FUTURE REQUIREMENTS FOR GRAIN HANDLING THROUGH PACIFIC COAST PORTS

by

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ABSTRACT

Grain is the single most important export commodity shipped through four important Canadian ports on the Pacific Coast. Recent rapid growth in these exports have strained present facilities close to capacity. Therefore the necessity has arisen to study the problem of future requirements for grain handling facilities in British Columbia. Furthermore the over-all development of British Columbia ports has been widely discussed in recent years and because grain is such an important export, the problem of port development requires specific study of grain handling facilities.

Investigation of future grain handling requirements relied on both library and field sources. Field work, mainly in the form of interviews with people in port administration and grain handling and selling were especially useful in gaining first-hand knowledge of the actual problems of grain exporting. Facts and opinions gained from field work were also invaluable to interpretation of a large mass of statistics that were available from various library sources.

The results of the research have led to several conclusions. The most important is that the Pacific Coast of Canada requires new grain handling facilities in the near future. In addition improvements in handling are possible within existing facilities and throughout the extensive system of grain gathering which begins on the farms, hundreds of miles

from the export point.

In addition to the above findings there are several important secondary conclusions. First, the markets for grain are likely to continue growing in the foreseeable future. Because the markets of greatest growth are near the Pacific Ocean, Canada's West Coast ports are well situated to serve them. Second, the United States Pacific ports are also well situated to provide direct competition with Canada. If and when this competition becomes more direct, Canada will require the best facilities to keep its customers. Third, Canadian ports have definite advantages to ship operators over the United States ports in the form of lower charges for port use, but maintenance of efficiency in Canadian ports is essential to maintaining this advantage. Finally, the main Canadian Pacific ports are physically suitable for the expansion of grain handling facilities.

TABLE OF CONTENTS

Page

LIST OF TABLES

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CHAPTER I

INTRODUCTION

Background and Statement of Problem

Facilities for handling Canada's grain exports are an important part of the port installations on the British Columbia coast. Grain was the single most important commodity exported through British Columbia Customs Ports in 1964. The value of the shipments was 435.2 million dollars or 25% of the total value of exports.[1] In quantity, approximately 218.2 million bushels of grain were exported in the 1964 calendar year. This represented 50% of the tonnage exported through British Columbia ports.[2] Virtually all of this grain is exported through the four British Columbia ports where grain handling facilities are installed: namely Vancouver, Victoria, New Westminster and Prince Rupert. Only very minor amounts are exported by rail to United States destinations.[3] Figures such as the above clearly illustrate the magnitude of grain exports in overall trade and indicate that any comprehensive study of port installations on

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[1]Bureau of Economics and Statistics, Preliminary Statement of External Trade Through British Columbia Customs Ports for the Calendar Year 1964 (Victoria, 1964), p. S3.

[2]Dominion Bureau of Statistics, Shipping Report (Ottawa; Queen's Printer, 1965), p. 188.

[3]Dominion Bureau of Statistics, Grain Trade of Canada 1964-65 (Ottawa; Queen's Printer, 1965), p. 3.

the British Columbia coast must include some specific study of the grain handling facilities.

There is little unanimity in defining the problems of grain handling in British Columbia. For example a recent periodical article quoted many varying opinions in explanation of a recent grain handling tie-up in Vancouver.[4] As Mr. W. A. Sankey, Manager of the Vancouver Merchants Exchange and Honourable Joe Greene, Minister of Agriculture for Canada, attribute the problem to the railroads for not delivering the boxcars that are needed to keep the elevators full. On the other hand Mr. Ian Sinclair, President of the Canadian Pacific Railway, and Honourable Mitchell Sharp, Minister in charge of the Canadian Wheat Board, have blamed poor port facilities for grain handling delays. Finally the manager of one of the largest grain handling operations in Vancouver, in an interview with this writer, not only faulted the railways but also blamed the Canadian Wheat Board for over-selling particular grades of wheat. Thus when ships come to load the grade may not be available for some period of time. It was also stated that at times the Wheat Board may under-sell certain grades, leading to congestion in the elevator because grain is stored that does not move out of the elevator, thus reducing the effective capacity to handle grain. On the other hand officials of the Canadian Wheat Board said that in 1964 75 million dollars of grain sales were lost because of the inability of British

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[4]Laurencom Writers, "Grain Handling Sparks Controversy at Vancouver," Canadian Milling and Feed, XLVII (May 1966), 20-23.

Columbia ports to move more grain.[5] To counter this statement, grain handling agencies said that expanded capacity was not warranted to handle the temporary heavy shipments of 1963-64.[6]

Charges and countercharges such as the above are not new. Ever since Canada started making substantial grain sales to China in 1960 there have been periodic disputes and discussions over West Coast grain handling facilities. In 1961 a Pacific Coast Grain Conference was arranged by the Canadian Wheat Board. A short report was made by an Immediate Problems Committee in which many of the problems were stated and some recommendations for their solution were made. The possible problem areas listed at that time remain relatively unchanged today. Some of the problems mentioned were:

1. Shortage of sufficient boxcars for unloading caused by:
   a. Lack of ample shipping orders in the country.
   b. Slides or washouts on the railway.
   c. Total restriction of country loadings by railways affecting terminal elevators.
   d. Shortage of boxcars due to abnormal increases in demand generally.
2. Elevator congestion caused by:
   a. Lack of shipping generally - delayed arrival due to storms etc.
   b. Stocks of non-shippable grain.
   c. Grain that requires drying or processing.
   d. Unloading oil seeds when not required to avoid railway demurrage charges.
3. Shipping delays caused by:
   a. Bad weather - excessive rain fog etc.
   b. Periods of high tides.
   c. Modern vessels - size and type of construction.
   d. Intermittent shortage of stevedore gangs for 1:00 P.M. or 6:00 P.M. starts.
   e. Physical limitations of sustained overtime work.

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[5] J. K. Edmonds, "Behind the Big West Coast Grain Back-up," Financial Post, March 14, 1966, p. 1 ff.

[6] Edmonds, p. 1.

f. Excessive trimming or sacking slack holds while also loading bulk.
g. Shortage of grades to meet requirements.
h. Difficulties in maintaining grades on outward shipments as compared to those established at unload.
i. Vessels not passed for loading or not completely ready for loading but occupying berths and preventing vessels from unloading that have passed and are ready.
j. Berthing generally, including shifting from berth to berth.
k. Delay in grading some export cargoes until Winnipeg Inspector establishes grade.
l. Lack of sufficient draft at some berths.
m. Silting at New Westminster Elevator and at entrance to Fraser River.
n. Reluctance and/or refusal to work overtime.[7]

History of Pacific Coast Grain Handling

Grain handling on the British Columbia coast has a relatively short history when compared to the Lakehead or Eastern Ports. Pacific Coast grain exports were hard won and represented a victory over the established eastern shipping and grain interests. Originally the opening of the Panama Canal was seen as leading the way to heavy grain exports from Vancouver. In anticipation of the canal route an elevator was opened in Vancouver in 1916. However, little activity resulted and the small amount of grain exported in the next five years went chiefly to the Orient. Thus the established interests in the east were slow to see the opportunities inherent in the Pacific and Panama route to Europe. First they had reservations about shipping grain through the tropics because of a fear of spoilage en route to Europe. Experimental shipments undertaken by the Dominion Research Laboratory in 1917 proved this to be

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[7]Pacific Coast Grain Conference, "Report of the Immediate Problems Committee" (Vancouver, 1961), mimeo., p. 3.

an unfounded fear.[8] Probably of greater importance was that the eastern route was tried and proven. Considerable money was invested in Lakehead and Eastern port facilities and control of these facilities was remote from British Columbia. Consequently there was considerable inertia in developing a western route from those responsible for the export and handling of grain. One result of inertia was the fact that rail freight rates to the Pacific Coast were unfavourable. Not until 1925 were freight rates to the Pacific ports equalized with the Lakehead. Prior to the equalizing of rail rates on grain, exporting through Vancouver to Europe was only possible because of lower ocean rates to Europe as compared with the Lakehead or East Coast. These lower ocean rates began in 1921 and after this European grain exports from Vancouver increased rapidly. By 1925 there were six elevators in Vancouver with a storage capacity of 6.5 million bushels.[9] Grain shipments increased from about 500,000 bushels in 1920-21 to 53 million bushels in 1925-26 (Table I). By 1932-33 shipments had reached a pre-war peak of 103 million bushels through all British Columbia ports. Elevator storage capacity in Vancouver had also risen in the period to 18.7 million bushels by 1933.

The present elevator facilities at Prince Rupert (1925), New Westminster (1929), and Victoria (1928) were also

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[8] D. A. MacGibbon, The Canadian Grain Trade (Toronto; MacMillan Company, 1932), p. 268.

[9] See the unpublished graduating essay (Faculty of Commerce, U.B.C., 1962) by G. R. Wheatley, "Grain Handling Through the Port of Vancouver," p. 31.

constructed during this period of rapid growth although they did comparatively little to improve the grain trade on the Pacific Coast at that time. All of these developments during the decade of the twenties and early thirties clearly established the Pacific Coast as a major export point for Canadian grain. Exigencies of war reduced the trade to a trickle during the 1940's but since that time British Columbia grain exports have shown steady increases, and at times have surpassed the volume shipped through St. Lawrence River Ports (Table I).

Purpose of Study

Continuing growth of grain exports through British Columbia ports, particularly in the past five years, has raised the problem of how much participation is possible in this growing market with present elevator facilities which are in most cases more than 25 years old. Simply stated, the problem is what should be done to ensure the efficient handling of a growing volume of grain through British Columbia ports. The purpose of this thesis is to consider and analyze the many facets of the problem that have to be considered and furthermore to indicate the course of action this analysis suggests.

Among the most important facets of the problem examined in this thesis are the future of grain markets, the future of shipping as it relates to the grain trade and the future competitive forces from the near-by ports in the United States.

Other Studies

The ports of British Columbia are presently undergoing thorough examination and study in preparation for building for the future. Vancouver particularly, is receiving close

TABLE I

CANADIAN GRAIN EXPORTS BY SEABOARD SECTOR
SELECTED CROP YEARS

(Figures in thousands of Bushels)

Crop Year	Via Pacific Coast	Via Canadian St. Lawrence Ports and Lakehead direct	Via Canadian Atlantic Coast	Via Churchill	Via U.S.A. Atlantic Coast
1920-21	475	52,060	9,816	-	64,081
1925-26	53,404	93,867	15,949	-	175,017
1930-31	75,866	63,495	11,108	-	98,699
1932-33	102,605	88,869	9,235	2,736	55,516
1935-36	59,979	71,778	13,705	2,407	75,429
1940-41	4,106	63,237	50,741	-	57,740
1944-45	8,644	106,949	52,409	-	83,095
1945-46	66,951	121,681	30,695	-	72,825
1950-51	68,481	94,958	16,758	6,767	4,624
1955-56	113,583	147,816	45,210	12,818	227
1956-57	138,967	117,392	27,818	16,250	676
1957-58	169,555	123,508	30,930	18,451	-
1958-59	154,107	120,067	31,110	18,723	-
1959-60	136,755	110,432	25,099	21,838	136
1960-61	159,813	139,659	33,970	20,203	-
1961-62	180,907	144,101	21,808	19,244	-
1962-63	160,292	142,357	19,843	21,761	366
1963-64	220,745	306,102	54,475	21,680	-
1964-65	186,141	178,142	34,295	22,060	-

Source: Board of Grain Commissioners for Canada, Canadian Grain Exports for the Crop Year 1964-65 (Ottawa; Queen's Printer), p. 31.

scrutiny. Several studies are presently under way in this regard that will, no doubt, provide a wealth of information on British Columbia's ports. Physical problems of port construction are being studied with the use of an elaborate hydrographical model of the Vancouver Harbour area.[10] There is also a study presently being done by Joseph B. Ward and Associates which will give a complete inventory of all port facilities in Vancouver. Economic and geographical studies are being undertaken by the British Columbia Research Council for the National Harbours Board and also by a graduate student in the Department of Geography on a $10,000 research grant from the Department of Transport and the National Harbours Board. The latter study is a thorough analysis of the origins and destinations of goods in foreign trade through Vancouver. In addition private organizations, particularly the Canadian Pacific Railway and the Canadian National Railway, are studying Vancouver's port and have developed extensive plans for expansion. On a smaller scale the Saskatchewan Wheat Pool has studied closely the Pacific Coast as an outlet for grain. And, finally, various municipal governments and the provincial government are vitally interested in port development plans and have undertaken studies of their own.

Within the extensive study of British Columbia ports now underway very little is being done to study the most important commodity presently exported from the province. This thesis is intended to help fill this gap with a comprehensive and

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[10]"Ottawa Rolls Out Giant Docks Plan," Vancouver Sun, February 18, 1966, p. 1.

detailed analysis of grain handling. Furthermore it is an analysis from a different viewpoint than that which may be done by private or even public grain handling interests, first because it has no particular interest in mind and second because it includes analyses of competitive ports close to British Columbia. So far as can be determined the competitive factors of United States ports have not as yet been given study.

Method of Analysis and Organization

Most of the attention being directed to port development and study in British Columbia is understandably focused on Vancouver simply because it is the major port on the Pacific Coast of Canada. However, other ports such as New Westminster and Prince Rupert have been attracting some attention and development dollars. New Westminster is currently having its ship channels improved[11] and Prince Rupert is being spoken of as the outlet for northern British Columbia's exports. Vancouver, therefore, is not the only port that is likely to see new developments. For this reason it is considered logical to study all grain handling facilities on the British Columbia coast.

Any research into future requirements for grain handling facilities is a complex problem involving the workings of the grain trade, the intricate operation of ports, and the continually changing shipping industry. Such complexity possibly explains why controversy arises among the various interested groups in trying to pinpoint problem areas in grain handling.

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[11]Fraser River Harbour Commission, 1st Annual Report (1965), 3.

In each of the chapters that follow the various aspects of this complex problem are analyzed separately.

Chapter II is primarily a descriptive chapter that details the present grain handling facilities in British Columbia. In addition some analysis of the operations of the grain elevators is undertaken in order to establish their position in the Canadian grain trade. Finally an effort is made to analyze their efficiency in handling grain.

Problems of forecasting future markets for Canadian grain are an important part of planning for future grain handling facilities. This aspect, however, appears to have received relatively little attention, being ignored in favour of the more immediate problems of handling present orders. Longer term aspects of port development in British Columbia requires such analysis. For this reason Chapters III and IV analyze the trends and outlook in the grain markets served by British Columbia.

By implication, a study of grain handling facilities and future needs is a study of competitive advantages and disadvantages of certain ports over others. Chapter V studies this aspect in considerable detail. As research data on Pacific Coast ship movements becomes available it will likely be shown conclusively that all ports on the Pacific Coast, both American and Canadian, can be considered as a functionally integrated system. Therefore if Vancouver becomes an inefficient port and Portland or Seattle improve, Vancouver is likely to lose trade. This does not mean our grain exports would be diverted to American ports but, even worse, grain

sales could be lost altogether if Vancouver and other Canadian West Coast ports become inefficient, high cost centres. Conversely, American grain exports may increase and, in turn, their ports will benefit. Because of these factors it was thought beneficial to study closely American grain handling methods, plans for expansion, and the costs involved with shipping through American ports on the Pacific. By doing so the relative competitiveness of ports in Canada and the United States can be determined.

Finally, after study of the various facets of grain handling in earlier chapters of the thesis, a synthesis is attempted in Chapter VI in order to make clearer what future action will be required with regard to grain handling facilities on the British Columbia coast. No pretention is made to recommend specific facilities, but it is possible at least to give some idea of the direction future planning and expansion should take.

CHAPTER II

PRESENT GRAIN HANDLING FACILITIES

Any assessment of the future needs for grain handling facilities in British Columbia requires both a study of the future potential grain trade in Canada and a complete analysis of present Canadian port facilities for grain. In addition the possible division of traffic between regions must be considered. The second of these analyses will be dealt with comprehensively in this chapter while the other two are the subject of Chapter IV.

Smooth and efficient handling of grain through British Columbia ports has a dual role. First the interests of Canada as a major grain exporter are enhanced because it allows Canada to sell more wheat overseas when the opportunities arise. In some measure, it is safe to say, the prosperity of prairie agriculture relies upon the quality of grain handling procedures on the Pacific Coast. Secondly the ports of British Columbia benefit because efficient inexpensive handling adds to the attractiveness of the ports for shipping. Due to this fact it appears quite clear that a study of grain handling cannot stand alone without reference to other port activities and facilities. In fact the grain handling aspect is very much a part of the larger integrated whole of the port.

Advantages of British Columbia Ports

Ports offering grain as a cargo have several important advantages in attracting ships. First, grain is a clean cargo

that can be quickly stowed and discharged.[1] This, of course, speeds turn-around time which is so important to profitable ship operation. This factor may be even more important today because it appears turn-around times are getting longer as time passes. A recent book points out that days at sea, which are considered a ship's productive time, have dropped from 210 days per year in 1929 to 130 days per year in 1950 and have continued downward since 1950.[2] Some of this may be attributed to larger and faster ships, but at least part of the fewer days at sea can be blamed on inefficient ports that have failed to keep up with the trends in shipping efficiency.

Second, grain is an excellent distress cargo to fill empty holds when other traffic is not available. Ships will quote very low rates on grain when this occurs. In effect grain is the type of traffic that will move at rates very close to marginal cost. This appears to be a feature of the Vancouver-European trade[3] and no doubt contributes to the relatively low average ocean freights from Vancouver as compared with Eastern Canadian ports.[4] For example rates from Vancouver averaged only 24% higher to Britain than from Montreal in 1964-65, yet the distance is practically three times as great (Table II).

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[1] R. S. McElwee, Port Development (New York; McGraw Hill, 1926), p. 236.

[2] Col. R. B. Oram, Cargo Handling and the Modern Port (London; Pergamon Press, 1965), p. 4.

