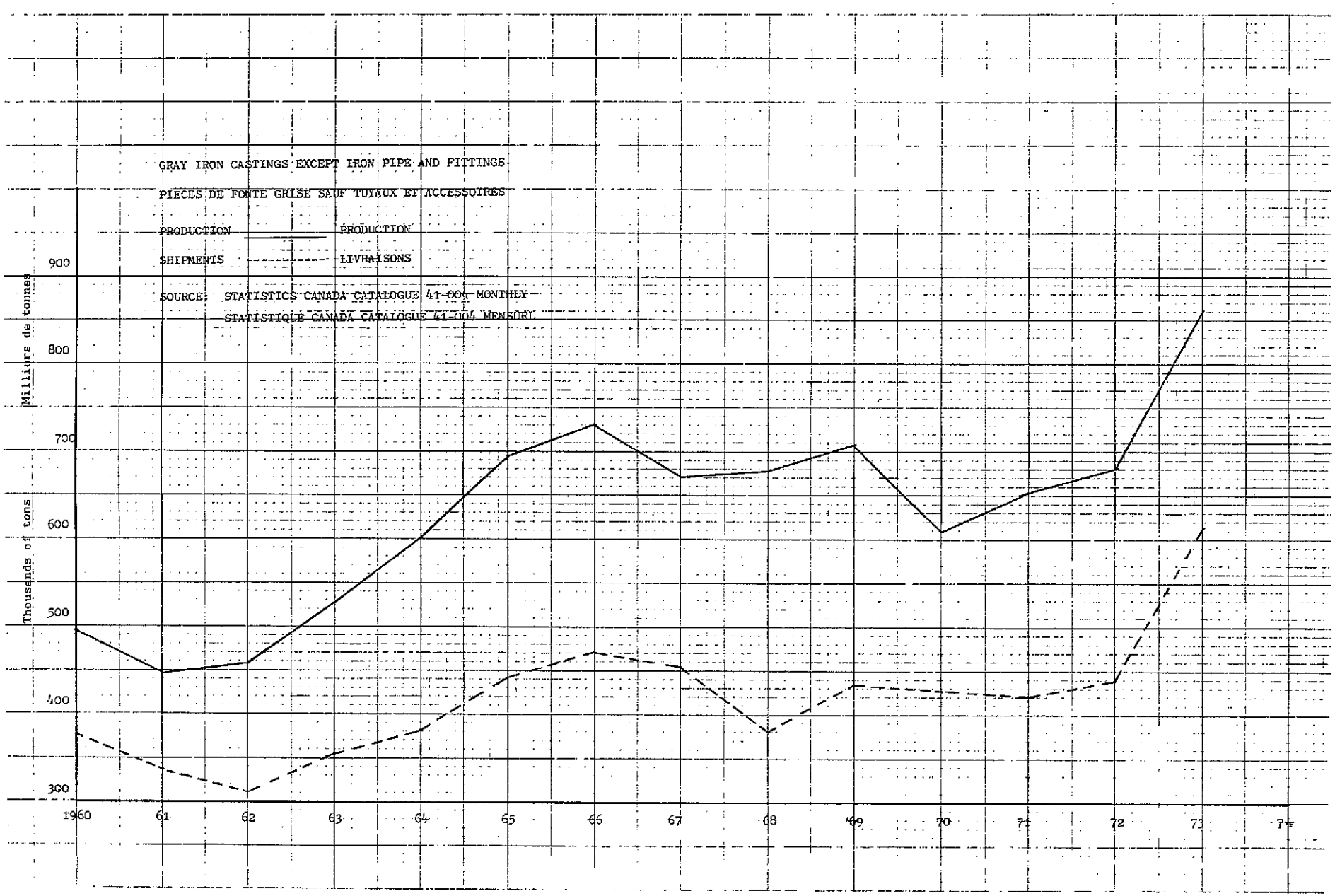
APPENDIX III

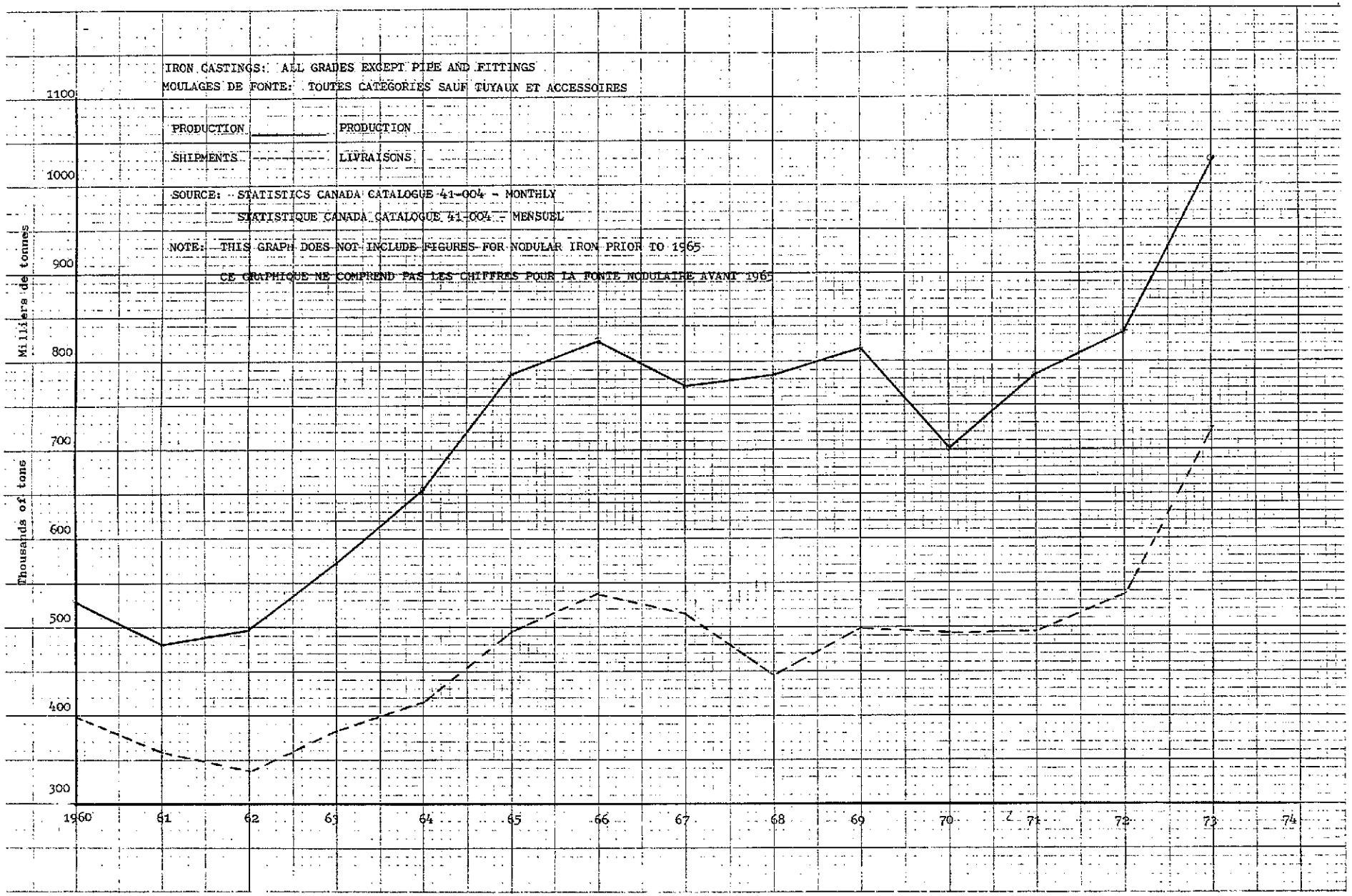
INDEX OF GRAPHS BASED ON STATISTICS CANADA DATA