[3] See the unpublished graduating essay (Faculty of Commerce, U.B.C., 1962) by G. R. Wheatley, "Grain Handling Through the Port of Vancouver," p. 31.

[4] Board of Grain Commissioners, Canadian Grain Exports for the Crop Year 1964-65 (Ottawa; Queen's Printer, 1965), p. 21.

TABLE II

DISTANCES TO MAJOR OVERSEAS PORTS

	Distance from		
	Vancouver	Port Arthur Fort William	Montreal
	(nautical miles)		
Western Europe			
Antwerp	9,005	4,354	3,142
Copenhagen	9,210	4,453	3,241
Hamburg	9,137	4,408	3,196
Havre	8,683	4,156	2,944
Liverpool	8,614	3,967	2,755
London	8,833	4,306	3,094
Naples	9,383	5,372	4,160
Oslo	9,134	4,377	3,165
Rotterdam	8,874	4,351	3,139
Asia (Far East)			
Hong Kong	5,704	12,780	11,568
Manila	6,019	12,656	11,444
Shanghai	5,160	12,948	11,736
Singapore	7,078	11,326	10,114
Yokohama	4,262	12,064	10,852
Vladivostok	4,312	12,123	10,911
Bombay	9,519	9,359	8,147
Africa			
Capetown	10,505	8,330	7,118
Aden	11,802	7,699	6,487
South America			
Callao	4,783	5,732	4,520
Rio de Janeiro	8,360	6,569	5,357

Source: Canadian Ports and Seaway Directory 1965, (Gardenvale, Quebec; National Business Publications Ltd.), pp. 48-49.

Finally grain has a stowage factor of one. This means that one ton of wheat fills forty cubic feet: its free flowing nature allowing for no waste space.[5]

An important advantage of the Pacific Coast lies in its position in relation to the shipping patterns in the world. Generally speaking ships from Europe unload their cargoes all along the Pacific seaboard of North America, thus arriving in the vicinity of Vancouver or British Columbia ports looking for a return cargo. A brief study done a few years ago illustrates this point. The study was done to show how ships spread out around the world once they leave their home ports in Europe. Of the 245 vessels that were charted, six reached Vancouver and all six listed Vancouver as their terminal port.[6] In other words Vancouver was the last port of call before starting the return journey to Europe. On the other hand the same survey indicated the vessels reaching Los Angeles and San Francisco had further ports of call before starting the return journey to Europe. This would indicate that, since grain is a bottom cargo, Vancouver and British Columbia ports are very favourably located for the loading of such cargoes.

The final and obvious advantage of British Columbia ports for grain shipping is their proximity to the markets of the Orient. The advantage in this regard is so great that there is no question of Eastern Canadian ports being competitive. Greater shipping distances and higher handling charges

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[5]McElwee, op. cit., p. 237.

[6]F. W. Morgan, Ports and Harbours (London; Hutchinson's University Library, 1952), p. 107.

involved in double handling in the East makes the Pacific Coast the only economical export point for grain to the Orient. It should be remembered, of course, that British Columbia shares this advantage with the United States ports immediately to the south.

Distances from the markets for exports from British Columbia ports are very great and probably constitute the most serious disadvantage of the Pacific ports in world trade. This is true particularly of the major European markets which are far closer to Eastern Canada than to Western Canada (Table II). Therefore despite the many advantages listed previously there is a great need for efficient port facilities to overcome some of the costs of long distance. In effect the higher costs of long distance by ocean shipping have to be offset by lower land transport costs and lower transfer costs from rail to ship.

In Canada, the land transport costs for grain are stable and reasonably low. The well known Crows Nest Pass grain rates are set by statute, which means that only in extraordinary circumstances will grain rates be changed. It would appear, in fact, that any revision of these rates, either up or down, is out of the question. Under these circumstances the advantages and disadvantages of West over East as an export point to Europe must be in terms of port facilities and ocean freight rates. Similarly in the Far East trade, part of Canada's ability to sell to this market will rest on the port's ability to handle grain, when compared with United States Pacific ports. Therefore it is necessary to look at

British Columbia's grain handling facilities.

Elevator Capacities

There are four ports on the British Columbia coast that have grain elevator facilities. Vancouver has by far the greatest proportion of the installations, with six of the nine elevators on the coast. Victoria, Prince Rupert and New Westminster each have one. The six Vancouver elevators make up 88% of the total registered storage capacity on the Pacific Coast, or 21.8 million bushels out of 24.9 million bushels. It was noted in Chapter I that most of this capacity was installed many years ago. In 1933 there was 18,716,500 bushels of storage capacity in Vancouver. Since that time the additions have been relatively minor. The latest addition to capacity was made in 1959 when one million bushels were added to the United Grain Growers installation. Nothing has been added at the other ports that export grain. This does not mean to say that improvements have not been made. Over the years new equipment has been developed and installed and old equipment has been replaced. For example, cleaning and drying equipment has been improved considerably since the original was installed. As old machinery wears out or new demands are placed on the elevators the latest and most efficient equipment has been installed.

In spite of this, the basic plant has changed little over the years. Furthermore the plant, consisting of large concrete silos, is by nature long-lasting and permanent. Even after 40 and 50 years of use the grain elevators still appear to be in good condition. Most of the people interviewed for

this study felt that the original concept of the terminal elevator had been so well developed that there was actually little room for improvement. This appears to be borne out in practice because the new Saskatchewan Wheat Pool Elevator, now being built in Vancouver, follows the same basic design of the elevators built in 1920.

Even though it is easy to be complimentary about the basic elevator plant, there are some operational problems that still arise that have not been overcome. A study of the data relating to the various stages of the elevator operation reveals where these problems lie. Generally speaking a grain elevator can load grain to a ship far faster than any of the other operations such as drying, unloading boxcars or cleaning. Table III shows the various capacities of the terminal elevators in British Columbia. In any eight-hour shift all of these elevators can load 2,061,000 bushels to ships. In the same period of time only 965,000 bushels can be unloaded from rail cars (Table III). It is in drying, however, that the real bottlenecks arise. All of the elevators in British Columbia can clean 1,449,000 bushels of grain in twenty-four hours and a mere 196,000 bushels can be dried in the period. The small drying capacity can be explained by the fact that drying is only an intermittent operation. Damp grain is a result of poor harvest conditions on the prairies such as cold, wet, or snowy weather. Grain harvested under these conditions cannot meet Canadian Wheat Board standards for export without undergoing the drying process. As a rough average this only occurs about once every three years. Consequently

TABLE III

OPERATING CAPACITIES OF BRITISH COLUMBIA TERMINAL ELEVATORS
(bushels in thousands)

City	Company	Rated Capacity	Working Capacity	Method of Unloading	Amount Unloaded in 8 hr. Shift Cars / (bushels)*	Cleaning Capacity 24 hrs. (bushels)	Drying Capacity 24 hrs. (bushels)	Shipping Capacity 1 hr. / 8 hrs. (bushels)	Shipping Berths	Depth at Low Water (ft.)	Length of Wharf (ft.)	Railroad Serving
Vancouver	Alberta Wheat Pool	7,300	6,400	Car Dumpers	125 / 233	325	40	40 / 320	2	32-35	N.A.	C.P.R.
Vancouver	Pacific Elevators #1 & Annex and NHB #1	7,112	6,000	Power Shovels (manual)	136 / 253	275	48	60[a] / 480	3	35	2,500	C.N.R.
Vancouver	Pacific Elevators #2	600	400	Power shovels	14[b] / 26	60	Nil	10 / 80	1	35	N.A.	C.P.R.
Vancouver	Saskatchewan Wheat Pool	1,650	1,400	Power shovels	45 / 84	150	24	33 / 267	2	35	2,610	C.N.R.
Vancouver	United Grain Growers Ltd.	3,645	2,500	Car Dumper	60 / 112	300	24	27 / 213	2	28-40	N.A.	C.N.R.
North Vancouver	Burrard Terminals Ltd.	1,500	1,000	Power shovels	28[c] / 52	48	12	17 / 133	1	N.A.	N.A.	C.N.R.
New Westminster	Pacific Elevators Ltd.	750	500	Power Shovels	40[d] / 75	75	12	20 / 160	1	30	975	C.N.R.

*Calculated on the basis of average Pacific Coast unloading of wheat per boxcar of 1,862 bushels in 1964-65.
Source: Sanford Evans, Grain Trade Year Book (Winnipeg, 1966).

*Based on wheat standard of 60 lb. per bushel.

[a]Could only load at this rate if a ship at each berth. Otherwise at each berth hourly loading capacity is 20,000 bushels per hour. One ship cannot be loaded at 60,000 bushels per hour.

[b]None when vessel being loaded.

[c]Reduced 1/3 - 2/3 when loading vessel.

[d]Reduced to 24 when loading vessel.

TABLE III (continued)

City	Company	Rated Capacity	Working Capacity	Method of Unloading	Amount Unloaded in 8 hr. Shift Cars (bushels)*	Cleaning Capacity 24 hrs. (bushels)	Drying Capacity 24 hrs. (bushels)	Shipping Capacity 1 hr. / 8 hrs. (bushels)	Shipping Berths	Depth at Low Water (ft.)	Length of Wharf (ft.)	Railroad Serving
Victoria	Victoria Elevator Ltd.	1,040	850	Power shovels	28 / 52	96	24	21 / 168	1	31-48	800	C.N.R.
Prince Rupert	Canadian Government Elevator	1,250	850	Power shovels	42 / 78	120	12	30 / 240	1	43-70	1013	C.N.R.
British Columbia Totals		24,847	19,900		518 / 965	1,449	196	258 / 2,061	14			

*Calculated on the basis of average Pacific Coast unloading of wheat per boxcar of 1,862 bushels in 1964-65.
Source: Sanford Evans, Grain Trade Year Book (Winnipeg, 1966).

*Based on wheat standard of 60 lb. per bushel.

Sources: 1. Grain Elevator Companies in interviews and personal correspondence.

2. Pacific Coast Grain Conference, Report of Immediate Problems Committee, 1961. Unpublished mimeo.

3. Sanford Evans, Grain Trade of Canada (Winnipeg, 1966).

4. Dominion Bureau of Statistics, Grain Elevators in Canada (Ottawa; Queen's Printer, 1965).

5. Canadian Ports and Seaway Directory, 1965 (Gardenvale, Quebec; National Business Publications Ltd.), pp. 229-300.

the elevator companies are reluctant to install more capacity when utilization is so sporadic. It should be realized however that grain drying will be a recurring problem as long as the drying capacities are not increased.

From the information that could be gathered for this thesis it would appear that grain cleaning is not a serious problem and rarely causes bottlenecks. Loading of grain ships is usually an intermittent operation, sometimes being done at full capacity while at other times several days may go by without any ships being loaded. This allows grain to build up in the storage bins in the elevator. Then when a ship arrives to load it can be filled as rapidly as possible without any hold-up caused by cleaning or boxcar unloading capabilities. It is conceivable that in the event of prolonged heavy shipments a problem would arise because of a lack of sufficient grain in the elevator. This becomes a particular concern when the various grades of grain are considered and will be dealt with more fully in a later chapter.

A common question asked about British Columbia grain elevator facilities concerns their true capacity. Table III indicates that over two million bushels of wheat could be loaded each day. This, however, is only an estimate made up of total rated capacities of machinery. Obviously this is impossible to maintain. If two million bushels could be loaded each day British Columbia would be capable of exporting forty million bushels of grain each month, assuming 20 working days

a month. The record to date is about 30 million bushels,[7] which is considerably more than the 21 million bushel capacity estimated in 1961. The conditions under which the very high figure of 30 million bushels of exports for one month was attained could not be considered ideal. First there was a constant queue of ships in the harbour at Vancouver. Secondly a backlog of ships had built up because of a lack of grain in the previous month. Therefore the very high output for this month can be considered as extraordinary and unlikely to be maintained for an extended period of time. A through-put around the 20 million bushel level is attainable with existing facilities. In the 1963-64 crop year the Pacific Coast regularly handled close to or over 20 million bushels per month (Table IV); having handled this quantity in seven of twelve months. A conclusion that can be drawn from these figures is that the 21 million bushel estimate of capacity is probably a good one over the long run. The present facilities are capable of much higher outputs for short periods but these higher outputs are often at the expense of smooth low cost operation because overtime is required in the elevators and ships may be required to wait for loading. Neither of these conditions is tolerable for extended periods.

Shipping Facilities

Harbours and port facilities for ships are an important aspect to be considered in an over-all analysis of grain handling. They are very much a part of the total operation of

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[7]"B.C. Grain Exports for the Month of March," Harbour and Shipping, XLIX (April 1966), 270.

TABLE IV

MONTHLY SHIPMENTS OF GRAIN BY OCEAN SHIPPING FROM BRITISH COLUMBIA SEMI-PUBLIC TERMINAL ELEVATORS FOR CROP YEARS 1963-64 AND 1964-65

(thousands of bushels)

	Prince Rupert		Victoria		Vancouver & New Westminster		Total	
	1963-64	1964-65	1963-64	1964-65	1963-64	1964-65	1963-64	1964-65
August	-	639	246	531	10,801	15,625	11,047	16,793
September	786	922	495	1,358	14,594	13,114	15,875	15,393
October	493	995	867	302	18,433	17,761	19,793	19,058
November	702	444	684	533	18,384	12,984	19,770	13,961
December	1,206	969	343	620	14,061	16,751	15,610	18,339
January	1,576	-	1,013	647	22,824	13,947	25,413	14,594
February	504	935	338	660	15,458	16,476	15,846	18,071
March	889	1,128	866	858	17,675	17,787	19,430	19,773
April	1,306	786	987	1,172	20,240	18,511	22,533	20,469
May	1,058	1,166	817	534	19,038	15,173	20,913	16,872
June	901	1,150	783	670	19,229	10,920	20,913	12,740
July	1,055	991	498	982	17,238	7,159	18,791	9,132
Total for year	10,475	10,124	7,938	8,865	207,974	176,206	226,386	195,195

Source: Dominion Bureau of Statistics, Grain Trade of Canada (Ottawa; Queen's Printer, 1963-64 and 1964-65 issues).

transferring grain from land to ocean transportation. On the British Columbia coast the four grain handling ports have fine deep water harbours. Vancouver, for example, has only one limitation to its excellent sheltered harbour,[8] that being the First Narrows entrance with a minimum water depth of 40 feet at low tide. However few of the loading wharves have this water depth. As Table III shows, most of the shipping berths have about 35 feet of water at minimum low tide which clearly limits the harbour more than the First Narrows entrance. Within the harbour there is adequate space for maneuvering vessels and water depths are no problem within the main harbour area between the First and Second Narrows. Unpredictable currents are a problem around Ballantyne Pier. This is caused by a back eddy into Coal Harbour and ships have to use some care when moving about this area.[9] There is also some problem in berthing ships at the Alberta Wheat Pool, which, being close to the Second Narrows is affected by the swift tidal run through the narrows. Beyond these minor limitations there are no other major problems at the eleven grain berths in Vancouver.

New Westminster is probably the least desirable grain port on the British Columbia Coast. First it is up the Fraser River about 20 miles from the Georgia Strait. Navigation up the river requires a pilot and consequently an extra charge to the vessel. The second drawback of New Westminster is that

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[8]See the unpublished Masters Thesis (University of British Columbia, 1952) by I. H. B. Cornwall, "A Geographical Study of the Port of Vancouver in Relation to Its Coastal Hinterland," p. 11.

[9]Cornwall, p. 14.

the channel is only 30 feet at low water, thus restricting the port to handling the conventional freighters sailing today. Because the elevator in New Westminster is small, however, the larger deep-draft vessels will not call at the port for grain. Therefore the channel is adequate for present grain facilities.

Victoria has a very small harbour for ocean shipping, with just two wharves, one for general cargo and another for grain loading. The harbour is an artificial one, entirely protected by a large breakwater which is constructed to a considerable height to provide wind protection as well as a wave protection. One ship can be berthed for loading grain at one time. Water depth is quite good, varying from 32 to 48 feet along the 800 foot grain loading pier. There is very little room within the confines of the Ogden Point breakwater to expand shipping facilities, either for grain or general cargo.

Prince Rupert has one of the finest harbours on the Pacific Coast from the standpoint of water depth and shelter. There is a large harbour area that allows easy maneuvering. No restrictions are placed on vessels due to water depths. The shallowest part of the approach to the harbour is 21 fathoms. The one loading berth at the Canadian Government Elevator has a minimum depth of 43 feet dropping off to 70 feet at the deepest point on the 1,013 foot pier. Under these conditions Prince Rupert is capable of loading any size grain vessel that is now in use.

Rail Facilities

Railway facilities are another important part of the grain handling operation through the ports of British Columbia.

The ports receive grain from the interior of Canada on three railways: the Canadian Pacific, the Canadian National and the Pacific Great Eastern. Of the three the Pacific Great Eastern is insignificant. In 1964-65 this railroad delivered only 213 cars of the 99,512 cars delivered to British Columbia Ports (Table V). The other two railways divide the traffic almost equally, with the Canadian Pacific Railway generally delivering a few more than the Canadian National Railway. In 1964-65 the Canadian Pacific delivered 51% and the Canadian National delivered 49% of all cars. In the Port of Vancouver the Canadian Pacific Railway delivers the most boxcars, ranging from 53% to 64% between 1959-60 and 1964-65.

Railway capacity to deliver grain has been studied closely by the Canadian National Railway, Canadian Pacific Railway, and Canadian Wheat Board in the past few years because of recent large export orders. On the prairies there is little problem. Large track mileage exists for picking up the grain, although scarcity of boxcars occasionally arises. In periods of heavy movement the wide dispersal of grain cars across the prairies can lead to inefficiencies because turnarounds cannot be affected as quickly as would be the case if more centralized pickups were possible. The capacities of mainline track have also been taxed, although capacities have been expanded with the use of centralized traffic control. This has helped speed up the greatly increased traffic into British Columbia, not only of grain, but of new export commodities such as potash and sulphur.

TABLE V

DISTRIBUTION OF BOXCARS TO BRITISH COLUMBIA PORTS 1959-60 AND 1964-65

	Total Boxcars Delivered to:									
	Vancouver - New Westminster						Victoria		Prince Rupert	
	C.P.R.	% of B.C. Total	C.N.R.	% of B.C. Total	P.G.E.	% of B.C. Total	C.N.R.	% of B.C. Total	C.N.R.	% of B.C. Total
1959-60	42,386	59	23,234	32	173	-	1,914	3	4,455	6
1960-61	48,014	54	32,586	37	241	-	3,753	4	4,541	5
1961-62	51,822	52	40,375	40	215	-	3,076	3	4,699	5
1962-63	43,966	49	39,376	44	217	-	3,432	4	2,360	3
1963-64	59,346	51	47,012	40	245	-	4,237*	4	5,521	5
1964-65	50,930	51	38,096	38	213	-	4,687	5	5,586	6

	Total British Columbia							
	C.P.R.	% of B.C. Total	C.N.R.	% of B.C. Total	P.G.E.	% of B.C. Total	Total	% of B.C. Total
1959-60	42,386	59	29,603	41	173	-	72,162	100
1960-61	48,014	54	40,880	46	241	-	89,135	100
1961-62	51,822	52	48,150	48	215	-	100,187	100
1962-63	43,966	49	45,168	51	217	-	89,351	100
1963-64	59,346	51	56,768	49	245	-	116,359	100
1964-65	50,930	51	48,369	49	213	-	99,512	100

*Includes 2 C.P.R. cars.

Source: Dominion Bureau of Statistics, Grain Trade of Canada 1964-65 (Ottawa; Queen's Printer), pp. 40-41.

Switching facilities in each port are important to the smooth flow of grain. In Vancouver the waterfront elevators receive their grain cars after they have been sorted in the railway yards at Port Coquitlam (C.P.R.) and Port Mann (C.N.R.). Both of these marshalling yards are currently being improved so they can handle more traffic. It is the sidings at the elevators that tend to be a problem. There is limited trackage at many of the elevators, particularly on the south shore of Burrard Inlet. This means that frequent car spotting is necessary. In one instance for example, four separate car spots are necessary each day to allow the elevator to unload at its economic capacity.[10]

On the North Shore the new Saskatchewan Wheat Pool elevator along with the Canadian National Railways' large 27 million dollar improvement program should provide adequate switching facilities to this area.[11]

In Prince Rupert there is little problem with railway trackage, since the elevator is immediately adjacent to the marshalling yard of the C.N.R. Similarly in New Westminster no great problem with boxcar spotting is felt because the size of the elevator does not demand heavy movement. Victoria cannot be considered ideal as far as rail facilities are concerned because every boxcar unloaded on Vancouver Island has to be

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[10]D. Yates, "Grain and the Port of Vancouver," Symposium on the Port of Vancouver Proceedings, ed. Robert W. Collier (U.B.C., 1966), p. 90.

[11]Information in a letter to the author from Mr. R. Phillips, Research Director of the Saskatchewan Wheat Pool, June, 1966.

ferried across by barge. This is a slow and costly process because it involves extra shunting and switching, barge hauling and slower turnaround for boxcars than when they are unloaded on the mainland.

The brief description of rail facilities above does not attempt to set some figure of capacity on how much grain the railways can deliver. This would vary depending on the volume of other traffic they have to haul. The capacity for spotting cars at any siding will depend to some extent on the number of cars that have to be spotted at other railway sidings or the amount of shunting and sorting necessary in the yards. It is known that during 1963-64 the railways delivered up to 500 boxcars per day to Vancouver alone.[12] This is close to maximum capacity for the elevators because without overtime the unloading capacity in Vancouver is 400 cars per day. To unload another 100 cars per day requires double shifting or overtime. It would appear then, that railway facilities are adequate to serve present grain handling facilities in British Columbia but future expansions in elevators will likely require similar expansions of rail capacity.

Comparative Elevator Operations - B.C. and Eastern Canada

A useful comparison can be made between western and eastern elevator operations by comparing the relative yearly turnovers of capacity in the west and east. In British Columbia the total rated storage capacity of 24.9 million bushels turned over 9.14 times in the 1963-64 crop year. This is the highest turnover in the 1960-61 to 1964-65 period. In

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[12] Yates, op. cit., p. 88.

the individual ports of Vancouver-New Westminster, Prince Rupert and Victoria the turnover was 9.28, 7.70, and 8.16 respectively. Table VI shows this utilization factor for the past five years. In 1963-64 the Lakehead elevators turned over capacity 4.23 times while the eastern elevators turnover was 5.86, both of which are much lower than western terminal elevator turnover (Table VII).

The performance of the western elevators is even more significant when the operations of west and east are compared. Lakehead elevators are primarily used for cleaning and grading grain and forwarding to eastern elevators for export or domestic use. Table VIII shows the disposition of grain from the Lakehead for 1964-65 which can be considered a representative year. 98.3% of wheat and 79.4% of oats forwarded from the Lakehead is transferred to eastern elevators. Somewhat smaller proportions of other grains are forwarded to eastern elevators but in total eastern elevators are the destination of 89% of Lakehead shipments. Another 4% is forwarded to United States elevators or Canadian mills or maltsters. Thus 93% of Lakehead shipments are transferred to other elevators. The great significance of this fact is that virtually all of these shipments are made in bulk loading lake vessels. The Lakehead operation, therefore, is relatively simple, consisting of dumping boxcars, cleaning and grading, and loading one type of vessel. Similarly the eastern elevators have a simple operation. Their job consists of unloading the lake vessels, elevating the grain and loading deep sea vessels. No cleaning or grading is involved.

TABLE VI

TURNOVERS OF TERMINAL ELEVATOR CAPACITY IN BRITISH COLUMBIA 1960-61 TO 1964-65
(thousands of bushels)

	Total Capacity*	1960-61 Shipments**	1960-61 Turnover	1961-62 Shipments	1961-62 Turnover	1962-63 shipments	1962-63 Turnover
Vancouver - New Westminster	22,557	152,210	6.75	174,239	7.72	157,131	6.97
Victoria	1,040	7,092	6.82	5,042	4.85	6,276	6.03
Prince Rupert	1,250	9,889	7.91	10,268	8.21	4,309	3.45
All British Columbia	24,847	169,191	6.81	189,549	7.63	167,716	6.75

	1963-64 Shipments	1963-64 Turnover	1964-65 Shipments	1964-65 Turnover
Vancouver - New Westminster	209,423	9.28	177,106	7.85
Victoria	8,006	7.70	8,995	8.65
Prince Rupert	10,206	8.16	10,173	8.14
All British Columbia	227,635	9.16	196,274	7.90

*Same for each year.

**Includes rail shipments which are insignificant.

Sources: Dominion Bureau of Statistics, Grain Trade of Canada 1964-65 (Ottawa; Queen's Printer), various issues.

TABLE VII

TURNOVERS OF EASTERN AND LAKEHEAD TERMINAL ELEVATOR CAPACITY 1960-61 TO 1964-65

(thousands of bushels)

	1960-61			1961-62		
	Capacity	Shipments	Turnover	Capacity	Shipments	Turnover
Lakehead - Fort William Port Arthur	93,152	320,433	3.44	97,582	251,753	2.57
Eastern Elevators	110,435	444,255*	4.02	110,955	441,580	3.98
Lakehead + Eastern Elevator Shipments minus Lakehead Shipments to Eastern Elevators						

	1962-63			1963-64			1964-65		
	Capacity	Shipments	Turnover	Capacity	Shipments	Turnover	Capacity	Shipments	Turnover
Lakehead - Fort William Port Arthur	101,741	290,107	2.85	106,421	449,916	4.23	106,421	385,658	3.62
Eastern Elevators	108,575	441,713	4.07	119,585	700,815	5.86	120,335	515,286	4.28
Lakehead + Eastern Elevator Shipments minus Lakehead Shipments to Eastern Elevators	210,316	480,290	2.28	226,006	740,548	3.28	226,756		

*Includes United States grain handled in Canadian elevators.

Source: Dominion Bureau of Statistics, Grain Trade of Canada, 1964-65 (Ottawa; Queen's Printer).

TABLE VIII

DISTRIBUTION OF PRIMARY SHIPMENTS OF CANADIAN GRAIN FROM THE SEMI-PUBLIC AND PRIVATE TERMINAL ELEVATORS, FORT WILLIAM - PORT ARTHUR, CROP YEAR 1964-65

(thousands of bushels)

	Wheat	%	Oats	%	Barley	%	Rye	%	Flaxseed	%
Transfers:										
By vessel to:										
Eastern Elevators	273,197	98.3	34,680	79.4	26,653	55.5	1,393	29.3	5,598	57.0
United States points	-		277	.6	7,161	14.9	2,433	51.1	-	
By rail to:										
Eastern Elevators	24	-	84	.2	4	-	-	-	181	1.8
Domestic Shipments										
By vessel to:										
Canadian points - eastern division (mills & maltsters)	209	.1	60	.1	4,409	9.2	-	-	-	-
By rail to:										
Canadian points - eastern division	241	.1	777	1.8	102	.2	33	.7	-	-
United States points	-		150	.3	46	.1	-		-	
Milled & processed locally	3	-	39	.1	4,656	9.7	2		-	
Exported overseas	4,108	1.5	7,633	17.5	4,968	10.4	898	18.9	4,049	41.2
Totals	277,782	100.0	43,699	100.0	47,999	100.0	4,758	100.0	9,828	100.0

Source: Dominion Bureau of Statistics, Grain Trade of Canada, 1964-65 (Ottawa; Queen's Printer), p. 24.

In British Columbia, on the other hand, all of the operations carried out in the Lakehead and eastern elevators are combined at one point. In other words, boxcars are unloaded, grain is cleaned, dried and graded, stored for a time and finally loaded to the great variety of ocean shipping that arrives to load grain. All of this is carried on in a much smaller elevator plant, as has already been pointed out. The varying capacities to handle grain at the various phases of the elevator operation clearly raises the possibility of bottlenecks. This possibility only increases if there are not intervening cushions of storage to alleviate temporary problems in one or more operations. In the east these insurances against breakdown are very much greater than they are in British Columbia. For example between cleaning, drying and grading at the Lakehead elevators, there are 106 million bushels of Lakehead storage plus the 122 million bushels of eastern elevator storage plus that loaded in lake vessels on the way to eastern elevators. Therefore if boxcars are held up for a period, loading of grain ships will not be tied up for lack of grain. Conversely, if a temporary shortage of ships occurs in Montreal, unloading and cleaning will likely carry on at the Lakehead because lake vessels will continue to load. The east, therefore, with its huge installations of elevator capacity, can have breakdowns in part of the operation, without serious consequence. Such cushions are not available at British Columbia terminals. Even a short delay in boxcar deliveries due to slides or derailments, will result in tieups of shipping because grain supplies are rapidly depleted.

A fair conclusion to make here is that the British Columbia terminal elevator operation requires very careful and tight scheduling. There is little room for breakdowns at any phase without the whole grain handling operation being slowed, if not stopped.

CHAPTER III

TRENDS IN GRAIN EXPORTS THROUGH BRITISH COLUMBIA PORTS

A thorough analysis of all aspects of the volume of grain shipments in British Columbia is necessary in order to provide a basis for projecting future grain handling needs. Such an examination includes trends in total volumes, in origin and destination of grain, in seasonability and in volumes loaded to each vessel.

Volume of Grain

The most striking aspect of British Columbia grain shipments is the upward trend in total volume. Table IX shows this trend quite clearly over the post-war period. The figures in Table IX are for wheat only, but because wheat makes up 90% or more of Canada's grain exports and 80% or more of British Columbia grain exports the figures would change little for total grain exports from all ports. The figures are not representative for each individual port, however. Appendices I, II and III show exports of grain from individual ports for the past ten years. From these tables the trends in other grain can be seen. Of greatest importance in the trends is the fact that both Prince Rupert and Victoria are now specializing in wheat shipments, whereas only a few years ago they specialized in other grains. Victoria formerly shipped oil seeds as well as wheat, and Prince Rupert formerly handled only barley. Apparently most of this traffic has now been switched to

TABLE IX

HISTORICAL REVIEW OF CANADIAN WHEAT EXPORTS 1944-45 TO 1964-65
(thousands of bushels)

	1944-45	1949-50	1954-55	1959-60	1960-61	1961-62	1962-63	1963-64	1964-65
Vancouver-New Westminster	7,239	61,339	78,176	92,246	118,720	145,520	129,748	153,439	136,269
%*	3.0	37.0	37.8	39.7	38.5	45.3	43.4	28.6	37.2
Victoria	288	-	1,410	2,822	5,467	4,427	6,222	7,937	8,705
%	.1		.7	1.2	1.8	1.4	2.1	1.5	2.4
Prince Rupert	224	-	315	-	-	-	3,533	10,475	10,124
%	.1		.1				1.2	1.9	2.8
Total B.C.	7,750	61,339	79,901	95,068	124,187	149,947	139,503	171,851	155,098
%	3.2	37.0	38.6	40.0	40.3	46.7	46.7	32.0	42.4
Total Canada	238,427	165,969	206,829	232,629	308,433	321,264	298,925	535,700	366,740
%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Per cent of total Canadian wheat exports.

Source: Board of Grain Commissioners, Canadian Grain Exports for the Crop Years 1963-64 and 1964-65 (Ottawa; Queen's Printer), pp. 33-35 and 17.

Vancouver, which will explain the lower proportion of wheat shipments from that port in recent years. During the Second World War very little grain was exported from British Columbia because of difficulties encountered with shipping during the period of war. Since that time however there has been a continuing and vigourous growth in the British Columbia grain trade. In fact prior to 1963-64 British Columbia ports were exporting 40% to 50% of Canada's total exports.

There are two significant features of Table IX that should be noted. The first is that in the 1963-64 crop year the British Columbia share of Canadian exports of wheat dropped sharply from 47% in the previous year to 32% in 1963-64. This occurred in a record year for grain exports for Canada. Noting what was said in Chapter II about handling capabilities in British Columbia, the conclusion can be reached that the Pacific ports are not equipped to handle an increased share of Canada's expanding grain sales. In other words, although British Columbia, along with the rest of Canada, did a record grain export business in 1963-64, Pacific coast facilities were not adequate to share proportionally in shipping the heavy volumes of that year. The second feature to note from Table IX is the recent growing significance of the small ports of Victoria and Prince Rupert. Indications are that after years of relative idleness these facilities are now being utilized at close to full capacity. The fact that these two small elevators shipped 5% of Canada's wheat exports and turned over capacity between eight and nine times in 1964-65 indicates this quite clearly.

Seasonability

A feature of grain handling that affects the total size of the grain handling installation in Canada is seasonability. In eastern Canada the handling capacity on the Great Lakes and Eastern Ports is limited by the length of the navigation season on the St. Lawrence River. Each year grain exports are halted from this region for three or four months. On the Pacific Coast this does not occur because each port has an open shipping season for the entire year (Table X). It might be expected that with the St. Lawrence ports closed three months of the year the Pacific ports would experience a heavier export rate in the winter months and a noticeable slackening during the summer months. This is not the case as a study of Table X reveals. There is not a definite regular seasonal pattern in British Columbia wheat exports. July and August tend to be the slowest months but the pattern is not clear because other slack months appear in winter when the St. Lawrence Seaway is closed. On the other hand busy months occur when the Seaway is also very busy. For example in the 1964-65 crop year the two slowest months were January and July and the two busiest were October and April. British Columbia, therefore, has a non-seasonal pattern of grain exports. Furthermore, British Columbia ports have a more constant flow of exports than the ports on the St. Lawrence. Even during the shipping season, fluctuations at the St. Lawrence ports are greater.

The situation described above makes British Columbia an ideal location for grain elevators from an operational

TABLE X

CANADIAN WHEAT EXPORTS BY MONTHS AT PACIFIC AND ST. LAWRENCE PORTS, 1960-61 TO 1964-65

(thousands of bushels)

	Pacific Ports					St.Lawrence River Ports				
	1960-61	1961-62	1962-63	1963-64	1964-65	1960-61*	1961-62	1962-63	1963-64	1964-65
August	7,754	14,623	9,227	9,864	14,062	5,280	12,820	5,465	10,445	19,172
September	8,459	11,527	6,384	14,005	14,380	8,855	7,123	8,343	16,894	18,341
October	7,615	9,903	10,758	16,532	17,237	9,081	17,758	14,296	33,428	18,799
November	4,938	9,172	6,798	15,001	11,246	17,227	30,702	25,079	43,139	19,653
December	10,432	10,668	13,169	13,014	14,111	9,634	7,181	5,238	22,190	9,513
January	9,410	13,748	15,921	18,271	9,740	6,872	149	-	1,808	231
February	11,085	16,572	13,884	11,612	10,957	9,425	149	-	-	-
March	11,136	15,156	13,932	14,651	13,678	12,235	93	-	-	107
April	12,684	13,013	16,373	16,921	18,156	18,227	8,762	11,939	20,111	10,792
May	14,203	14,837	15,859	13,529	14,117	24,105	17,010	16,853	40,255	19,035
June	15,798	8,876	12,043	12,612	10,092	18,428	12,599	11,653	49,915	19,585
July	10,675	11,852	5,174	15,839	7,322	13,770	6,130	12,199	42,505	16,301

*Includes Atlantic Seaboard Ports.

Source: Dominion Bureau of Statistics, Grain Trade of Canada, 1960-61 to 1960-64 Issues (Ottawa; Queen's Printer).

standpoint. It means that with a year-round shipping season an elevator can be one-quarter to one-third smaller on the Pacific Coast than an elevator on the St. Lawrence but still turn over the same amount of grain annually. In addition the greater regularity of shipping on the Pacific further reduces the size of installation needed. Going back to Tables VI and VII in Chapter II, the data on the turnovers of elevator capacity support this conclusion. It is an important fact to keep in mind when future expansions are considered.