Note: These graphs show production and shipment figures in net tons (2,000 lb.) as shown in Statistics Canada Catalogues #41-001: "Primary Iron and Steel" and #41-004: "Iron Castings and Cast Iron Pipes and Fittings."

No.	Title
1.	Iron Castings: All Grades Except Pipe and Fittings.
2.	Gray Iron Castings Except Pipe and Fittings
3.	Malleable Iron Castings Except Pipe Fittings
4.	Cast Iron Pipe: All Sizes
5.	Cast Iron Pipe Fittings: All Grades and Sizes
6.	Steel Castings: All Grades
7.	Carbon Steel Castings
8.	Manganese and Abrasion Resistant Steel Castings
9.	Low Alloy Steel Castings
10.	High Alloy Steel Castings Except Manganese and Abrasion Resistant Steels


MALLEABLE IRON CASTINGS EXCEPT PIPE FITTINGS
PIECES DE FONTE MALLEABLE SAUF LES ACCESSOIRES DE TUYAUX
PRODUCTION PRODUCTION
SHIPMENTS LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-004 MONTHLY
STATISTIQUE CANADA CATALOGUE 41-004 MENSUEL
Thousands of tons
Milliers de tonnes
55
50
45
40
35
30
25
20
15
19 60
61
62
63
64
65
66
67
68
69
70
71
72
73
74


GRAY IRON CASTINGS EXCEPT IRON PIPE AND FITTINGS
PIECES DE FONTE GRISE SAUF TUYAUX ET ACCESSOIRES
PRODUCTION
PRODUCTION
SHIPMENTS
LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-004 MONTHLY
STATISTIQUE CANADA CATALOGUE 41-004 MENSUEL
Milliers de tonnes
Thousands of tons
900
800
700
600
500
400
300
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74


IRON CASTINGS: ALL GRADES EXCEPT PIPE AND FITTINGS
MOULAGES DE FONTE: TOUTES CATÉGORIES SAUF TUYAUX ET ACCESSOIRES
PRODUCTION
PRODUCTION
SHIPMENTS
LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-004 - MONTHLY
STATISTIQUE CANADA CATALOGUE 41-004 - MENSUEL
NOTE: THIS GRAPH DOES NOT INCLUDE FIGURES FOR NODULAR IRON PRIOR TO 1965
CE GRAPHIQUE NE COMPREND PAS LES CHIFFRES POUR LA FONTE NODULAIRE AVANT 1965
Thousands of tons
Milliers de tonnes
1100
1000
900
800
700
600
500
400
300
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74

CAST IRON PIPE: ALL SIZES

TUYAUX EN FONTE: TOUTES DIMENSIONS

PRODUCTION _____ PRODUCTION

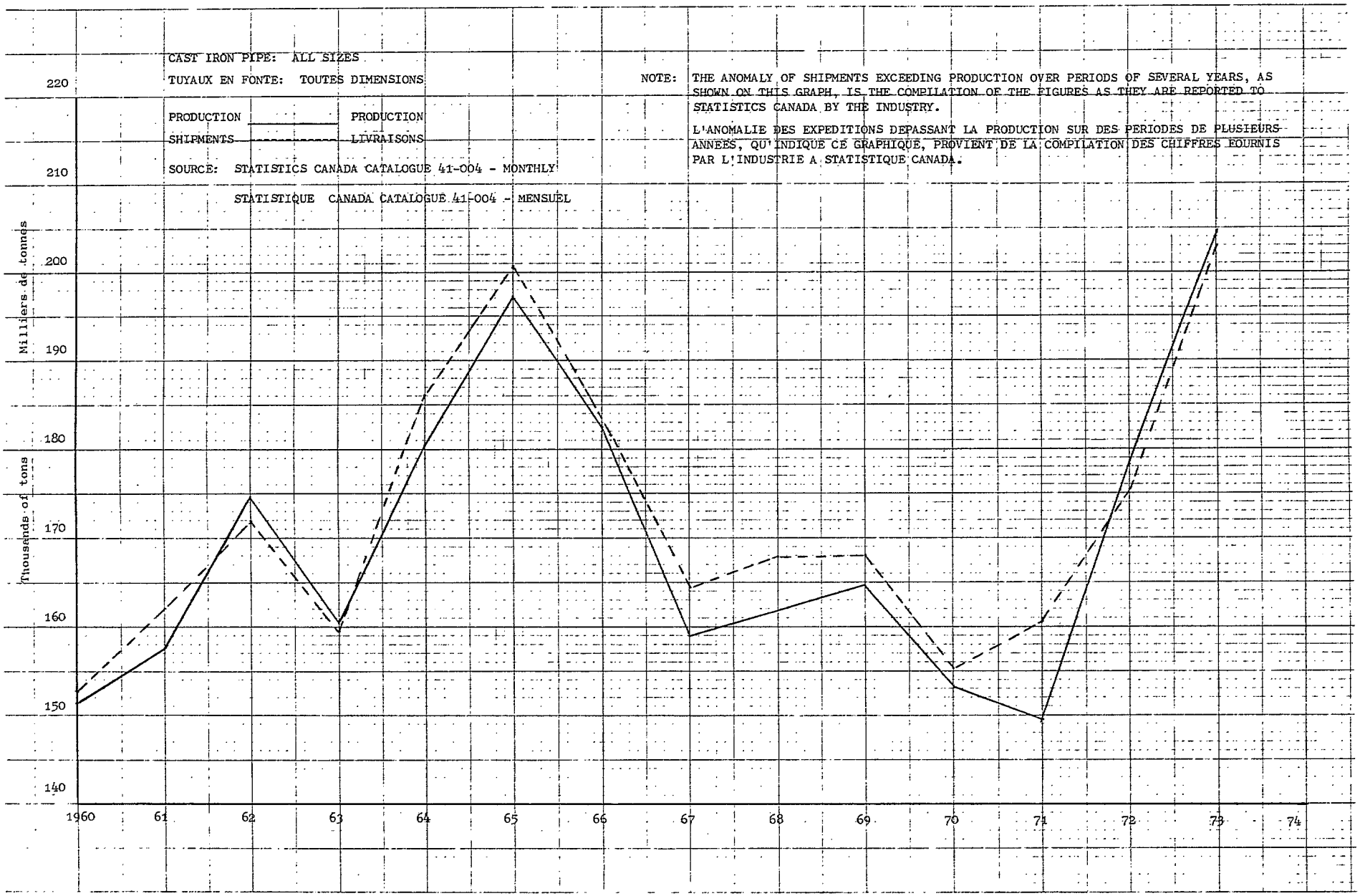
SHIPMENTS - - - - - - - - - - LIVRAISONS