Destinations of Grain Exports

Total export figures have indicated that shipments are increasing from British Columbia ports, but they give no indication of why they are increasing. To get behind the trends it is necessary to analyze the individual destinations of grain exports. Probably the most striking trend in grain exports from British Columbia is the decline in the importance of the European market. Wheat exports from British Columbia ports to Western Europe have declined 50% from 1955 to 1964 (Appendix IV). This has been offset to some extent by growth of the Eastern European market (excluding Russia) but not enough to prevent an over-all decline of European exports of 34%. Within the European market Britain remains the major country of destination for British Columbia wheat exports although the decline to that country has been just as rapid as to other European countries. Other major European importers that are showing declining imports from British Columbia are Belgium, Luxembourg, Germany, Scandinavia and Italy.

In the Far Eastern market trends for British Columbia and Canada are showing extremely rapid growth, having quadrupled in the past decade to become the major destination of British Columbia wheat. China is Canada's newest customer in the Far East and is now the largest in this area. Japan, long a regular purchaser of Canadian wheat, has increased its imports 66% over 1955 but since 1960 has been a stable market of around 50 million bushels per year. Another regular customer for Canadian wheat, is the Phillipines. Growth of this market has been rapid since 1958 and in 1964 totaled about 8 million bushels. These three markets together, accounted for 98% of British Columbia's wheat trade with the Orient.

The trends in other grains show a mixed pattern. Barley, for example (Appendix V), is declining to European destinations. Britain, the largest customer, took 53% less in 1964 than in 1955. As with wheat the major change in destination has been from Europe to Asia. In 1964 Japan and China accounted for 68% of exports from British Columbia whereas in 1955 Japan took all the barley for the Far East or 34% of exports through British Columbia. In that year the United Kingdom accounted for the other 66%.

Oats imports from British Columbia into Europe show no clear trend. This country seems to do a sporadic trade with all countries (Appendix VI), except for the small amounts to South America. The Netherlands, for example, imported no oats in 1961 but took 65% of exports from British Columbia in 1964. Other European countries show similar violent fluctuations. Since oats are used primarily for feeding livestock there is

little or no demand as yet in the Far East because of the low standard of living.

Now it is necessary to analyze Canadian grain trade statistics to see if British Columbia's share of exports in the various markets is changing. First, in the European market, British Columbia has lost some of its share. The drop in Canadian exports to Europe has only been 20% (Appendix VII) compared to British Columbia's drop of 50% between 1964 and 1965. It can be concluded from these two figures that a greater percentage of European exports are now moving through Eastern Canada. Unfortunately the figures in Appendix III and VII are compiled on a calendar year and crop year basis respectively, so the conclusions that can be drawn from the difference in the two percentages are limited to the very general one made here. In the Far Eastern market there is no question of British Columbia's sharing with other Canadian ports. Thus any trends in grain exports to this area will affect only the ports of British Columbia.

One final trend in exports from British Columbia is the increasing volume of wheat destined for the South American countries of Venezuela, Ecuador and Peru. While the volumes are not nearly as great as the Far Eastern market, it could soon surpass Europe as a destination for wheat if present trends continue. This market has grown proportionally with the Far Eastern market from 2.6 million bushels in 1955 to 11.8 million bushels in 1964 or more than four fold. Venezuela is the chief recipient of these exports and is the fastest growing South American market for exports from British Columbia. South

American countries receive mainly wheat, and small amounts of oats.

Russia is the only other major recipient of wheat from Canada. However exports from the Pacific Coast for this market have been limited, amounting to only 9.5 million and 15.9 million bushels in 1963 and 1964 respectively. This is only about 16% of total volume shipped to Russia in the 1963-64 crop year.[1] Just how much of the new three-year contract with Russia will be shipped by Pacific coast ports is unknown but it has been said that some of it definitely will be shipped via British Columbia.[2]

Origin of Grain Exports

Traditionally the origins of grain shipped from British Columbia are supposed to be west of the rate break or rate equalization point with the Lakehead. Some of these points are Battleford, Kindersley, Kerrobert and Maple Creek, all in western Saskatchewan (Table XI). It should be noted that all the rates quoted for Vancouver are identical to Victoria and Prince Rupert even though Victoria has an extra ferry haul and Prince Rupert is about 200 miles further from the points listed in Table XI. All origin points are between 40 and 100 miles from the Alberta border. This only leaves a small part of Saskatchewan as the economic grain hinterland of British Columbia. There are signs that perhaps this

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[1]Dominion Bureau of Statistics, Grain Trade of Canada 1964-65 (Ottawa; Queen's Printer, 1966), p. 94.

[2]John Best, "Canada Sells $800 Million Wheat, Flour to Russians," Vancouver Sun, June 20, 1966, p. 1.

TABLE XI

RAIL FREIGHT RATES ON GRAIN FOR EXPORT FROM SELECTED POINTS IN ALBERTA AND SASKATCHEWAN AS AT JULY 31, 1965

Origin	Distance to Port Arthur	Distance to Vancouver	Grain rate in ¢ per 100 lbs. to Port Arthur	Vancouver
Battleford, Sask.	1,018	1,018	24	24
Biggar, Sask.	964	1,029	23	24
Elrose, Sask.	1,031	1,133	24	25
Kerrobert, Sask.	1,044	979	24	24
Kindersley, Sask.	1,032	1,079	24	24
Maple Creek, Sask.	1,017	881	23	23
Moose Jaw, Sask.	822	1,067	20	25
Outlook, Sask.	941	1,081	23	26
Brooks, Alta.	1,147	751	25	22
Calgary, Alta.	1,247	642	26	20
Empress, Alta.	1,050	839	24	23
Hanna, Alta.	1,168	942	26	23

Source: Dominion Bureau of Statistics, Grain Trade of Canada, 1964-65 (Ottawa; Queen's Printer), p. 111.

hinterland is becoming larger. The main indication comes from the Saskatchewan Wheat Pool. By building a five million bushel elevator in Vancouver, they are implying that considerably more than a small part of western Saskatchewan will be relied on to keep this facility operating.

The fact that the Saskatchewan Wheat Pool will be drawing grain from a higher freight rate zone does not mean that they will incur the cost of higher freight. If the grain is required to serve markets serviced by the British Columbia ports the Canadian Wheat Board pays the rate differential. By doing this the lowest total shipping cost can be maintained, although costs of rail haulage may be slightly higher. Thus service to customers is more important than strict adherence to freight rate differentials and divisional points. It is not unreasonable to conclude from this that knowledge of the hinterland is not crucial to decisions on shipping grain through Pacific ports. Therefore from the standpoint of future planning, the hinterland or origin of grain is not of great importance.

Vessel Loadings

The final trend in grain shipping through British Columbia ports is the volume loaded per vessel. Information in this area will serve to indicate the type of cargo being loaded and the demands individual ships are making on port facilities. Table X shows that March is consistently a relatively heavy wheat shipping month. Therefore March can be considered a representative month for grain loading in British Columbia ports and is used in this chapter to illustrate

shipping trends. Two things are obvious from Tables XII and XIII. First, ships are loading more grain per vessel today than they did ten years ago. The average load has risen from 247,000 bushels in 1955 to 540,000 bushels in 1966. There are two reasons behind this rapid increase. First, vessels using the port are obviously larger than they were ten years ago. This is clearly shown in Table XII by the figures on the largest cargoes loaded in the various years. The trend is unmistakably upward. Indeed, in March of 1966 five vessels loaded over one million bushels, three more between 800,000 and 1,000,000 bushels and altogether eighteen vessels loaded more than 600,000 bushels.[3] (Table XIII) In 1955 no ship loaded over 500,000 bushels.

The second reason for heavier loadings per vessel probably lies in the changing markets being served. It has already been noted that exports to the Far East are rapidly expanding while those to Europe are tending to decline. The greater grain trade with the Far East, particularly with China, is carried almost exclusively as full cargoes in vessels chartered by the Chinese, whereas the European traffic has been carried as both full cargo and top-off cargo. Hence average load to Europe would be less than to China.[4] Table XIII shows this change. Only 9 of 64 ships or 14% loaded less than

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[3]"B. C. Grain Exports for the Month of March," Harbour and Shipping, XLIX (April 1966), 270.

[4]See the unpublished Graduating Essay (Faculty of Commerce, U.B.C., 1962) by G. R. Wheatley, "Grain Handling Through the Port of Vancouver," p. 31.

TABLE XII

GRAIN CARGOES LOADED PER VESSEL IN MARCH 1955-1966 AT BRITISH COLUMBIA PORTS

(thousands of bushels)

	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Average load per vessel	247	233	289	256	286	315	280	331	378	396	354	540
Largest load	492	561	570	512	570	931	616	899	989	1288	803	1671

Source: "B. C. Grain Exports for the Month of March," Harbour and Shipping, April, various issues.

TABLE XIII

INDIVIDUAL CARGOES LOADED AT BRITISH COLUMBIA PORTS FOR MONTH OF MARCH - SELECTED YEARS

	1955	1960	1962	1965
Less than 100,000 bu.	13	18	23	9
100 - 200 bu.	3	8	6	8
200 - 300 bu.	2	5	6	9
300 - 400 bu.	17	5	8	2
400 - 500 bu.	5	10	13	9
500 - 600 bu.	0	9	12	9
600 + bu.	0	5	4	18
	40	60	72	64

Source: "B. C. Grain Shipments for Month of March," Harbour and Shipping, April, Various issues.

100,000 bushels in March of 1966 whereas in 1955, 13 of 40 or about one-third of vessels loaded less than 100,000 bushels. Thus the trend is definitely away from parcel or partial cargoes.

In summary, the important western forelands for grain from British Columbia have been increasing rapidly. To serve the markets ships are getting larger and elevator facilities are required to load larger and larger cargoes. Such clear trends suggest that changes in port facilities may be necessary before very long. The next chapter looks at the future of the markets in order to determine if changes will be warranted or needed in the long run.

CHAPTER IV

FUTURE OF GRAIN MARKETS

World Grain Consumption

Using some of the information from Chapter III and some further information from world grain trade data an attempt is made in this chapter to give some idea of the future outlook in markets served by British Columbia ports. First, some general observations about the consumption of grain should be made. A misconception that frequently appears when wheat markets are analyzed is that the rapidly expanding population of the world will automatically provide a large market for wheat exports. This is not necessarily the case. Generally, changes in income levels have been the most significant factor affecting wheat consumption.[1] The cycle, stated generally, is one of rising consumption per capita as incomes increase from very low levels. During this stage people change their diets from the cheaper breads made from rye or maize to bread made from wheat flour. Furthermore as incomes continue to rise, constantly more expensive bread and wheat is consumed. People will use bread with higher wheat content or a higher grade of wheat that improves the quality of the product. As incomes rise to even higher levels the per capita consumption of wheat reverses as people substitute still more expensive foods for bread. Table XIV can be used to illustrate each stage of the

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[1] International Wheat Council, Review of the World Wheat Situation, April 1960, p. 16.

TABLE XIV

PER CAPITA HUMAN CONSUMPTION OF WHEAT FLOUR AND OTHER GRAINS IN SELECTED COUNTRIES
(1909-10 - 1956-57)

Country	Cereal	Grain Equivalent - Kilograms per head per year						
		1909-10 to 1913-14	1922-23 to 1926-27	1927-28 to 1931-32	1932-33 to 1936-37	1947-48	1951-52	1954-55 to 1956-57
United States	Wheat	135	114	109	99	91	85	79
	Other grains	NA	NA	NA	27	25	20	18
United Kingdom	Wheat	151	140	134	126	125	117	113
	Other grain	NA	NA	NA	6	12	15	15
Argentina	Wheat	146	142	150	151	166	141	133
	Other grain	NA	NA	NA	13	10	13	7
Germany (W)	Wheat	73	68	73	66	84	77	80
	Other grain	NA	NA	NA	NA	58	45	42
Greece	Wheat	78	119	131	141	126	148	154
	Other grain	NA	NA	NA	48	39	31	23
Turkey	Wheat	117	112	128	127	122	148	177
	Other grain	NA	NA	NA	80	71	61	37
Egypt	Wheat	83	80	86	68	58	84	82
	Other grain	NA	NA	NA	144	150	115	133
India	Wheat	22	22	22	22	NA	21	24
	Other grain	NA	NA	NA	160	NA	121	147
Japan	Wheat	26	25	28	17	21	32	33
	Other grain	NA	NA	NA	169	125	142	141
Brazil	Wheat	27	26	29	24	25	32	NA
	Other grain	NA	NA	NA	71	80	86	NA

Source: International Wheat Council, World Wheat Situation 1960 (London; 1960).

cycle outlined above.

India is an example of the initial phase of the cycle. Over the years India's economic development has not been rapid while population has increased rapidly. As a result the people have remained relatively impoverished and wheat consumption has remained at a constant low level for nearly half a century. Japan, on the other hand, is an example of a country going through rapid economic development and, in turn, rapidly increasing consumption of wheat. Indeed, since the very low per capita consumption level of the 1930's Japan's consumption level had nearly doubled by 1957. No doubt per capita consumption has increased since that time. It is interesting to note that for Japan the levels of consumption of other grains (primarily rice) are showing a corresponding drop with the rise in wheat consumption. The figures indicate the substitution factor is very much in operation in Japan.

The United States and the United Kingdom are examples of countries in the upper income stage of the cycle. Both of these countries have shown a continual drop in wheat consumption per capita over the 50 years shown in Table XIV. The United States, the more prosperous country of the two, has declined 49% in per capita consumption and Britain has declined about 25%. The difference in decline reflects the relative prosperity of the two countries. This leads to the conclusion that the falling per capita consumption of wheat in North America is an irreversible trend as long as prosperity continues.[2] On the other hand in the less developed countries

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[2]Wheat Council, p. 62.

there is huge scope for increasing consumption if the potential demand represented by the large numbers of people can be made effective. Table XV gives an idea of the magnitude of the potential in the very near future. A growing proportion of world population is living in Asia and by 1970 the proportion is estimated at approximately 57%. This is indeed a huge potential market. But potential must be emphasized because the rapidly increasing numbers in the Asian countries complicates their problems of raising living standards[3] and thus activating the market for grain. It could well be that until this swelling population is controlled and real economic progress is made the market for Canada's grain will be limited. Such a conclusion has restricted value however and a much better picture of the future is possible by considering each of the separate markets on an individual basis.

Japanese Grain Market

Canada's longest standing important Oriental market for grain has been Japan but since 1960 Mainland China has surpassed Japan in all but one year (Appendix IV). Canada's share of the Japanese market has been slipping during this period from 55% of the market to 41% in 1964-65 and as low as 34% in the year before (Table XVI). The reasons for the decreasing share of this important market are not clear although the greater competitiveness of the United States may be the most important reason. This aspect is more closely analyzed in Chapter V.

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[3]Barbara Ward, The Rich Nations and the Poor Nations (New York; W. W. Norton and Company, 1962).

TABLE XV

WORLD POPULATION BY REGIONS 1920 - 1970

Region	1920	%	1930	%	1940	%	1950	%	1960	%	1970	%
Europe	328	18.1	355	17.6	380	16.9	386	15.9	424	14.6	457	13.1
U.S.S.R.	158	8.7	176	8.7	192	8.6	200	8.2	214	7.3	249	7.1
North and Central America	147	8.1	169	8.4	187	8.3	212	8.7	262	9.0	311	8.9
South America	61	3.4	75	3.7	90	4.0	109	4.5	140	4.8	179	5.1
Asia	967	53.4	1073	53.3	1213	54.0	1310	54.0	1620	55.6	1980	56.8
Africa	140	7.7	155	7.7	172	7.7	199	8.2	237	8.1	294	8.4
Oceania	9	.5	10	.5	11	.5	13	.5	16	.6	19	.6
Total	1810	100.0	2013	100.0	2245	100.0	2429	100.0	2913	100.0	3489	100.0

Source: International Wheat Council, Review of World Wheat Situation (London; 1960), p. 17.

TABLE XVI

CANADA'S SHARE OF THE IMPORTS OF WHEAT INTO SELECTED COUNTRIES, 1955-56 - 1964-65 (%)

	1955-1956 %	1956-1957 %	1957-1958 %	1958-1959 %	1959-1960 %	1960-1961 %	1961-1962 %	1962-1963 %	1963-1964 %	1964-1965 %
Western Europe (total)	36	32	41	37	42	35	30	35	41	34
Belgium - Lux.	89	90	100	53	75	70	65	73	75	98
Netherlands	30	42	67	49	29	22	11	25	13	14
Switzerland	63	49	63	54	66	58	54	20	61	34
United Kingdom	52	50	52	52	55	50	49	53	50	52
Germany (W)	31	32	33	34	34	40	35	35	52	41
Eastern Europe (total)	44	93	16	35	14	28	99	30	20	48
Poland	63	99	17	34	15	5	93	30	17	36
Bulgaria	-	-	-	0	0	-	0	-	85	76
Czechoslovakia	19	92	0	-	-	100	0	100	54	83
Asia (Far East) (total)	29	16	24	22	20	24	30	20	16	21
China (Communist)	-	-	0	0	-	41	48	35	19	32
Japan	37	38	45	49	50	55	49	49	34	41
Phillipines	-	-	-	71	69	16	37	58	53	44
South America (total)	4	5	6	6	7	6	4	7	8	10
Venezuela	40	13	41	48	31	27	28	54	54	44
Ecuador	84	22	36	100	70	100	80	72	62	-
Peru	8	27	25	17	23	13	2	3	3	7
U.S.S.R.	100	100	100	98	-	100	-	-	63	49

Source: Food and Agriculture Organization of the United Nations, World Grain Statistics (Rome; various issues).

Japan can be classed as a growth market for grain for several reasons. First, it is a country that is rapidly becoming industrialized. In the process the living standards in Japan are rising quite rapidly; hence the growing demand for bread made from wheat rather than the traditional rice. The over-all growth in demand for wheat is about 5% per year and the demand for imports is growing faster because of a shrinking acreage devoted to growing wheat. Japan has a small fully utilized land area and as industrialization progresses the demand for land for factories and housing increases. The land most suitable for these purposes is the dry wheat lands rather than the swampy rice lands. Consequently Japan is experiencing a 10% annual reduction in wheat growing acreage.[4] Japan is not a major market for other grains, although in the past two years substantial purchases of barley have been made.[5]

Chinese Grain Market

Mainland China, the other major Asian market for Canadian grain is a much more difficult market to predict. Unlike Japan, there is no assurance that China will continue to demand imports of wheat over the long term. There is considerable controversy on this subject in Canada. When the grain sales to China were first developing four years ago, there was considerable doubt about China as a consistent market and some even concluded that any outlook for long-term

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[4]Information obtained in an interview with Mr. N. Nakadai, Food Agency, Ministry of Agriculture and Forestry of Japan, June, 1966.

[5]Dominion Bureau of Statistics, Grain Trade 1964-65 (Ottawa; Queen's Printer, 1966), 97.

sales was poor because of rapidly improving Chinese agriculture.[6] On the other side of the argument there are those who see China as a definite long-term market. Mr. C. W. Gibbings, President of the Saskatchewan Wheat Pool, is one who believes this. He does not see China increasing productivity very rapidly and the gains that are made are overcome by population growth.[7] This is a viewpoint based on personal observations of Communist China by people in the Saskatchewan Wheat Pool. The fact that they are building a large terminal elevator indicates their views are not idle speculation but something they, as Canada's largest grain company, are willing to act upon. Further evidence to support their viewpoint came late in 1965 when a new agreement was signed with China to begin August 1, 1966. This was a three-year agreement with a minimum sale of 168 million bushels (56 million bushels per year), and a maximum of 280 million bushels (70 million per year). In addition the contract could be changed to a five-year agreement with a minimum of 280 million bushels purchased.[8] This means China is under agreement to purchase Canadian wheat until 1970 and possibly until 1972. By this time China will have been Canada's second or third largest customer for ten years. With this in mind it seems likely China will continue

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[6]Peter C. Newman, "Backstage in Ottawa," MacLean's, July 6, 1963, p. 2.

[7]C. W. Gibbings, "A Bullish Future for Canadian Grain," Western Business and Industry, XXXVIII (November 1964), 18-19 ff.

[8]L. T. Earl, "A Record Crop and All Sold," Western Business and Industry, XXXIX (November 1965), 26a.

to be a major purchaser of Canadian wheat.

United Kingdom Grain Market

Britain is Canada's chief market for wheat and is one of the most reliable and predictable markets. Canada's share of this market has remained constant at about 50% over the past ten years (Table XVI). Therefore the declines in the market in Britain are due to consumption trends or rising British domestic production rather than Canada losing any share of the market. There is little to indicate that Britain will not continue to be one of Canada's chief markets. The only possible change could occur if Britain entered the European Economic Community. In that event it is probable that Britain would find some of her wheat supply in Europe. The reasoning behind this has pertinence for the European as well as the British market and lies in France's apparent intended objective of becoming a major exporter of wheat. This will be done under a heavily subsidized system of government support.

European Grain Markets

In other parts of Europe under the European Economic Community Canadian wheat exports could also be affected if France's intended policy is successful. The main reason is that Europe cannot be considered a growth market for grain consumption and therefore increased French production would replace imports from outside the Common Market. The per capita consumption in the United Kingdom has been falling throughout the 20th century and as prosperity grows will continue to do so. The same applies to Germany where wheat consumption per capita has changed little in 60 years. Identical

analyses could be applied to most of Western Europe where economic growth is making this area one of the most prosperous in the world.

Eastern Europe and Russia are similar to China, in that predicting their market future is difficult because of lack of information. Past trends and present intentions are the only indicators that are available. Poland is Canada's most consistent customer in Eastern Europe with purchases of grain in each of the past ten years. Other major customers have been Czechoslovakia, Bulgaria and East Germany but their demands have been sporadic. In keeping with these sporadic demands Canada's share of Eastern European imports have also fluctuated (Table XVI). For example Canada has supplied as little as 5% and much as 99% of Poland's imports in the past ten years.

When Russia made its large purchase of Canadian wheat and flour in 1963 it was thought this would be a single purchase to supplement a crop failure. The next two years tended to support this but the recent three year agreement to take 336 million bushels of Canadian wheat and flour[9] practically establishes Russia as a steady customer. The reasons for Russia and other Eastern European countries having to import wheat apparently lie in difficulties of organizing agriculture under the collective system. Moreover there is possibly the fact that agriculture has taken a secondary position to industrialization and hence resources have not been available to keep

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[9]John Best, "Canada Sells $800 Million Wheat, Flour to Russians," Vancouver Sun, June 20, 1966, p. 1.

agricultural productivity in line with population and economic growth. If this is so, and the willingness of Russia to buy ahead for three years certainly indicates that it is, then Canada can look to Eastern Europe and Russia for continued substantial sales of grain.

British Columbia ports are likely to find limited benefit from large Russian sales. As noted in the previous chapter only a small percentage of past sales have moved through British Columbia. Most of the grain is moved in Russian vessels. Hence they tend to favour the closer eastern and St. Lawrence ports. The shipments from British Columbia to Russia logically go to the east coast of Russia and supply eastern Siberia. There are strong economic arguments for this from the Russian point of view since it saves very long rail hauls from the wheat growing areas of Western Russia.

Despite British Columbia's limited participation in the Russian trade there may be secondary or spillover benefits for the West Coast ports. This lies in British Columbia's competitiveness in shipping to Western Europe. Large handlings of Russian wheat in the east could mean a greater proportion of Western European grain being moved through British Columbia ports.

The only other market area of importance to British Columbia is Central and South America. Venezuela and Ecuador are the chief recipients of Canadian wheat and minor amounts of other grains. These countries will be increasing their wheat consumption as they progress from relatively low levels of income, but volumes are not likely to be great. Population

and economic growth in these countries is not great enough for their relative importance to advance beyond the present level and are therefore of minor importance to British Columbia.

Grain shipments from Canada and especially from British Columbia appear to be headed for long-term growth. Demands of ever increasing population, and economic growth assure the future demand for grain, particularly wheat. The ports of British Columbia are well located to serve the main growth markets in Asia and possibly regain some of the share of the European market that has been lost. In brief, the ports of British Columbia will continue to experience growth in grain exports, providing the facilities are available.

CHAPTER V

COSTS OF GRAIN HANDLING

A comparison of the Canadian and American West Coast grain ports is an essential part of a study of future grain handling needs in British Columbia. There are two aspects to the comparison of ports in the two countries. One is the competition between ports provided by the relative adequacy of the facilities. The other aspect is the relative costs involved in using those facilities. Each of these aspects, as they relate to grain facilities, will affect the desirability of a port as a stop for ocean vessels.

The physical aspects of grain handling have already been considered for British Columbia ports in Chapter II, but the analysis is extended in this chapter to include a comparison with United States ports of both physical capacities and costs. Another aspect that affects the demand for grain facilities is the grain supply and market itself. Of prime interest here are features of grain marketing in the United States Pacific Northwest and how they compare to the British Columbia situation.

The Columbia River ports of Portland, Longview, Vancouver and Kalama are, by far, the busiest grain ports on the Pacific Coast of the United States. These four ports account for about 80% of wheat and 87% of the barley and rye shipped through Pacific ports in the United States. Seattle

and Tacoma account for virtually all the remainder with San Francisco and the San Joaquin River in California being insignificant (Table XVII). In effect then, there are two areas of grain shipment on the American Pacific Coast which, for purposes of this analysis, can be represented by two ports. One is Portland, representing the Columbia River ports and the other is Seattle representing Puget Sound ports. Portland is studied because it ships about twice as much grain as any other Columbia River port (Table XVII). Furthermore any costs that apply in Portland will, in almost every case, also apply to the other grain shipping ports of Vancouver, Longview and Kalama, Washington. Seattle is chosen for study for two reasons. First it is presently the busiest Puget Sound port and second, Seattle promises to become much more important in the very near future.

The United States Pacific Ports are well supplied with grain handling facilities with a total of 42.1 million bushels of storage capacity (Table XVIII). The California elevators are little used, however, and actual active capacity is closer to 39.3 million bushels. Of the total active Northwest elevator capacity, 73% is situated in the Columbia ports and 27% is in the Puget Sound at Tacoma and Seattle. In summary the United States Pacific Coast has 14.4 million bushels or 59% more grain elevator capacity than British Columbia. At the same time, however, the United States ports on all of the Pacific Coast have shipped less wheat than British Columbia in two of the past five years and only very slightly more in two others (Table XIX). The American ports export considerably

TABLE XVII

EXPORTS OF GRAIN THROUGH UNITED STATES PACIFIC PORTS 1959-1963

(Short Tons)

Port	1960		1961		1962	
	Wheat	Barley & Rye	Wheat	Barley & Rye	Wheat	Barley & Rye
San Joaquin River (Stockton)	118,043	78,284	174,781	30,692	59,235	253,064
Long Beach	7,716	-	31,050	-	3,976	-
San Francisco Harbour	10,689	2,750	65,060	15,604	31,330	13,565
Oakland	27,370	4,784	41,216	2,800	12,651	3,758
Los Angeles	-	-	5,338	-	644	-
Longview, Wash.	615,425	311,845	662,405	280,464	457,243	251,908
Astoria	5,787	-	790	-	-	-
Kalama, Wash.	-	-	-	-	143,572	35,056
Vancouver, Wash.	890,679	147,096	672,946	60,501	442,877	104,135
Portland, Oregon	1,694,539	337,014	1,553,431	240,168	1,308,749	421,448
Tacoma, Wash.	682,273	32,120	505,188	47,178	282,126	15,889
Seattle, Wash.	573,718	209,377	580,451	192,217	378,530	111,322
Totals	4,626,239	1,123,270	4,292,656	869,624	3,166,657	1,210,145

TABLE XVII (continued)

Port	1963 Wheat	1963 Barley & Rye	1959 Wheat	1959 Barley & Rye
San Joaquin River (Stockton)	61,404	577	131,538	160,708
Long Beach	10,735	-	3,863	-
San Francisco Harbour	25,541	5	6,759	7,984
Oakland	9,731	-	36,062	14,193
Los Angeles	2,106	-	-	-
Longview, Wash.	925,579	224,298	365,357	323,291
Astoria	-	-	32,079	-
Kaloma, Wash.	242,872	-	-	-
Vancouver, Wash.	546,373	66,764	520,577	189,802
Portland, Oregon	2,238,381	244,790	1,055,524	520,153
Tacoma, Wash.	404,616	10,950	215,736	54,622
Seattle, Wash.	547,214	68,296	348,719	256,765
Totals	4,991,980	615,680	2,716,214	1,527,518

Source: Department of the Army Corps of Engineers, Waterborne Commerce of the United States, Part IV (Washington, D.C.; Superintendent of Documents), various issues.

TABLE XVIII

UNITED STATES PACIFIC COAST GRAIN STORAGE CAPACITY
1964

Port	No. of Elevators	Bushels of Capacity	No. of Berths
California			
Long Beach	1	830,000	1
San Francisco	1	2,000,000	1
Oregon			
Portland	5	12,353,000	6
Washington			
Longview	1	7,850,000	2
Kaloma	1	3,326,000	1
Vancouver	1	5,250,000	2
Tacoma	1	4,500,000	1
Seattle	1	6,000,000	2
Total		42,109,000	

Sources: 1) Harbour Directory of Portland, Oregon, Port of Portland Commission, p. 15.

2) Captain T. S. Campbell, ed., Ports, Dues, Charges and Accommodation, 1964 (London; G. Phillip and Son, Ltd., 1964).

TABLE XIX

EXPORTS OF GRAIN THROUGH BRITISH COLUMBIA PORTS, 1960-1964

(short tons)

Port	1960 Wheat	1960 Barley & Rye	1960 Oats	1961 Wheat	1961 Barley & Rye	1961 Oats	1962 Wheat	1962 Barley & Rye	1962 Oats
Vancouver	2,673,264	450,021	36,990	3,732,240	447,011	5,858	3,744,597	239,417	17,559
New Westminster	72,248	-	-	129,797	-	255	71,398	20	-
Prince Rupert	-	121,152	-	-	351,830	-	-	126,179	-
Victoria	110,732	-	-	192,286	-	-	131,304	-	-
Total	2,856,244	571,173	36,990	4,054,323	798,841	6,113	3,947,299	365,616	17,559
Total U.S. Pacific Ports	4,626,239	1,123,270	-	4,292,656	869,624	-	3,166,657	1,210,145	-

Port	1963 Wheat	1963 Barley & Rye	1963 Oats	1964 Wheat	1964 Barley & Rye	1964 Oats
Vancouver	4,430,283	242,796	188,220	4,339,663	56,278	149,461
New Westminster	82,175	-	118	170,129	-	45
Prince Rupert	202,190	2,660	-	337,573	-	-
Victoria	172,991	-	-	246,527	-	-
Total	4,887,639	245,456	188,338	5,093,892	56,278	149,506
Total U.S. Pacific Ports	4,991,980	615,680	-	2,716,214	1,527,518	-

Sources: 1) Department of the Army Corps of Engineers, Waterborne Commerce in the United States, Part IV (Washington, D.C.; Superintendent of Documents), various issues.

2) Dominion Bureau of Statistics, Canadian Shipping Report (Ottawa; Queen's Printer), various issues.

more barley and rye than British Columbia. As a result they have tended to ship more grain in total, although since 1960 the margin has narrowed. Indeed in the very busy year of 1964 British Columbia exported over one million short tons more than the Pacific Northwest ports.

Comparison of Port Facilities

Facilities for loading vessels at the United States ports can be considered equal to or better than those in Vancouver. While storage facilities are not as great at Portland or Seattle as in Vancouver they are adequate to provide the same service as Vancouver for distress or top-off cargoes. For bulk loading the United States facilities are superior to Vancouver at the present time. Both Seattle and Portland have elevators that can load up to 50,000 bushels per hour[1] while the best loading capacity in Vancouver (and British Columbia) is about 40,000 bushels per hour.

Grain shipping from the United States ports is considerably more decentralized than it is in British Columbia. A comparison of the figures in Tables XVII and XIX reveals that the small ports on the Columbia River ship considerably larger tonnages of grain than do the secondary ports of British Columbia. Whereas Vancouver regularly ships close to 90% of British Columbia grain exports, Portland, the major Columbia River port, ships only between 51% and 55% of the grain shipped from that area. Larger capacities in the United

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[1] F. S. Campbell, ed., Ports, Dues, Charges and Accomodation (London; G. Philip and Son Ltd., 1964), pp. 642 and 646.

States small ports relative to Canada is the reason for this situation and indicates that service in small ports is superior to Canada. The implication for shipping is that there is a wider choice of ports in which to load grain cargoes in the Pacific Northwest.

All west coast ports, Canadian or American, can accomodate most ships now in the grain trade. Minimum water depth in each area is generally 35 feet or more. In the Columbia River the channel is presently 35 feet and being deepened to 40 feet. Depths alongside loading wharves are between 30 and 35 feet at low water.[2] Similar conditions exist in Seattle and the other Columbia River ports. One disadvantage of the Columbia ports which will doubtless become more serious in the future, is their location on a river. The water depths fluctuate only slightly due to limited tidal action or periods of high runoff. As a result it is not possible to load a large ship and sail it out at high tide, as is done in Vancouver or Seattle.

Grain handling at the United States terminal elevators has at least one important difference to Canada. It was noted in the description of Canadian handling capacities that grain cleaning can be a bottleneck operation. In the United States this does not exist because little grain is cleaned before export. Grain is only cleaned for special orders. Therefore grain can be unloaded, weighed and put into storage silos ready for a shipment in one operation. This means that

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[2]Campbell, p. 642.

if a shortage occurs, once supplies are delivered to the elevator, no further shipping delays are experienced.

Another bottleneck-producing service not performed in the United States terminals is grain drying. Consequently problems of shipping delays that may arise in British Columbia ports because of the drying operation will not be encountered in the United States. In addition the American grain grading requirements are not as demanding as in Canada. There are fewer grades of grain in the United States than in Canada. Hence fewer separate storage areas are required with the result that more storage bins can be filled to capacity. The important implication of this circumstance for shipping is that a ship will be less likely to be forced to move from one grain berth to another in order to load a full cargo. It is clear then, that under these conditions the United States ports may be viewed more favourably by ship owners operating in the grain trade.

Comparison of Port Charges

Problems of grain handling such as those listed above, are important cost considerations but they tend to be unpredictable. Delays and bottlenecks inevitably occur in practically every port and unless they are chronic and repeatedly involve ships in high costs they are not likely to seriously damage a port's competitive position. On the other hand known and predictable expenses in each port will, to some extent, determine a port's ability to attract traffic. In the grain trade two aspects of costs are notable. First there are port dues and charges which are levied against a vessel entering and leaving

a port. Secondly, there are grain handling charges or charges for services performed in the terminal elevator. This second group of charges do not affect vessel owners because they are levied against the owner of the grain. However elevator service charges help determine the price at which grain will be offered for sale, although this effect is very minor in light of government subsidies to farmers and the rigours of the international markets. Nevertheless they are part of the transfer cost of grain from land to ocean transportation and must be accounted for.

Table XX and Appendix VIII list the primary charges involved in shipping and elevating grain in the ports of the Pacific Coast. Close study of Appendix VIII immediately reveals the great complexity of port charges. Each port has a different list of charges. To give two examples, Vancouver, alone, has a cargo rate on grain loaded and Portland makes no charges for harbour dues while all others do. Therefore a strict comparison of costs is a very difficult task. Finally it should be pointed out that the list of charges is not exhaustive. There are other charges such as port warden fees, brokerage, and customs inspection fees that have not been investigated here because they are relatively minor expenses. Thus Table XX and Appendix VIII are restricted to major important expenditures of terminal grain handling.