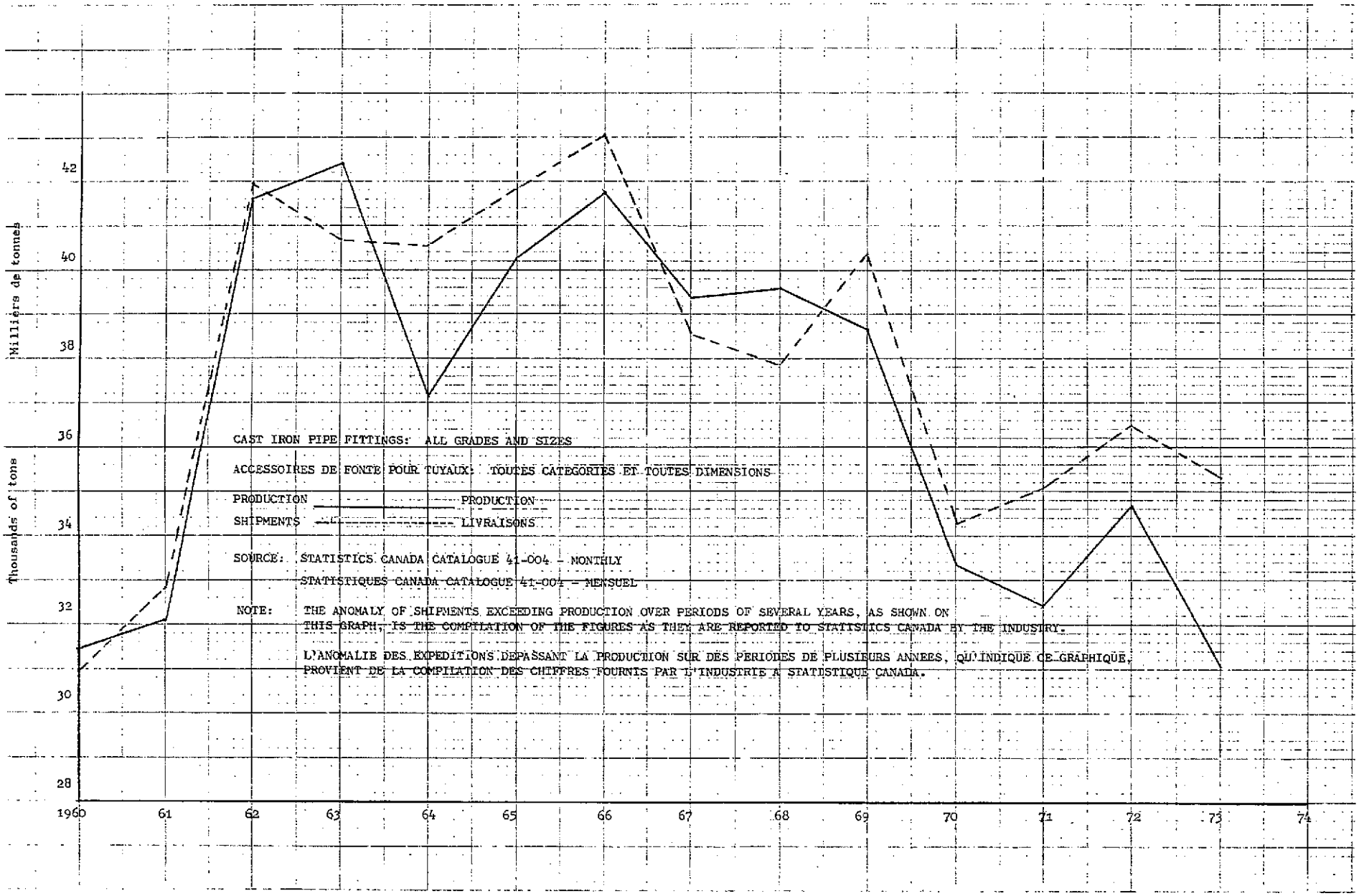
SOURCE: STATISTICS CANADA CATALOGUE 41-004 - MONTHLY

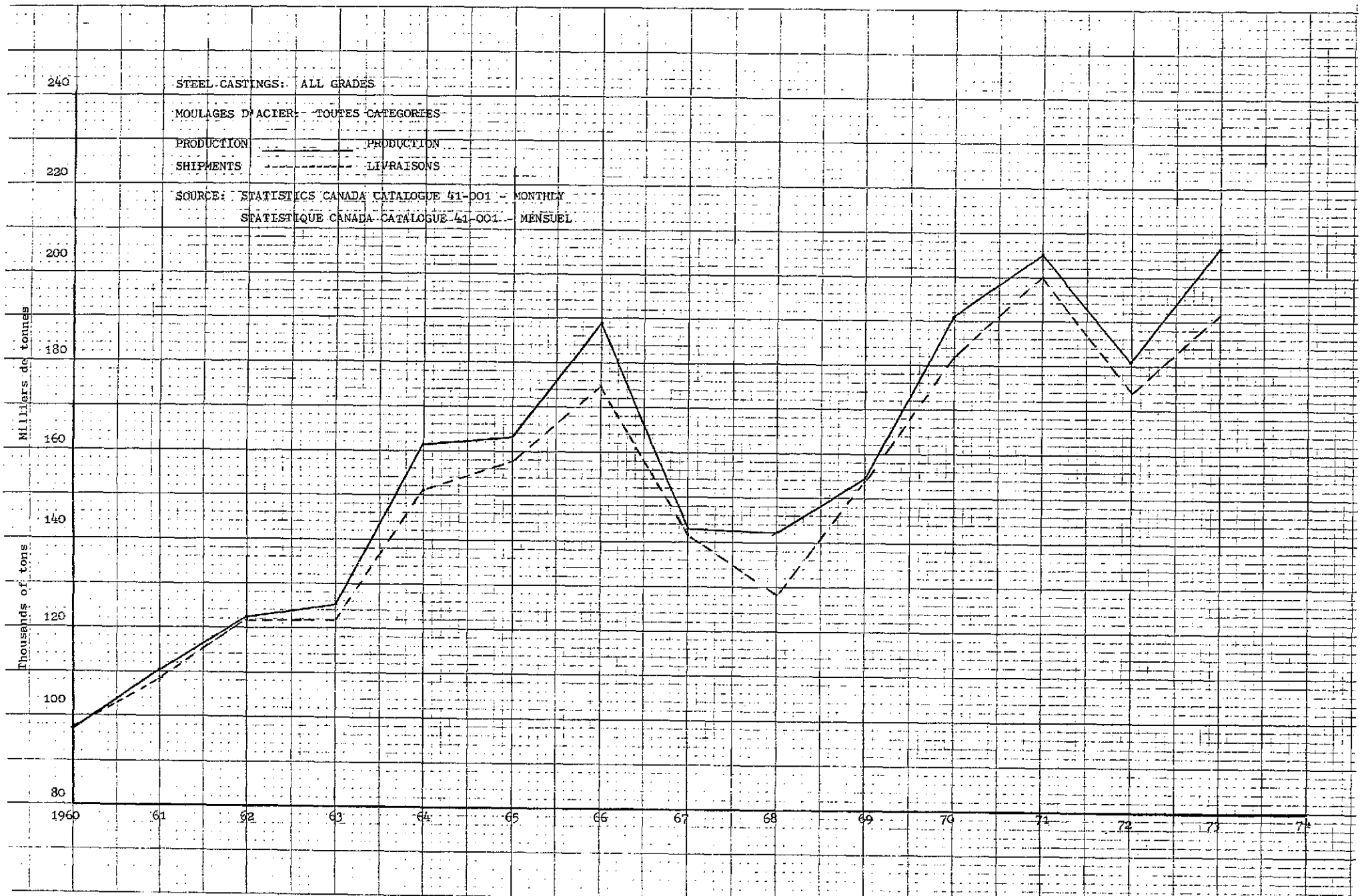
STATISTIQUE CANADA CATALOGUE 41-004 - MENSUEL

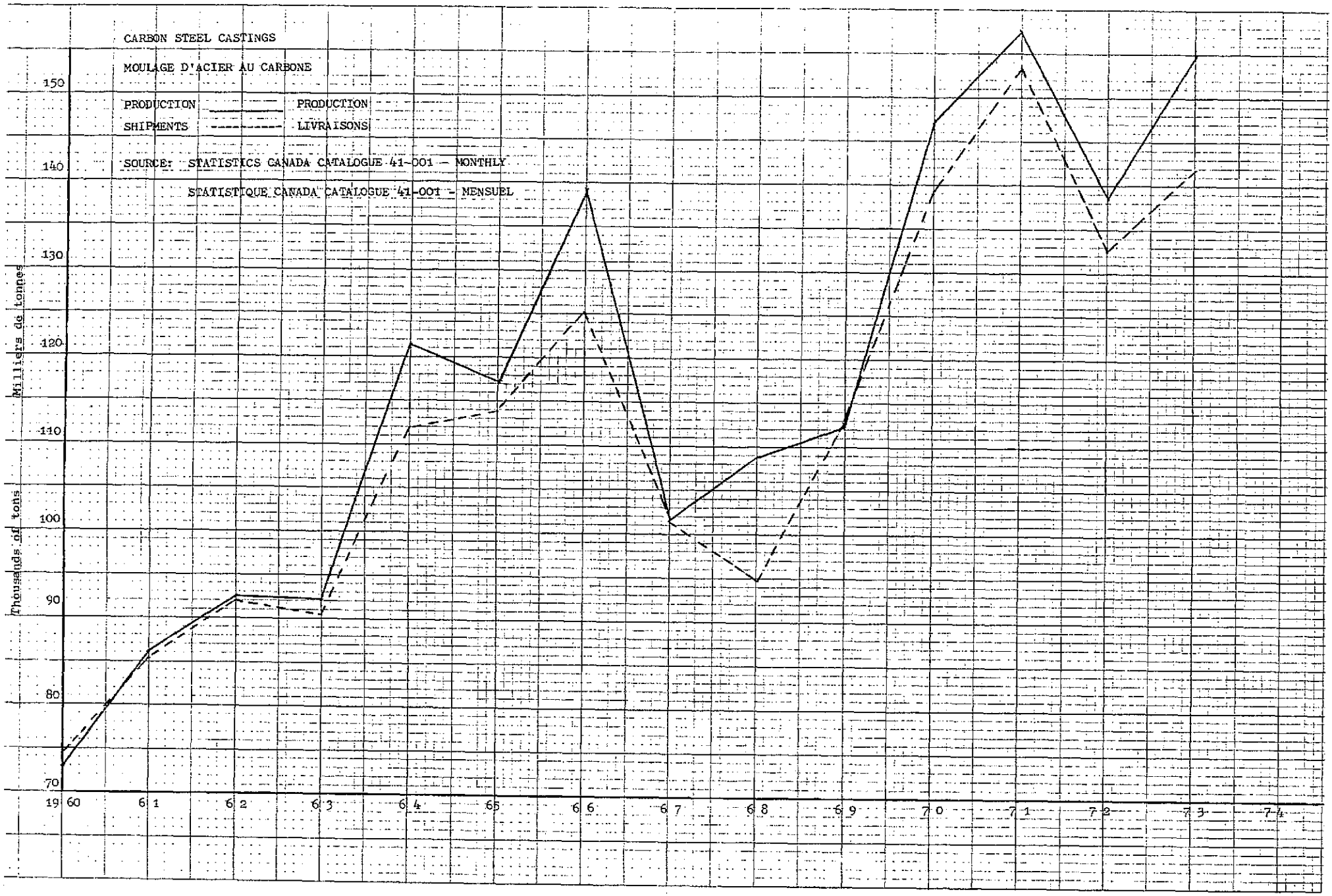
NOTE: THE ANOMALY OF SHIPMENTS EXCEEDING PRODUCTION OVER PERIODS OF SEVERAL YEARS, AS SHOWN ON THIS GRAPH, IS THE COMPILATION OF THE FIGURES AS THEY ARE REPORTED TO STATISTICS CANADA BY THE INDUSTRY.