The best method of attempting a comparison of costs is to choose a vessel of a particular size and apply the charges it would incur in each port. For purposes of this example a dry cargo vessel classified as C3-5-A2 type by the United

TABLE XX

TOTAL PRIMARY CHARGES FOR SAMPLE VESSEL CALLING AT PACIFIC PORTS TO LOAD GRAIN

Charge	Vancouver	New Westminster	Victoria	Prince Rupert	Seattle	Portland
Pilotage - one way	$170.00(est.)	$287.00(est.)	$87.00(est.)	$93.00	$158.63	$386.80
Sick Mariners dues	94.80	94.80	94.80	94.80	Nil	Nil
Light Money and Tonnage Tax	Nil	Nil	Nil	Nil	94.80 or 284.40	94.80 or 284.40
Harbour Dues	142.20	94.80	142.20 or 237.00	142.20 or 237.00	5.00	Nil
Wharfage	355.50	711.00	1,777.50	1,777.50	2,488.50	2,488.50
Cargo Rate	355.50	Nil	Nil	Nil	Nil	Nil
Dockage (per 24 hrs. for working vessel)	123.00	Nil	29.52	29.52	65.64	65.64

Sample Vessel Specifications (C3-5-A2 type)

Gross Tons	7900 Tons
Net Tons	4740 Tons
Length	492 feet
Beam	69 feet 6 inches
Draft	28 feet 6 inches
Wheat loaded	11,850 Tons or approximately 395,000 bushels

Source: Appendix I.

States Federal Maritime Commission is selected.[3] The vessel has an over-all length of 492 feet and a beam of 69 feet 6 inches. The draft of the vessel, fully loaded, is 28 feet 6 inches. Its gross tonnage is 7,900 tons. On the basis of a world average the net tonnage is 60% of gross tonnage or 4,740 tons.[4] The tonnage figures are based on the total cubic capacity of the vessel divided by 100 or, in other words, 4,740 tons of 100 cubic feet. In Chapter II it was noted that one ton of wheat occupied only 40 square feet.[5] Therefore the vessel in the example will be able to load 2-1/2 times net tonnage or 11,850 tons of wheat. In summary the specifications of the vessel used for the example are:

Gross Tons:	7,900 Tons
Net Tons:	4,740 Tons
Length:	492 Feet
Beam:	69 Feet 6 Inches
Draft:	28 Feet 6 Inches
Wheat Loaded:	11,850 Tons or approximately 395,000 bushels.

In British Columbia the vessel will incur identical pilotage rates to all ports. Any variance in total pilotage will be incurred because of greater distances. For example a vessel will pay $82.00 more to come to Vancouver than to call at Victoria because it is 82 miles between the two ports.

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[3]Steward R. Bross, Ocean Shipping (Cambridge, Mass.; Cornell Maritime Press, 1956), p. 48.

[4]Campbell, p. vii.

[5]R. S. McElwee, Port Development (New York; McGraw Hill, 1926), p. 237.

A gross ton charge of $38.00 and draft charge of $29.00 will be identical regardless of the port of call. In addition to the regular British Columbia pilotage charge, a call at New Westminster incurs a Fraser River Pilot Charge, which for this vessel would be $137.00. This is nearly double the pilotage charge of taking a vessel into Vancouver. In the United States pilotage varies widely. For a vessel calling at Seattle there is a straight mileage charge of $2.35 per mile for 67-1/2 miles for a total charge of $158.63. For a call at Portland the pilotage charge is considerably higher than any other port on the Pacific with a total cost of $386.80.

In both Canada and the United States certain federal levies are made against ships. In Canada this charge is called Sick Mariners' Dues and in the United States tonnage tax and light money. It is payable no more than three times per year at any Canadian port,[6] and five times per year in any United States port.[7] Hence a ship that calls at three British Columbia ports on one voyage will not incur this cost again if it calls at other Canadian ports during the year. The charge for the sample ship in Canada will be $94.80 per call. In the United States it will be $94.80 or $284.40 with the latter figure applying to a foreign tramp vessel in the grain trade.

Harbour dues are charged with considerable variance on the Pacific Coast. In Portland no harbour dues are assessed and range up to 5¢ per net registered ton in the Public

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[6]Campbell, p. 570.

[7]Campbell, p. 609.

Harbours of Victoria and Prince Rupert. Seattle's charge is a nominal $5.00. As with Sick Mariners' Dues, harbour dues are only assessed a certain number of times in Canadian ports. For Vancouver and New Westminster harbour dues are collected a maximum of five times per year in each port. Prince Rupert and Victoria are classed as Public Harbours with the result that dues are only payable twice per year.[8] As a generalization it is safe to say that harbour dues are charged in British Columbia but not in American ports.

Terminology used to describe charges for the use of wharf and dock facilities tends to be confusing. The author found four different classifications for these charges. First there is wharfage, which is generally a charge based on the tons loaded over the wharf. Alternately this may be called top wharfage. To confuse matters even further the American grain elevators charge what they call wharfage on grain coming into the elevator. Their equivalent of Canadian wharfage charges is the service and facilities charge, which more adequately defines the charge for loading grain. A further confusion is added in Vancouver where a so-called cargo rate is charged. This is, in fact, only a wharfage charge which, for some inexplicable reason, has been separated into a different tariff. Finally there is a dockage charge or, as it is sometimes called, side wharfage.

Besides American terminology being better, their charges for loading vessels are more rational. As Appendix VIII

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[8] Canadian Ports and Seaway Directory (Gardenvale, Que.; National Business Publications, 1966), p. 34.

reveals, the service and facilities charges in Portland and Seattle recognize the varying efficiencies of loading inherent in different types of vessel. Thus a self trimming bulk loaded is given a huge advantage over the tri-deck type vessel that is typical of the sample vessel used in this chapter. For example the 11,850 tons of wheat in the example would cost $1,185.00 to load on the sample vessel. This practice of lower rates for bulk carriers is a feature in favour of the United States ports. Even though the charges are now higher than in Vancouver or New Westminster they are lower than either Victoria or Prince Rupert. On the other hand for the regular dry cargo vessel the wharfage in the United States is much higher than Canada as Table XX and Appendix VIII show.

Dockage is a charge made in a port for occupation of wharf space. In most cases dockage is charged on two scales; one for the working vessel and another for the idle vessel. The idle vessel is always charged a higher rate[9] or a penalty fee[10] to discourage the use of wharf space by vessels engaged in operations other than loading or unloading. For example a grain ship that is being cleaned or lined in preparation for loading would incur the penalty fee. Canadian and American ports use a different basis for assessing dockage. Canadian ports use a length of ship basis and American ports have charges on the gross registered tonnage. In addition the time period of application of charges also varies considerably.

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[9]Port of Seattle, Seattle Terminals Tariff No.100-A, March 18, 1966.

[10]National Harbours Board, Tariff of Dockage Buoyage and Booming Ground Charges, Harbour of Vancouver, Feb.23, 1966.

British Columbia Public Harbours assess dockage on a twenty-four hour basis and Vancouver charges on an eight hour period. Seattle and Portland, on the other hand, charge on four hour periods, although this will soon change to eight hour periods.

One final cost incurred by ships is for stevedoring. This is a complex activity and considerable difficulty is experienced in developing comparative costs. Stevedoring is often arranged by private contact and total costs will vary depending on time taken to load a vessel. A full study of the practices and costs of ship loading, because of this complexity, has been impossible. It appears, however, that labour rates in Canada and the United States are approximately equal. Table XXI gives the labour rates charged in the American ports. The $3.38 per hour figure shown in Table XXI is the base rate for a longshoreman in British Columbia.[11]

All of the costs listed above are incurred by ships calling at the ports and therefore influence the shipping concern in deciding which ports are worthwhile serving. It is clear from this standpoint that British Columbia ports have a considerable advantage over the United States ports, assuming that turnaround times are similar. If, on the other hand, ships load faster and do not encounter delays in the apparently higher cost ports in the United States, then the $1,000.00 to $2,000.00 advantage in British Columbia ports soon disappears. Little is known about delays as this is written, although studies are presently under way to determine the frequency and

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[11]Department of Labour, Wage Rates, Salaries and Hours of Work, October 1965 (Ottawa; Queen's Printer, 1966), Table 76.

TABLE XXI

SCHEDULE OF MAN-HOUR RATES AT UNITED STATES PACIFIC PORTS

S.T. - straight time
S.T.P. - straight time penalty
O.T. - overtime
P.O.T. - penalty overtime

When Base S.T. Scale of Wage is	S.T. Rate is	S.T.P. or O.T. Rate is	P.O.T. Rate is
$3.38	$6.09	$7.89	$10.58
3.48	6.25	8.10	10.82
3.53	6.31	8.18	10.99
3.65	6.51	8.46	11.39
3.68	6.53	8.44	11.30
3.78	6.66	8.67	11.68
3.83	6.77	8.82	11.89
3.97	6.88	8.98	12.13
4.05	7.04	9.15	12.29
4.59	7.82	10.26	13.92

Source: Seattle Terminals Tariff No. 2-E.

seriousness of such delays in the Port of Vancouver. Until this research is completed any firm conclusions are impossible. However, as already noted, the differences in terminal elevator operations such as drying, cleaning and grading may tend to reduce the number of delays and hence favour the United States ports.

Comparative Elevator Costs

So far the costs of half the transfer operation of grain from land to sea have been considered. The other costs involved are those of elevator handling. These are less important for comparison purposes for two main reasons. First they do not affect shipping directly. Costs of grain elevation are paid by the shipper. In other words all costs on the land side of the operation are paid by the farmer or seller. Secondly the farmer's share of expenses of getting grain to the ship may be offset by government action. For example in the United States the guaranteed price paid to certain farmers is adjusted to allow him to ship through Portland or Seattle instead of the Great Lakes.[12] With adjustments such as this the actual elevator charges become a secondary consideration. Despite these factors the level of charges has some importance for future development. The total per bushel charge in a United States elevator for grain received from a rail car and delivered to a ship is 3-3/4¢ per bushel (Appendix VIII). The equivalent operation in Canada returns 2-7/8¢,

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[12]Information obtained in an interview with Mr. R. Crabtree, Manager, Pacific Northwest Grain and Grain Products Association, June 1966.

assuming no cleaning in either case. For cleaning the United States charges are also higher at 2¢ per bushel for all grain cleaned whereas in Canada the maximum charge is 1¢ per bushel. For relatively clean grain of less than 2-1/2% dockage[13] there is no charge at all. Under these circumstances, in future, it may be much more financially attractive to expand facilities in the United States ports than it is in Canada. This is particularly so if private interests are expected to build or lease terminal elevators and operate them on a profitable basis.

Other aspects of Pacific Northwest grain exporting are more likely to affect the need for elevator facilities in British Columbia. Traditionally the American Pacific Northwest and British Columbia grain export businesses have been quite distinct and different. In large measure this still exists today although some important competitive trends are developing.

Wheat grown in the Pacific Northwest area comes from eastern Washington and Oregon and northern Idaho. This is primarily a white winter wheat growing area. Between 1958 and 1962 between 90% and 95% of wheat production was a white variety (Table XXII). Nearly all of the remainder was made up of hard red spring and soft red spring varieties. Total production of white wheat ranged between 78 million and 104 million bushels between 1952 and 1963[14] and is about 60% of total United States white wheat production. White wheat has been the chief

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[13]Dockage as used here refers to wild oats, weed seeds etc. that are removed from grain in the cleaning process.

[14]Western Wheat Associates, U.S.A. Inc. and U.S. Department of Agriculture, Wheat Supply Distribution and Value in the Pacific Northwest, 1962 (Portland, Oregon; November 1963), Statistical Bulletin No. 2, p. 40.

TABLE XXII

WHEAT: PERCENTAGE OF TOTAL PRODUCTION, BY CLASS, SELECTED COUNTRIES 1955-1962

	Common White %	White Club %	Hard Red Winter %	Other %
1955	29.0	60.0	10.5	.5
1956	49.6	42.1	7.4	.9
1957	33.5	53.3	12.9	.3
1958	25.4	64.2	10.2	.2
1959	27.1	65.8	6.4	.7
1960	20.9	73.6	5.2	.3
1961	28.2	66.6	4.9	.2
1962	57.6	37.8	4.0	.6

Source: Western Wheat Associates, U.S.A.Inc. and United States Department of Agriculture, Wheat Supply Distribution and Value in the Pacific Northwest, Statistical Bulletin #2, 1963, p. 42.

variety exported from the Pacific Northwest area although since 1950 hard red winter wheat has been exported from the area, most of this originated in Montana and some in Utah and Southern Idaho.[15] All of these exports are a different variety than Canadian exports. Canada's wheat is largely hard spring wheat used primarily for milling and bread making. Canada's superior wheat for this purpose has therefore experienced no serious competition from Pacific Northwest varieties. Three recent developments may change this situation.

The first and most important event is the lowering of rail freight rates on export grain from the central plains to the Pacific coast. The rate, at 70¢ per hundred pounds from North and South Dakota, is far higher than Canada's Crows' Nest Pass rates. However other factors such as Public Law 480, which provides for subsidized grain exports to poor nations could combine with lower rates to make it economically feasible to export through Pacific Coast ports. The second event is the establishment of flour mills in the Phillipines. The Americans have directly participated in establishing these new mills. Consequently wheat is blended and exported in the United States rather than being milled into flour and then exported. This too is another demand for the hard spring wheat of the central plains.

The third factor that could affect Canada's competitive position is the effort of the Pacific Northwest grain growers to educate the Japanese in the use of American wheat. This

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[15]Western Wheat Associates, p. 54.

program has been going on since the mid-1950's with the direct aim of gaining a larger share of the Japanese cash market for wheat.[16] Unlike exports under Public Law 480, this scheme is directly competitive with Canada because it is in the cash rather than subsidized market.

The lower rates on wheat to be competitive with Canada are apparently having results. The 1959-63 average inshipments[17] were 61,130,000 bushels and in 1964-65 this was up to 65,430,000 bushels. However since the new rail rates became effective in June of 1965, inshipments of wheat for the first three-quarters of 1965-66 crop year are 63% greater than the first three-quarters of 1964-65 (Table XXIII). Similarly exports of inshipments are up 52% over the same period.

There is no way to conclude from the statistics whether Japan is receiving greater shipments. However, people associated with the American grain trade have said that their objectives of gaining more of the Japanese market are meeting with success.[18] As to exports of spring wheat it is also hard to estimate the volume since part of the inshipments are hard winter wheat, but the fact that such a large increase has occurred in one year indicates a new source is being tapped.

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[16]Western Wheat Associates, p. 56.

[17]Inshipments in the Pacific Northwest grain statistics means grain handled in the Pacific Northwest grain growing region of Washington, Oregon and Northern Idaho, but grown outside the region. For example, wheat exported through Portland and grown in Montana is an inshipment.

[18]Information obtained in interviews and discussions with various grain interests in Portland, Oregon.

TABLE XXIII

INSHIPMENTS AND OUTSHIPMENTS OF WHEAT: PACIFIC NORTHWEST

1959-63 AVERAGE AND CROP YEARS 1964 AND 1965 BY QUARTERS

All Wheat	Inshipments (rail & truck) (thousands of bushels)	Outshipments (thousands of bushels)
1959-63 Avg.		
July - Sept.	18,739	28,783
Oct. - Dec.	14,376	33,306
Jan. - Mar.	14.420	34,893
Apr. - June	13,593	38,255
Crop Year	61,130	135,237
1964		
July - Sept.	23,013	19,493
Oct. - Dec.	12,367	30,237
Jan. - Mar.	13,765	38,700
Apr. - June	16,285	55,273
Crop Year	65,430	143,703
1965		
July - Sept.	35,647	36,881
Oct. - Dec.	22,858	46,689
Jan. - Mar.	21,567	51,443
Apr. - June	N.A.	N.A.
Crop Year		

White Wheat	Outshipments	% of Outshipments
1965		
Oct. - Dec.	31,279	68
Jan. - Mar.	29,776	58

Source: United States Department of Agriculture Statistical Reporting Service, Pacific Northwest Wheat Summary Quarterly Report, May 2, 1966, Mimeo.

It is clear that large quantities of inshipments are being exported. Approximately 32% and 42% of outshipments were non-white wheat in the October-December and January-March quarters of the current crop year. This represented 67% and 100% of inshipments in the two quarters respectively, thus indicating the chief inward movement is for direct export which is a change from the past when most inshipments were for milling purposes.

Approximately one-third of exports of wheat through British Columbia are bound for Japan and before the large Chinese wheat sales it was as high as one-half. Therefore any serious inroads into this market by the United States suppliers could materially reduce Canada's exports to that country. Beyond the Japanese market however, Canada and the United States do not compete in the Pacific. The United States is a supplier of large quantities of grain to under-developed countries such as India, Pakistan, South Korea and Formosa. Such sales are made possible by United States Public Law 480 which allows for under-developed countries to pay for the grain in their own currencies rather than dollars. In effect this is a subsidized surplus disposal program. Since Canada is chiefly a cash dollar seller, the countries supplied under the Public Law 480 program could not buy from Canada, even without the United States plan. On the other hand Canada is exploiting markets in which the United States cannot presently sell because of political considerations. China is excluded from United States trade by deliberate choice of the American government and Russia is effectively cut off from United States grain supplies by shipping regulations that make purchases in the

United States too costly for the Russians. As a result Canada has benefited immensely from large grain sales to these two countries. It should be remembered however that this present large market is based upon political considerations which can and very possibly will change in the future. When and if such changes come the position of Canadian grain and British Columbia ports in relation to Russia and China could change drastically. Indeed, it appears that China, particularly, does not need Canada's high quality wheat but merely buys wherever it is available. The fact that only grades four and five are purchased indicates high quality is not important. Furthermore, considering China's diet and standard of living, soft wheat, if it were available, would likely be preferable.

To summarize briefly, this chapter has shown that the United States ports are capable of a high standard of grain loading efficiency which, for ocean vessels, is probably superior to British Columbia. Offsetting these service advantages are considerable cost disadvantages of United States ports compared to British Columbia ports. The above factors of service and cost will only apply when grains in the two countries compete in the same market. At present this applies almost exclusively to the Japanese market. However future political and economic changes can and over the long run will expand the sphere of competition between the United States and Canada. As this occurs ports and grain handling facilities will take on much more importance for competitive purposes.