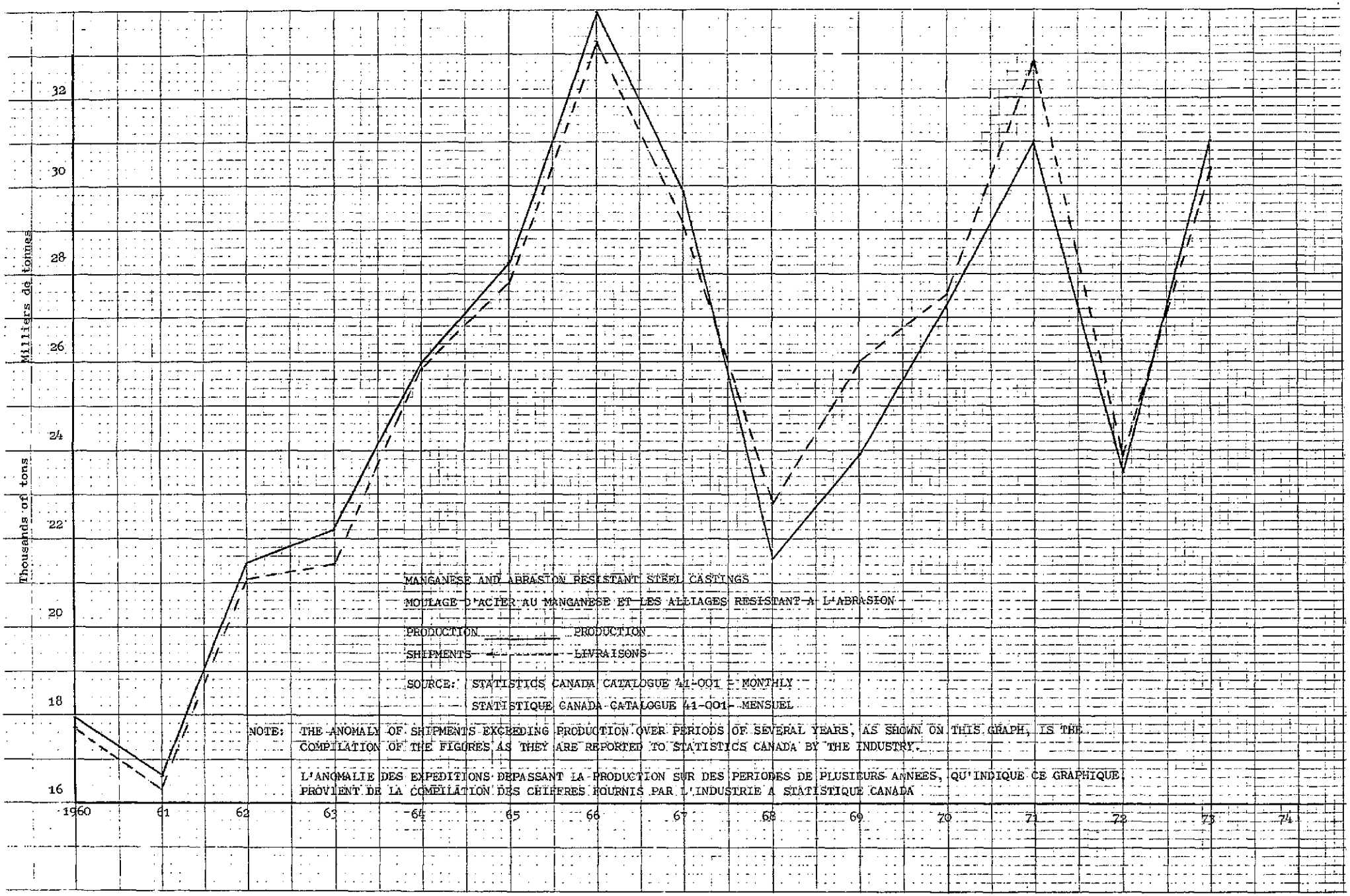
L'ANOMALIE DES EXPEDITIONS DEPASSANT LA PRODUCTION SUR DES PERIODES DE PLUSIEURS ANNEES, QU'INDIQUE CE GRAPHIQUE, PROVIENT DE LA COMPILATION DES CHIFFRES FOURNIS PAR L'INDUSTRIE A STATISTIQUE CANADA.




Milliers de tonnes
Thousands of tons
42
40
38
36
34
32
30
28
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74
CAST IRON PIPE FITTINGS: ALL GRADES AND SIZES
ACCESSOIRES DE FONTE POUR TUYAUX: TOUTES CATEGORIES ET TOUTES DIMENSIONS
PRODUCTION
PRODUCTION
SHIPMENTS
LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-004 - MONTHLY
STATISTIQUES CANADA CATALOGUE 41-004 - MENSUEL
NOTE: THE ANOMALY OF SHIPMENTS EXCEEDING PRODUCTION OVER PERIODS OF SEVERAL YEARS, AS SHOWN ON THIS GRAPH, IS THE COMPILATION OF THE FIGURES AS THEY ARE REPORTED TO STATISTICS CANADA BY THE INDUSTRY.
L'ANOMALIE DES EXPEDITIONS DEPASSANT LA PRODUCTION SUR DES PERIODES DE PLUSIEURS ANNEES, QU'INDIQUE CE GRAPHIQUE, PROVIENT DE LA COMPILATION DES CHIFFRES FOURNIS PAR L'INDUSTRIE A STATISTIQUE CANADA.


STEEL CASTINGS: ALL GRADES
MOULAGES D'ACIER - TOUTES CATEGORIES
PRODUCTION
PRODUCTION
SHIPMENTS
LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-001 - MONTHLY
STATISTIQUE CANADA CATALOGUE 41-001 - MENSUEL
Thousands of tons
Milliers de tonnes
240
220
200
180
160
140
120
100
80
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74


CARBON STEEL CASTINGS
MOULAGE D'ACIER AU CARBONE
PRODUCTION
PRODUCTION
SHIPMENTS
LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-001 — MONTHLY
STATISTIQUE CANADA CATALOGUE 41-001 - MENSUEL
Thousands of tons
Milliers de tonnes
150
140
130
120
110
100
90
80
70
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74


Thousands of tons
Milliers de tonnes
32
30
28
26
24
22
20
18
16
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74
MANGANESE AND ABRASION RESISTANT STEEL CASTINGS
MOULAGE D'ACIER AU MANGANESE ET LES ALLIAGES RESISTANT A L'ABRASION
PRODUCTION
PRODUCTION
SHIPMENTS
LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-001 - MONTHLY
STATISTIQUE CANADA CATALOGUE 41-001 - MENSUEL
NOTE: THE ANOMALY OF SHIPMENTS EXCEEDING PRODUCTION OVER PERIODS OF SEVERAL YEARS, AS SHOWN ON THIS GRAPH, IS THE COMPILATION OF THE FIGURES AS THEY ARE REPORTED TO STATISTICS CANADA BY THE INDUSTRY.
L'ANOMALIE DES EXPEDITIONS DEPASSANT LA PRODUCTION SUR DES PERIODES DE PLUSIEURS ANNEES, QU'INDIQUE CE GRAPHIQUE PROVIENT DE LA COMPILATION DES CHIFFRES FOURNIS PAR L'INDUSTRIE A STATISTIQUE CANADA