CHAPTER VI

FUTURE REQUIREMENTS FOR GRAIN HANDLING FACILITIES IN BRITISH COLUMBIA

The purpose of the final chapter of this thesis is to state the future needs for grain handling on the Pacific Coast of Canada. It is, in effect, the attainment of the original objective of this thesis stated in Chapter I. It represents the opinion of the author formed and drawn from the facts and argument of the previous five chapters.

The chief conclusion of this thesis is that the British Columbia coast will need more grain handling facilities in the near future. The conditions in the markets served by this area, the changing pattern of cargoes, new ships, and competitive forces from the United States all support this conclusion. Before any conclusions as to new facilities are reached however, current developments regarding grain elevators should be mentioned.

New Elevators Now Planned

Reference has been made several times to a new Saskatchewan Wheat Pool terminal elevator being constructed in the Port of Vancouver. Because it is part of the future development in British Columbia, analysis of its place in grain handling has been left to this final chapter. This new elevator will be a major addition to west coast grain handling facilities. Its capacity will be 5.2 million Bushels (Appendix X), which

is a 20% addition to British Columbia storage capacity and about a 25% addition to the storage capacity in the Port of Vancouver. At present rates of annual turnover, it should add between 40 million and 47 million bushels to the British Columbia export capacity. Other features of the new elevator indicate annual handlings could easily be higher than this. First, unloading capacity will be high relative to the other large elevators in Vancouver. With five million bushels of storage capacity the elevator will unload 128 boxcars in an eight-hour shift. Alberta Wheat Pool, with over seven million bushels of storage capacity, unloads about the same number of cars. Secondly the shipping capacity is the highest of any elevator. Two large shipping belts will be able to load 100,000 bushels per hour when two ships are berthed. This means that in an eight-hour shift 800,000 bushels could be loaded or 2-1/2 times the capacity of the Alberta Wheat Pool. Furthermore the shipping facilities will be able to load ships of 45,000 tons capacity. This makes the new elevator particularly important for loading large bulk carriers. Besides an important addition to the Port of Vancouver in terms of capacity, this new Saskatchewan Wheat Pool elevator is an important addition to efficiency because it will be able to serve the newer large ships. This presumes, of course, that bottleneck problems of cleaning or drying do not arise. With 32 grain cleaners of the latest and most efficient kind the former seems unlikely although drying will continue to be a problem from time to time since only one dryer is being installed.

Rail facilities will not be a problem in the new installation for two reasons. First its location on the North Shore of Burrard Inlet means there is adequate space for rail sidings. Secondly the project coincides with the improvements being made by the Canadian National Railway in the same area. This indicates the new elevator will be well equipped with rail facilities.

Another elevator installation in Seattle, Washington, has important implications for British Columbia and should be noted. Like the new Vancouver installation it is just getting under way. In terms of capacities it is very similar to the new Vancouver elevator. Storage capacity of the Seattle elevator will be five million bushels and the loading rate to vessels will be 100,000 bushels per hour.[1] The striking feature of the new Seattle installation is the fact that there will be 65 feet of water alongside. Consequently any ship now in the grain trade will be able to load to full capacity. Furthermore the elevator should be able to serve practically every ship for years to come, including the largest ones of up to 200,000 tons now being built. This new elevator in Seattle will make that port very competitive with Canadian facilities and improve the position of Seattle as a grain exporting port. Although the Columbia River ports may suffer more from the competition of Seattle because of the peculiarities of grain marketing in the United States, it should be remembered that if changes in American marketing conditions occur, Seattle

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[1] "5,000,000 Bushel Grain Facility Planned by Port," Port of Seattle Reporter, May 1966, p. 4.

will have the handling facilities to compete effectively with British Columbia. If British Columbia lacks efficient facilities the competition of Seattle could be harmful to Canada's grain trade. The conclusion to be drawn from this analysis is that new efficient facilities are needed in British Columbia not only to maintain a certain volume of exports but, just as importantly, to ensure present Canadian customers continue to buy Canadian grain.

Future Elevator Requirements

Present indications are that British Columbia elevator capacity is operating at or near its capacity with turnovers between eight and nine times in the very busy year of 1963-64 (Table VI), and will possibly be slightly higher than this in 1965-66. These turnovers in busy years result in delay problems for vessels and railways as has been stated earlier. The conclusion that British Columbia's facilities are being utilized at or near capacity is further supported by a study made for the Portland Commission of Public Docks. It stated that Portland's annual capacity to handle grain was about ten times its storage capacity.[2] It is concluded then, that British Columbia will need more grain handling facilities in the near future. The exact amount of new elevator capacity that will be needed is impossible to predict in this thesis but two specific studies would be useful in making this prediction. First, a thorough study of elevator operations to determine the

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[2]See the unpublished Ph.D. thesis (University of California, 1966) by James M. Ashbaugh, "A Geography of the Columbia River Ports, University Microfilms Inc., Ann Arbor, Michigan, p. 122.

most efficient turnover of capacity and the most efficient size of elevator. This is possibly known by the elevator companies but does not appear to be available otherwise. Second, a detailed market study should be undertaken to make available some estimation of the actual volume that may be exported in five or ten years' time.

Location of new facilities is another problem to be resolved and involves the consideration of port efficiency. Vancouver will soon have new facilities capable of efficient handling of all types of vessel now in the grain trade. As pointed out in earlier chapters, Vancouver is a port containing many of the advantages that attract ocean shipping. Modern facilities for grain handling add to that attractiveness. However one new elevator will not be sufficient to serve the increasing number of large bulk carriers in the grain trade.[3] Nor will it be sufficient to handle the constantly rising demand for export grain through British Columbia.

Inefficiency will increase as the old elevators become more obsolete in the face of new ships and shipping techniques. There is a need therefore to modernize present facilities. This may not always be possible due to limitations of present elevator design or limitations of physical space. For example on the south shore of Burrard Inlet it would be difficult to greatly increase the rail facilities at the elevators. Similarly some of the present small elevators may be restricted

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[3]Col. R. B. Oram, Cargo Handling and the Modern Port (London: Pergamon Press, 1965), p. 119.

for space for building new storage silos. Conversely the larger elevators may have latitude for expanding handling rates. For example the 7.3 million bushel Alberta Wheat Pool elevator could possibly install new loading galleries similar to those of the new Saskatchewan Wheat Pool elevator.

Location of Future Development - Vancouver

Larger ships will mean larger and deeper ship berths will be necessary. Any expansion of loading capacities at elevators would necessitate deepening and lengthening berths to serve the ships attracted by rapid loading facilities. Currently the United Grain Growers berth is being extended for this reason. General harbour facilities must also be adequate to accommodate large ships. Therefore it will be necessary to remove limits to shipping at the First Narrows entrance to Vancouver Harbour. Such a proposal for deepening the entrance to 50 feet has already been made by the local National Harbours Board office but, as yet, no decision has been made as to when or if the project will be undertaken. Before large-scale port investments are undertaken however, further research into the vessels that will be in the grain trade would be helpful. It is suggested that harbours will have to accommodate the largest ships if they hope to compete but this is not necessarily true. The largest tankers, for example, are in many ways ill-equipped for the grain trade and indeed may never be used for grain. Self-trimming bulk carriers are more likely to dominate the trade, hence the requirements and future development of vessels actually using the port should be studied when port investments

are contemplated. By doing this, investments can be made relative to actual conditions rather than some hypothetical "maximum ship size" criteria that may serve no purpose.

New Westminster and Victoria

New Westminster and Victoria, two ports now handling grain in British Columbia, do not warrant expansion of facilities. New Westminster is limited by the Fraser River and there is no apparent reason in the foreseeable future for the river to be deepened to handle large bulk ships, particularly with the deep harbour of Vancouver close by. The rationale for not developing Victoria is that shipping through this port involves a barge haul from the mainland. While this does not affect the freight rate of shipping grain, it does involve greater economic cost to the Canadian National Railway. This can best be avoided by restricting as much as possible shipments through this port. Another drawback is that Victoria has a very small harbour and expansion would therefore require a costly extension of the present artificial harbour.

Prince Rupert is the only other harbour where expansion of grain handling facilities can be justified at the present time. The large natural harbour means there are no restrictions of space or depth. Furthermore the large rail installations in Prince Rupert would preclude the expansion of that facility. Finally Prince Rupert is about 540 miles closer to the Far Eastern market than south coast ports.[4]

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[4]See the unpublished Master's thesis (University of British Columbia, 1951) by A. D. Crerar, "Prince Rupert,B.C. The Study of a Port and its Hinterland," p. 154.

On the other hand there are several disadvantages of Prince Rupert as a grain export port. Further investigation into these could possibly reveal that the disadvantages outweigh the advantages of expansion in Prince Rupert. Chief among the disadvantages is Prince Rupert's distance from the other ports in British Columbia. In general terms the south coast ports are to some extent complementary. Prince Rupert is so far from this area that ships regularly calling in the south coast area rarely go near Prince Rupert. Furthermore if ships do call at Prince Rupert they find few cargoes are available beyond grain and some lumber. Thus the port is not diverse enough to be attractive to shipping. This is offset to some extent by the fact that grain shipped from Prince Rupert goes as a full cargo. Hence other cargoes are of no importance to these charter vessels. A final disadvantage of Prince Rupert is its greater distance from the grain growing interior. This additional 200 mile haul at the same freight rates applying to Vancouver is, therefore, an additional cost to the railways. Despite the disadvantages, Prince Rupert is a desirable location for the expansion of grain handling facilities in British Columbia.

New facilities in Prince Rupert should be relatively large to allow efficient loading of the largest ships. A five million bushel elevator at this port, with similar unloading and loading capacities as the new Saskatchewan Wheat Pool elevator in Vancouver would allow easy loading of the largest bulk carriers that are being planned at the present time and

would give British Columbia facilities equal to Seattle's new elevator.

Other Requirements

There are some other changes in grain handling that could expand handling capacities without additional elevator installations. The first is concerned with grading and cleaning. It has been noted that Canada has a rigourous and well known high standard of grading and cleaning grain. It is suggested that in some instances the standard may be too high. This applies particularly to China and other under-developed areas that need wheat but not necessarily of a consistent high grade. In these cases it may be practical to sell an uncleaned grade at a lower price than the regular Canadian Wheat Board grades. It is possible that potential markets such as India would be more interested in buying this lower quality grain at a lower price. It could also help establish China as a longer term customer. China particularly is not interested in high quality grain because the bulk of her purchases at the present time are of the lowest grades. Obviously, if such a scheme as selling uncleaned wheat were worked out, the elevators could put grain through more rapidly if cleaning and grading were eliminated or reduced.

Another change that should be considered is the use of specialized grain cars on the railways. This could improve both elevator and railway efficiency. These grain cars carry the equivalent of three large boxcars of grain, yet can be dumped in the same time as one boxcar on a car dumper. In

elevators without a car dumper the time saving would be even greater. New handling belts and cleaning equipment would be necessary in the smaller elevators but the added efficiency of the larger cars could make this worthwhile. Finally, using these large grain cars would alleviate the railway trackage problem by allowing a much greater volume of deliveries on the same trackage. In Vancouver this is particularly important.

One final change that is recommended deals not with facilities but with pricing practices. Ultimately this would affect the utilization and demand for grain handling facilities. Wheat price quotations are consistently higher at Vancouver than at Lakehead or St. Lawrence ports.[5] No amount of research reveals a valid economic reason for the higher Vancouver price and one can only reach the conclusion this situation exists to keep wheat moving through Eastern Canada. In other words it is a practice to restrict British Columbia's competitive position. If this is true, and it appears that it is, then it should be removed. Its removal would favour British Columbia exports to Europe and would result in an even greater necessity for expanded grain handling facilities on the Pacific Coast of Canada.

Each of the above suggestions for change in the marketing procedures for grain could be a subject for research. Ideally a comprehensive study of the whole system of grain handling, from farm to final delivery aboard ship, should be undertaken. The suggested changes in this chapter would be

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[5]Dominion Bureau of Statistics, Grain Trade of Canada 1964-65 (Ottawa; Queen's Printer, 1966), p. 76.

topics for research within a full system study. Findings could then be related to the system and ultimately would lead to a set of recommendations for rationalizing the whole grain handling procedure.

Throughout this thesis an attempt has been made to develop a picture of grain handling on the Pacific Coast of Canada that shows the grain ports of British Columbia in relation to world markets, other Canadian export points and local competitive ports in the United States. The conclusion of this analysis is that British Columbia has a particularly advantageous position in all respects. Costs are low relative to the competition of American ports. The grain products offered are in strong and growing demand on the world market and finally, the ports, particularly Vancouver and Prince Rupert, have excellent harbours that have good opportunities for expansion of grain handling facilities. With the improvements in grain handling now planned as well as those recommended in this thesis the ports of British Columbia will not only maintain but would advance their position in world trade.

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APPENDIX I

PRIMARY NET SHIPMENTS OF CANADIAN GRAIN FROM SEMI-PUBLIC TERMINAL ELEVATORS, VANCOUVER, NEW WESTMINSTER, 1954-55 TO 1963-64

(thousands of bushels)

Year	Wheat	Oats	Barley	Rye	Flaxseed	Rapeseed	Other	Total
1954-55	78,952	4,801	9,924	-	319	154	-	94,189
1955-56	96,242	1,915	10,135	360	703	430	-	109,840
1956-57	103,891	1,746	22,970	-	2,408	970	-	133,143
1957-58	128,210	3,164	19,971	1,359	5,224	4,285	-	163,045
1958-59	106,195	5,023	28,347	336	5,974	4,042	-	151,172
1959-60	92,866	3,421	23,255	327	6,296	2,859	579	129,603
1960-61	119,114	968	16,988	1,012	7,073	7,437	618	152,210
1961-62	145,746	1,505	13,071	1,137	6,099	6,266	415	174,239
1962-63	129,856	9,600	5,071	1,666	4,902	5,561	475	157,131
1963-64	154,010	13,588	28,163	1,600	6,282	5,088	692	209,423
1964-65	136,269	3,740	19,834	1,193	6,276	8,268	715	176,206

Source: Dominion Bureau of Statistics, Grain Trade of Canada (Ottawa; Queen's Printer), Various Issues.

APPENDIX II

PRIMARY NET SHIPMENTS OF CANADIAN GRAIN FROM THE SEMI-PUBLIC TERMINAL ELEVATOR AT VICTORIA
CROP YEARS: 1954-55 TO 1963-64
(thousands of bushels)

Year	Wheat	Oats	Barley	Flaxseed	Rapeseed	Total
1954-55	1,411	26	1	-	-	1,438
1955-56	2,476	28	1	-	412	2,918
1956-57	1,201	30	1	704	1,041	2,978
1957-58	2,174	29	3	702	903	3,810
1958-59	1,409	34	8	675	390	2,516
1959-60	2,860	18	3	444	1	3,326
1960-61	5,482	59	7	248	1,296	7,092
1961-62	4,432	71	10	-	529	5,042
1962-63	6,228	43	5	-	-	6,276
1963-64	7,954	46	7	-	-	8,007
1964-65	8,723	44	10	-	178	8,955

Source: Dominion Bureau of Statistics, Grain Trade of Canada (Ottawa; Queen's Printer), Various Issues.

APPENDIX III

PRIMARY NET SHIPMENTS OF CANADIAN GRAIN FROM THE SEMI-PUBLIC TERMINAL ELEVATOR, PRINCE RUPERT
CROP YEARS: 1954-55 TO 1963-64
(thousands of bushels)

Year	Wheat	Oats	Barley	Total
1954-55	154	-	5,083	5,237
1955-56	238	-	4,542	4,780
1956-57	-	-	8,048	8,048
1957-58	-	-	10,357	10,357
1958-59	-	-	9,046	9,046
1959-60	-	-	8,896	8,896
1960-61	-	-	10,398	10,398
1961-62	-	-	10,531	10,531
1962-63	3,553	-	111	3,664
1963-64	10,475	35	-	10,510
1964-65	10,128	20	2	10,150

Source: Dominion Bureau of Statistics, Grain Trade of Canada (Ottawa: Queen's Printer), Various Issues.