LOW ALLOY STEEL CASTINGS

MOULAGE D'ACIER D'ALLIAGE A FAIBLE TENEUR

PRODUCTION ———— PRODUCTION

SHIPMENTS - - - - - - - - - - LIVRAISONS

SOURCE: STATISTICS CANADA CATALOGUE 41-001 MONTHLY

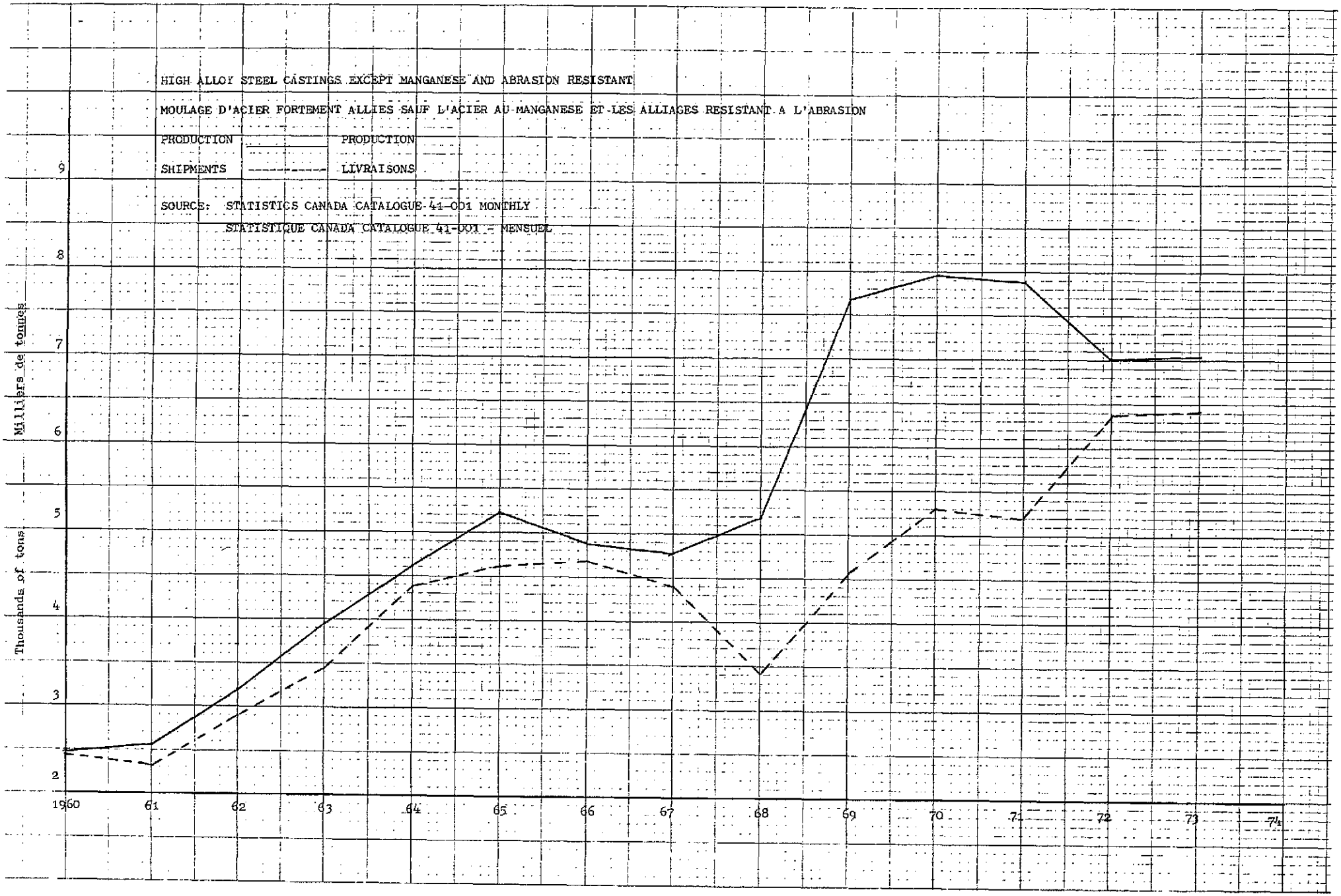
STATISTIQUE CANADA CATALOGUE 41-001 MENSUEL

Thousands of tons

Milliers de tonnes

16
14
12
10
8
6
4
2

1960 61 62 63 64 65 66 67 68 69 70 71 72 73 74


HIGH ALLOY STEEL CASTINGS EXCEPT MANGANESE AND ABRASION RESISTANT
MOULAGE D'ACIER FORTEMENT ALLIES SAUF L'ACIER AU MANGANESE ET LES ALLIAGES RESISTANT A L'ABRASION
PRODUCTION PRODUCTION
SHIPMENTS LIVRAISONS
SOURCE: STATISTICS CANADA CATALOGUE 41-001 MONTHLY
STATISTIQUE CANADA CATALOGUE 41-001 - MENSUEL
Thousands of tons
Milliers de tonnes
9
8
7
6
5
4
3
2
1960
61
62
63
64
65
66
67
68
69
70
71
72
73
74

THE CANADIAN FERROUS FOUNDRY INDUSTRY
REPORT OF THE 1974 NATIONAL SURVEY

APPENDIX IV

The names of foundries contributing data to this study are shown on the following pages.

PART I: STEEL FOUNDRIES

PART II: IRON FOUNDRIES

THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT OF THE 1974 NATIONAL SURVEY

APPENDIX IV

PART I: STEEL FOUNDRIES

Name	City	Province
Maritime Steel and Foundries Ltd.	New Glasgow	Nova Scotia
Canadian Steel Foundries Limited	Montreal	Quebec
Lynn MacLeod Metallurgy Limited	Thetford Mines	Quebec
Les Fonderies de Sorel Ltée.	Sorel	Quebec
Black Clawson-Kennedy Limited	Owen Sound	Ontario
Abex Industries Ltd.	Joliette	Quebec
Griffin Steel Foundries Limited	St-Hyacinthe	Quebec
Unitcast Midland Ross	Sherbrooke	Quebec
Alloy Casting Ind. Ltd.	St. Jacobs	Ontario
C.S. Castings Ltd.	Orillia	Ontario
Dayton-Walther Co. Ltd.	Guelph	Ontario
Fahralloy Canada Ltd.	Orillia	Ontario
Johnson, Matthey & Mallory Ltd.	St. Catharines	Ontario
Abex Industries Ltd.	Selkirk	Manitoba
Foothills Steel Foundry	Calgary	Alberta
Dominion Foundries & Steel Ltd.	Hamilton	Ontario
Indiana Steel Products of Canada Ltd.	Kitchener	Ontario
Welmet Industries Ltd.	Welland	Ontario

PART I: STEEL FOUNDRIES (CONT'D)

Name	City	Province
Griffin Steel Foundries Limited	Winnipeg	Manitoba
Quality Steel Foundries Limited	Edmonton	Alberta
A-1 Steel & Iron Foundry Ltd.	Vancouver	British Columbia
ESCO Limited	Port Coquitlam	British Columbia
Reliance Foundry Co. Ltd.	Surrey	British Columbia
CAE Machinery Ltd.	Vancouver	British Columbia
Letson & Burpee Ltd.	Vancouver	British Columbia
Victoria Machinery Depot Co. Ltd.	Victoria	British Columbia

THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT OF THE 1974 NATIONAL SURVEY

APPENDIX IV

PART II: IRON FOUNDRIES

Name	City	Province
Associated Foundry Ltd.	Surrey	British Columbia
Dobney Foundry Ltd.	New Westminster	British Columbia
Mainland Foundry & Engineering Ltd.	Vancouver	British Columbia
Nye's Foundry Co. Ltd.	Vancouver	British Columbia
Robar Industries Ltd.	Surrey	British Columbia
Thompson Foundry Ltd.	Surrey	British Columbia
Century Pacific Foundry Limited	Burnaby	British Columbia
Highland Foundry Ltd.	Vancouver	British Columbia
McLean & Powell Iron Works Limited	Vancouver	British Columbia
Ocean Foundries Ltd.	Surrey	British Columbia
Terminal City Iron Works Limited	Vancouver	British Columbia
Victoria Foundry Ltd.	Victoria	British Columbia
Canron Limited	Calgary	Alberta
General Foundry Ltd.	Edmonton	Alberta
McAvity-Crane Canada Ltd.	Medicine Hat	Alberta
Sovereign Castings Ltd.	Calgary	Alberta
Dominion Bridge Co. Ltd.	Edmonton	Alberta
Lethbridge Iron Works Co. Limited	Lethbridge	Alberta
Norwood Foundry Ltd.	Edmonton	Alberta
Titan Foundry Ltd.	Edmonton	Alberta
John East Iron Works Limited	Saskatoon	Saskatchewan
Norwood Foundry (Sask.) Limited	Regina	Saskatchewan

PART II: IRON FOUNDRIES (CONT'D)

Name	City	Province
Ancast Industries Ltd.	Winnipeg	Manitoba
Farm King Ltd.	Morden	Manitoba
Monarch Industries Ltd.	Winnipeg	Manitoba
Thor Foundry Ltd.	Winnipeg	Manitoba
Contract Castings Ltd.	Winnipeg	Manitoba
Manitoba Bridge & Engineering Works	Winnipeg	Manitoba
Teledyne Canada Bell Foundry Limited	Winnipeg	Manitoba
Alloy Foundry Co. Ltd.	Merrickville	Ontario
Aurora Tool & Mfg. Limited	St. Catharines	Ontario
Otaco Foundry	Orillia	Ontario
Benn Iron Foundry Ltd.	Wallaceburg	Ontario
Bowmanville Foundry Co. Limited	Bowmanville	Ontario
Aimco Industries Ltd.	St. Catharines	Ontario
Appleton Electric Ltd.	Cambridge(Preston)	Ontario
Babcock & Wilcox Canada Limited	Cambridge(Galt)	Ontario
Bell City Foundry Ltd.	Brantford	Ontario
Bibby Foundry Ltd.	Cambridge(Galt)	Ontario
Brown Boggs Foundry & Machine Co. Ltd.	Hamilton	Ontario
Brown Foundry Ltd.	Morrisburg	Ontario
Canadian Blower & Forge Ltd.	Kitchener	Ontario
Canron Limited Foundry Division(5 Fdries)	Toronto	Ontario
Canron Limited Pipe Division	Toronto	Ontario

PART II: IRON FOUNDRIES (CONT'D)

Name	City	Province
Canada Valve Ltd.	Kitchener	Ontario
Cornwall Brass & Iron Foundries Ltd.	Cornwall	Ontario
Crawford Machine & Foundry Ltd.	Woodstock	Ontario
Crouse-Hinds Canada Limited	Scarborough	Ontario
Crowe Foundry Ltd.	Cambridge(Hespeler)	Ontario
Crowle Fittings Ltd.	Malton	Ontario
Cunningham Foundry Ltd.	St. Catharines	Ontario
Dart Foundry Ltd.	Stephensville	Ontario
Date Industries Ltd.	Ayr	Ontario
Domestic Foundry Ltd.	Windsor	Ontario
Delhi Foundry & Machine Limited	Delhi	Ontario
Dorr-Oliver-Long Ltd.	Orillia	Ontario
Ex-Cell-O Corp. of Canada Limited	London	Ontario
FMC of Canada Ltd.	Elmira	Ontario
Findlay Foundry Ltd.	Carleton Place	Ontario
Fittings Limited	Oshawa	Ontario
Ford Motor Company of Canada Limited	Windsor	Ontario
Galt Malleable Iron Ltd.	Cambridge(Galt)	Ontario
Galt-Brantford Malleable Ltd.	Brantford Township	Ontario
General Motors of Canada Ltd.	St. Catharines	Ontario
Georgian Bay Foundry Ltd.	Meaford	Ontario
Hamilton Foundry Co. Limited	Hamilton	Ontario
Hastings Foundry	Stratford	Ontario

PART II: IRON FOUNDRIES (CONT'D)

Name	City	Province
John T. Hepburn Ltd.	Toronto	Ontario
Hopper Foundry Ltd.	Forest	Ontario
ITT Grinnell Co. of Canada Ltd.	Toronto	Ontario
H. Imbleau & Sons Ltd.	Renfrew	Ontario
International Hardware Co. of Canada Ltd.	Belleville	Ontario
Kanmet Limited	Cambridge(Preston)	Ontario
International Malleable Iron Co. Ltd.	Guelph	Ontario
Kelsey-Hayes Canada Ltd.	Woodstock	Ontario
Lake Foundry Ltd.	Grimsby	Ontario
Massey Ferguson Industries Ltd.	Brantford	Ontario
McCoy Foundry Ltd.	Troy	Ontario
McLean Foundry Ltd.	Brantford	Ontario
Northern Ontario Castings Ltd.	Bracebridge	Ontario
Ontario Malleable Iron Company	Oshawa	Ontario
Orangeville Foundry Ltd.	Orangeville	Ontario
Port Arthur Shipbuilding Ltd.	Thunder Bay	Ontario
Rockwell International of Canada Ltd.	Guelph	Ontario
Standard Induction Castings Ltd.	Windsor	Ontario
Stephen-Adamson Ltd.	Belleville	Ontario
Snowdon's General Castings Ltd.	Brantford	Ontario
Soo Foundry & Machine Co. Ltd.	Sault Ste. Marie	Ontario

PART II: IRON FOUNDRIES (CONT'D)

Name	City	Province
Stanton Pipes Ltd.	Hamilton	Ontario
Stittsville Foundry Limited	Stittsville	Ontario
Summerstown Metals Ltd.	Summerstown	Ontario
Walkerton Foundry Ltd.	Walkerton	Ontario
Welland Iron & Brass Ltd.	Welland	Ontario
Wells Foundry Ltd.	London	Ontario
Western Foundry Co. Limited	Wingham	Ontario
Woodside Machinist & Foundry Limited	Thunder Bay	Ontario
J.A. Wotherspoon & Sons Limited	Oakville	Ontario
Belgren Inc.	Drummondville	Quebec
Canadian Ohio Brass Co. Ltd.	Baie d'Urfé	Quebec
Canron Ltd.(Pipe Div.)	Trois Rivières	Quebec
Daigle-Aqua Inc.	Longueuil	Quebec
Darling Bros. Ltd.	Montreal	Quebec
Desjardins Ltée.	Cté Kamouraska	Quebec
Fonderie Desrosiers Ltée.	Cté Richelieu	Québec
Fonderie Dion Ltée.	Ste-Thérèse	Québec
Dominion Engineering Works Ltd.	Lachine	Québec
F.X. Drolet Inc.	Quebec	Québec
Dussault & Lamoureux (1970) Inc.	St-Hyacinthe	Québec
Fonderie Emery Cormier	Joliette	Québec
Fornaco Ltée.	Plessisville	Québec
Fonderie Gazaille Inc.	Cté Johnson	Québec
Fonderie Grand'Mère Ltée.	Grand'Mère	Québec

PART II: IRON FOUNDRIES (CONT'D)

Name	City	Province
Industries Couture Ltée.	Chicoutimi	Québec
Jenkins Bros. Ltd.	Lachine	Quebec
La Fonderie Laperle Ltée.	St-Ours	Québec
Fonderie Z. Laroche & Frères, Ltée.	Pont Rouge	Québec
La Fonderie de Lauzon Ltée.	Lauzon	Québec
Legare Foundry (1961) Ltd.	Sherbrooke	Quebec
Fonderie Magog Ltée.	Magog	Quebec
Fonderie Maska Inc.	Cté Dorchester	Québec
Métallurgie Karby	St. Pierre de Montmagny	Québec
Métallurgie St-Raphael	St-Raphael de Bellechasse	Québec
Monsarrat Machinery & Foundries Ltd.	Rivière-du-Loup	Québec
Mueller Industries Ltd.	St-Jerome	Québec
Fonderie Napierville Ltée.	Napierville	Québec
Joseph Poitras & Fils Ltée.	L'Islet	Québec
Quebec Iron Foundries Ltd.	Mont-Joli	Québec
Quebec Iron Foundries Ltd.	Noranda	Québec
Fonderie St-Anselme Ltée	St-Anselme	Québec
Fonderie Ste-Croix Ltée	Ste-Croix de Lotbinière	Québec
Fonderie Ste-Croix Ltée	St-Jean	Québec
Fonderie Ste-Julie Enrg.	Cté Mégantic	Québec
Fonderie St-Placide Enrg.	Cté Deux-Montagnes	Québec
Shawinigan Foundry Ltd.	Shawinigan	Québec
Les Fonderies Sigma Inc.	Ste-Anne-de-la-Pérade	Québec

PART II: IRON FOUNDRIES (CONT'D)

Name	City	Province
La Fonderie Stanton Foundry Ltée	St-Hubert	Québec
Fonderie de Thetford (1969) Inc.	Thetford Mines	Québec
Pierre Thibault (1972) Ltée	Pierreville	Québec
Fonderie Waterloo Inc.	Waterloo	Québec
Atlantic Foundries Ltd.	Bathurst	New Brunswick
Courtney Iron & Brass Foundry Co. Ltd.	St. John	New Brunswick
Enamel & Heating Products Ltd.	Sackville	New Brunswick
The Enterprise Foundry Co. Ltd.	Sackville	New Brunswick
Lauder Mfg. Ltd.	Hillsborough	New Brunswick
McAvity-Crane Ltd.	St. John	New Brunswick
St. John Iron Works Ltd.	St. John	New Brunswick
Amherst Foundry Company	Amherst	Nova Scotia
Angel Manufacturing & Supply Company Ltd.	North Sydney	Nova Scotia
Industrial Marine Products Ltd.	Dartmouth	Nova Scotia
Steel & Engineering Products Ltd.	Liverpool	Nova Scotia

THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT OF THE 1974 NATIONAL SURVEY

APPENDIX V

Index of Non-Foundry Contributors to the Gathering and Documentation of Information Used in the Preparation of this Report.

THE CANADIAN FERROUS FOUNDRY INDUSTRY

REPORT OF THE 1974 NATIONAL SURVEY

APPENDIX V

Industry Operations Branch,
Department of Development,
Province of Nova Scotia.

Industrial Development Branch,
Department of Economic Growth,
Government of New Brunswick.

Ministry of Industry and Commerce,
Province of Quebec.

(a) Industry Branch
(b) Industrial Expansion Branch.

Ministry of Industry and Tourism,
Province of Ontario.

(a) Industry Research Branch
(b) Industrial and Marketing Studies Branch
(c) Technology Branch
(d) Industrial Development Branch.

Industrial Materials & Construction Branch,
Department of Industry and Commerce,
Province of Manitoba.

Industry Development Branch,
Department of Industry and Commerce,
Province of Saskatchewan.

Planning and Intelligence Branch,
Department of Industry and Commerce,
Province of Alberta.

APPENDIX V (CONT'D)

Business Development Branch,
Department of Industrial Development, Trade & Commerce,
Province of British Columbia.

D.I. Gallagher and Associates, Consultants,
Toronto, Ontario.

Department of Industry, Trade and Commerce,
Ottawa, Ontario.

(a) Professional and Administrative Branch.
(b) Resource Industries and Construction Branch.