APPENDIX IV

WHEAT EXPORTS THROUGH BRITISH COLUMBIA PORTS BY COUNTRY OF DESTINATION

(thousands of bushels)

	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955
Western Europe	15,568	21,924	16,435	20,837	30,767	33,983	46,356	70,070	45,466	31,956
United Kingdom	7,855	13,317	6,618	7,231	15,214	14,998	19,329	28,149	16,560	16,153
Belgium-Lux.	952	3,526	2,277	1,976	1,592	3,527	2,762	7,699	2,978	4,137
Germany(W)	1,439	1,949	5,050	7,196	3,978	7,811	12,066	16,303	15,877	1,188
Netherlands	5,052	2,960	1,803	2,815	5,732	1,876	5,266	9,910	4,758	1,092
Malta	-	-	244	807	1,308	-	747	1,131	1,501	1,727
France	-	63	36	57	235	131	93	-	12	-
Italy	270	109	139	80	940	709	467	1,126	73	-
Norway	-	-	174	823	2,230	1,709	1,415	1,617	1,927	1,316
Switzerland	-	-	94	16	696	2,035	4,073	2,705	1,578	6,177
Denmark	-	-	-	-	19	43	138	224	75	-
Austria	-	-	-	577	-	1,144	-	1,206	127	166
Eastern Europe	7,207	3,075	760	78	3,244	467	-	3,403	4,572	2,404
Bulgaria	3,376	-	-	-	-	-	-	-	-	-
E. Germany	-	-	-	-	-	-	-	-	372	-
Czechoslovakia	1,482	-	-	-	-	-	-	-	-	-
Poland	2,349	3,075	760	78	3,244	467	-	3,403	4,200	2,404
Total Europe	22,775	24,999	17,195	20,915	34,011	34,450	46,356	73,473	50,038	34,360
North and Central America	1,610	916	1,305	852	144	185	332	200	199	847
Dominican Rep.	309	321	830	539	93	-	-	-	-	-
El Salvador	965	583	448	212	48	55	38	64	-	-
Honduras	53	3	-	2	3	5	23	13	-	-
Nicaragua	205	-	-	-	-	-	-	-	-	-
Guatemala	-	-	27	80	-	70	167	107	133	3
United States	-	9	-	19	-	-	21	16	32	20
Panama	78	-	-	-	-	-	-	-	-	-

APPENDIX IV (continued)

	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955
Jamaica	-	-	-	-	-	-	-	-	1	1
Costa Rica	-	-	-	-	-	55	83	-	33	224
Cuba	-	-	-	-	-	-	-	-	-	599
South America	11,834	7,142	6,496	4,337	4,442	7,408	2,500	4,615	4,243	2,580
Ecuador	1,666	1,015	1,146	1,257	1,375	1,324	794	646	1,393	1,841
Peru	385	1,266	-	482	1,353	3,604	-	1,818	2,850	209
Venezuela	9,783	4,861	5,218	2,194	1,714	1,672	1,522	2,151	-	-
Colombia	-	-	132	404	-	808	184	-	-	531
Asia - Near East	-	1,322	5	1,592	977	3,600	956	1,711	568	1,180
Saudi Arabia	-	335	5	-	29	-	233	403	150	86
Iraq	-	-	-	-	435	2,033	-	-	41	370
Isreal	-	987	-	1,592	513	1,567	723	1,308	377	-
Palestine	-	-	-	-	-	-	-	-	-	724
Asia - Far East	120,780	109,335	110,494	102,672	52,746	42,630	51,250	34,309	35,409	31,593
Hong Kong	787	633	597	502	1,335	-	37	172	443	332
India	721	-	-	-	656	-	7,539	-	-	355
Malaysia	723	182	-	-	-	-	-	-	-	-
Pakistan	355	-	-	-	-	-	-	-	1,008	-
China(Mainland)	58,043	54,058	58,470	45,518	-	-	4,245	-	-	-
Japan	51,998	47,536	44,827	53,019	49,557	41,371	39,048	34,137	33,958	30,906
Phillipines	7,776	6,203	5,890	1,877	1,133	1,252	381	-	-	-
Taiwan	377	212	710	1,575	65	7	-	-	-	-
Burma	-	-	-	181	-	-	-	-	-	-
Korea	-	511	-	-	-	-	-	-	-	-
Total Asia	120,780	110,657	110,499	104,264	53,723	46,230	52,206	36,020	35,977	32,773

APPENDIX IV (continued)

	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955
Africa	4,319	7,916	1,113	1,250	4,977	9,763	619	397	5,639	5,506
Nigeria	299	-	213	-	-	-	-	-	-	-
Northern Rhodesia	37	-	11	90	191	11	608	240	369	190
Rep.of South Africa	3,983	7,916	683	205	4,705	9,696	-	71	5,100	5,184
Congo	-	-	9	18	-	-	-	-	-	-
Mozambique	-	-	197	-	81	-	-	-	-	-
Algeria	-	-	-	937	-	-	-	-	-	-
Portugese E. Africa	-	-	-	-	-	56	11	86	170	132
Oceania	296	386	562	314	134	-	1,473	-	-	-
U.S.Oceania	296	386	562	314	134	-	-	-	-	-
Australia	-	-	-	-	-	-	1,473	-	-	-
U.S.S.R.	15,861	9,453	-	7,511	-	7,229	4,220	5,913	14,852	-
Total*	177,475	161,469	137,170	141,040	98,608	105,265	109,857	118,467	110,948	

*Totals may be slightly different from official publication due to rounding.

Source: Bureau of Economics and Statistics, Preliminary Statement of External Trade, (Victoria, B.C.) Various Issues.

APPENDIX V

BARLEY EXPORTS THROUGH BRITISH COLUMBIA PORTS BY COUNTRY OF DESTINATION

(thousands of bushels)

Country	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955
United Kingdom	4,534	4,817	3,282	3,160	14,663	28,540	18,958	9,762	5,943	9,620
Germany	2,476	-	-	-	2,128	639	2	7,623	3,180	-
Italy	947	-	-	48	291	93	-	-	-	-
Spain	171	-	-	-	-	-	-	-	-	-
Czechoslovakia	620	-	-	-	-	-	-	-	-	-
China (Comm.)	16,647	1,083	9,309	30,340	-	-	-	-	-	-
Japan	3,828	1,694	-	-	-	4,860	6,824	12,604	9,753	4,989
Korea	115	1,318	-	-	-	-	-	-	-	-
Peru	93	92	92	161	92	-	92	-	-	-
United States	5	-	87	407	27	-	-	2	-	-
Netherlands	-	170	70	33	986	890	-	522	189	-
Costa Rica	-	-	-	-	-	-	-	-	-	4
Belgium Lux.	-	-	-	-	158	483	47	72	243	-
Denmark	-	-	-	-	397	-	-	-	-	-
Switzerland	-	-	-	-	685	870	229	-	70	-
Poland	-	-	-	-	4,681	2,287	-	-	-	-
Kuwait	-	-	-	-	483	-	-	-	-	-
Saudi Arabia	-	42	-	-	10	1	-	-	-	-
Union S.Africa	-	-	-	-	5	-	-	-	-	-
Panama	-	-	-	-	1	-	-	-	-	-
Hawaii	-	-	-	-	-	127	20	-	-	-
Venezuela	-	1	-	-	-	-	-	-	-	-
U.S.S.R.	-	-	-	-	-	-	3,799	-	-	-
Syria	-	-	-	-	-	662				
	29,436	9,217	12,840	34,150	24,605	39,544	30,462	30,586	19,378	14,613

Source: Bureau of Economics and Statistics, Preliminary Statement of External Trade (Victoria, B.C.), Various Issues.

APPENDIX VI

OATS EXPORTS THROUGH BRITISH COLUMBIA PORTS BY COUNTRY OF DESTINATION

(thousands of bushels)

Country	1964	1963	1962	1961	1960	1959	1958	1957	1956	1955
United Kingdom	83	340	25	-	19	1,736	2,144	359	40	897
Belgium-Lux.	230	1,537	132	-	99	84	-	481	-	688
France	66	26	-	-	-	-	-	-	-	-
Germany	1,747	1,686	-	-	1,834	1,698	-	-	-	-
Italy	186	2,141	-	-	-	-	-	-	-	-
Netherlands	5,691	4,642	856	-	178	454	-	-	-	189
Switzerland	17	195	-	-	-	-	-	-	-	86
Rep. S.Africa	472	-	-	-	-	-	-	-	-	-
Colombia	198	268	39	332	216	237	152	307	157	74
Panama	55	54	31	11	57	55	46	43	50	56
United States	28	5	18	26	290	492	404	457	758	249
Peru	-	2	227	2	4	-	-	-	-	-
Venezuela	-	166	4	1	34	4	5	-	3	-
Costa Rica	-	-	4	-	-	2	-	-	-	-
Ecuador	-	-	-	-	3	5	-	-	-	-
Ireland	-	-	-	120	-	-	-	-	-	-
Hawaii	-	-	-	-	-	-	-	-	-	2
Dom.Republic	-	-	-	-	-	-	-	-	8	-
Totals	8,772	11,064	1,340	492	2,733	4,768	2,752	1,655	1,009	2,241

Source: Bureau of Economics and Statistics, Preliminary Statement of External Trade (Victoria, B.C.), Various Issues.

APPENDIX VII

IMPORTS OF WHEAT FROM CANADA INTO SELECTED COUNTRIES

(thousands of metric tons)

Country	'55-56	'56-57	'57-58	'58-59	'59-60	'60-61	'61-62	'62-63	'63-64	'64-65
Western Europe (total)	4641.5	4859.8	4734.9	4498.9	4099.7	4587.1	4321.5	3836.5	4456.3	3689.6
Belgium-Lux.	407.0	429.1	390.5	294.7	294.3	330.1	314.4	260.7	423.6	418.1
Netherlands	243.9	339.6	544.9	406.2	221.1	157.4	114.5	126.6	96.5	95.3
Switzerland	188.4	284.1	231.9	177.1	222.0	178.3	233.0	80.1	201.7	122.0
United Kingdom	2490.0	2231.5	2418.8	2438.5	2178.2	2078.3	2024.7	2087.5	2072.0	1981.3
Germany (W)	797.4	1045.7	871.3	811.5	696.8	875.5	1222.8	739.5	983.6	612.5
Italy	162.3	90.5	42.1	50.3	59.3	405.1	106.9	127.1	112.2	18.0
Eastern Europe (total)	451.5	397.9	108.3	133.6	132.6	457.9	754.4	505.6	738.8	1927.3
Poland	398.7	190.9	108.3	133.6	132.6	63.4	426.2	386.0	323.3	485.6
Bulgaria	-	-	-	-	-	-	-	-	156.7	206.3
Czechoslovakia	42.7	207.0	-	-	-	330.4	-	119.6	178.8	714.2
Albania	-	-	-	-	-	64.1	-	-	-	-
E. Germany	-	-	-	-	-	-	271.0	-	-	275.9
Asia - Far East (total)	835.3	913.6	1715.0	1582.5	1545.7	2499.7	3538.7	2925.6	2600.1	3690.0
China (Mainland)	-	-	-	-	-	780.8	1967.7	1677.7	1004.8	1758.2
Japan	821.6	875.1	1050.6	1162.6	1224.6	1499.7	1301.6	1247.1	1306.0	1432.2
Phillipines	-	-	-	29.7	39.9	26.9	95.2	173.3	201.5	171.8
India	-	-	565.1	308.1	179.5	107.7	96.4	19.1	19.6	186.9
South America (total)	79.8	103.3	101.5	170.1	216.2	192.5	144.1	242.1	242.4	329.8
Venezuela	2.0	1.8	18.0	79.2	93.6	86.3	106.6	195.2	191.3	262.1
Ecuador	52.6	14.5	15.7	40.1	26.5	40.0	30.3	32.3	31.2	32.2
Peru	25.2	87.0	62.8	50.8	74.1	49.4	-	14.6	19.9	25.5
Colombia	-	-	5.0	-	22.0	13.7	7.2	-	-	10.0
U.S.S.R.	290.0	110.0	364.9	181.7	-	204.4	-	-	5195.1	868.1
Africa	174.0	34.7	20.7	198.6	244.0	53.7	82.0	246.7	65.8	96.9
North & Central America	327.2	243.9	332.5	163.3	183.2	233.6	173.0	184.2	325.9	322.7
World Total	6847.7	6725.6	7514.4	7043.5	6585.7	8339.2	9072.7	8242.9	13598.4	10999.9

Source: Food and Agriculture Organization of the United Nations, World Grain Trade Statistics (Rome), Various Issues.

APPENDIX VIII

PRIMARY CHARGES FOR GRAIN HANDLING AND SHIPPING AT PACIFIC COAST PORTS

Charge	Vancouver	New Westminster	Victoria	Prince Rupert	Seattle	Portland
Pilotage - one way only	1/2 ¢ per gross ton $1.00 per foot of draught $1.00 per mile	1/2 ¢ per gross ton $1.00 per foot of draught $1.00 per mile In Fraser River 1.3¢ per n.r.t. $2.60 per foot of draught	1/2 ¢ per gross ton $1.00 per foot of draught $1.00 per mile	1/2 ¢ per gross ton $1.00 per foot of draught $1.00 per mile	$2.35 per mile (67-1/2 miles)	$6.80 per foot of draught 4¢ per n.r.t.
Sick Mariners Dues	2¢ per n.r.t.- max. 6¢ per n.r.t. per yr. in all Canada	2¢ per n.r.t.- max. 6¢ per n.r.t. per yr. in all Canada	2¢ per n.r.t. - max. 6¢ per n.r.t. per yr. in all Canada	2¢ per n.r.t. - max. 6¢ per n.r.t. per yr. in all Canada	Nil	Nil
Tonnage Tax and Light Money	Nil	Nil	Nil	Nil	2¢ or 6¢ per n.r.t. max.5 times per yr.in all U.S.[b]	2¢ or 6¢ per n.r.t. max.5 times per yr.in all U.S.[b]
Harbour Dues	3¢ per n.r.t.- max.5 entries or 15¢ per n.r.t.per yr.	2¢ per n.r.t.- max.5 entries or 10¢ per n.r.t.per yr.	3¢ or 5¢[a] per n.r.t.- max.twice per yr.at any Public Harbour	3¢ or 5¢[a] n.r.t.-max. twice per yr. at any Public Har.	$5.00	Nil
Wharfage	3¢ per short ton loaded	6¢ per short ton loaded	15¢ per short ton loaded	15¢ per short ton loaded	Nil	Nil
Cargo Rate	3¢ per short ton loaded	Nil	Nil	Nil	Nil	Nil

APPENDIX VIII (continued)

Charges	Vancouver	New Westminster	Victoria	Prince Rupert	Seattle	Portland
Dockage	10¢ per ft. of length per 8 hrs. 5¢ per 8 hrs. in non work period[c]	Nil	6¢ per ft. of length per 24 hrs.	6¢ per ft. of length per 24 hrs.	Varies with G.R.T.-see Supplementary Table XIIA	Varies with G.R.T.-see Supplementary Table XIIA.
Wharfage[d]					1¢ per bu. or 33-1/3¢ per short ton	1¢ per bu. or 33-1/3¢ per short ton
Weighing & Inspecting	.045¢/bu.	.045¢/bu.	.045¢/bu.	.045¢/bu.	N.A.	N.A.
Elevation of Grain[e]						
From railcars	2-7/8¢ per bu. or 94.9¢ per short	2-7/8¢ per bu. or 94.9¢ per short ton	2-7/8¢ per bu. or 94.9¢ per short ton	2-7/8¢ per bu. or 94.9¢ per short ton	1-3/4¢ per bu. or 57.8¢ per short ton	1-3/4¢ per bu. or 57.8¢ per short ton
From barges	N.A.	N.A.	N.A.	N.A.	As above	As above
From trucks	N.A.	N.A.	N.A.	N.A.	2.5¢ per bu. or 82.5¢ per short ton	2.5¢ per bu. or 82.5¢ per short ton
Loading to ship	Nil	Nil	Nil	Nil	1¢ per bu. or 33-1/3¢ per short ton	1¢ per bu. or 33-1/3¢ per short ton
Service and Facilities Charge	Nil	Nil	Nil	Nil		
Selftrimming bulk carrier					10¢ per short ton	10¢ per short ton
Non-trimming bulk carrier					14¢ per short ton	14¢ per short ton

APPENDIX VIII (continued)

Charges	Vancouver	New Westminster	Victoria	Prince Rupert	Seattle	Portland
Tankers					13¢ per ST	13¢ per ST
Two-deck vessels					15¢ per ST	15¢ per ST
Three-deck "					21¢ per ST	21¢ per ST
Unclassified "					17¢ per ST	17¢ per ST
Cleaning-						
Wheat						
>2-1/2% dockage	Nil	Nil	Nil	Nil	2¢ per bu. or 66¢ per ST for all grain	2¢ per bu. or 66¢ per ST for all grain
3-1/2%-5-1/2%	1/2¢ per bu.or 16.5¢/ST	1/2¢ per bu.or 16.5¢/ST	1/2¢ per bu.or 16.5¢/ST	1/2¢ per bu.or 16.5¢/ST		
5-1/2-10%	1¢/bu.or 33-1/3¢/ST	1¢/bu.or 33-1/3¢/ST	1¢/bu.or 33-1/3¢/ST	1¢/bu.or 33-1/3¢/ST		
Oats & Barley						
>1% dockage	Nil	Nil	Nil	Nil		
1-5-1/2%	.5¢/bu.or 16.5¢/ST	.5¢/bu.or 16.5¢/ST	.5¢/bu.or 16.5¢/ST	.5¢/bu.or 16.5¢/ST		
5-1/2-10%	½¢/bu.or 33-¢/ST	1¢/bu.or 33¢/ST	1¢/bu.or 33¢/ST	1¢/bu.or 33¢/ST		

[a] 3¢ per n.r.t. if vessel from any point in North America or British possession bordering on North Atlantic or Carribean and 5¢ per n.r.t. from other origin.

[b] Charge is 6¢ per n.r.t. if vessel originates outside of North or Central America, West Indies or South America bordering on Carribean.

[c] Non-work period defined as period from 12:01 A.M. to 8:00 A.M.

[d] Wharfage is a charge for the use of grain facilities and is charged against the owner of the grain. It does not refer to term as it is applied to maritime operations in Canada. This wharfage charge is made against incoming grain whether or not it is loaded to a vessel.

[e] Charges are identical for all grain at Portland and Seattle. In British Columbia wheat, oats and barley are identical but rye, flaxseed and rapeseed have a higher charge.

Sources:

1. Grain Tariff No. 19. Applying at Seattle and Portland (Cargill, Incorporated, April 1, 1966).

2. Elevator tariffs for Canada provided by United Grain Growers.

3. Canadian Ports and Seaway Directory (Gardenvale, Que.; National Business Publications, 1966).

4. F. S. Campbell, ed., Ports, Dues, Charges and Accommodation (London; G. Philip and Son Ltd., 1964).

5. National Harbours Board, Tariff of Wharf Charges, Harbour of Vancouver, Aug. 25, 1965.

6. National Harbours Board, Tariff of Harbour Dues, Harbour of Vancouver, Nov. 25, 1964.

7. National Harbours Board, Tariff of Dockage, Buoyage and Booming Ground Charges, Harbour of Vancouver, Feb. 23, 1966.

8. National Harbours Board, Tariff of Cargo Rates, Harbour of Vancouver, Sept. 1, 1960.

9.Port of Seattle, personal correspondence.

APPENDIX IX

DOCKAGE RATES IN SEATTLE AND PORTLAND

Vessels of Gross Registered Tonnage	Seattle A[1]	Seattle B[2]	Portland A[1]	Portland B[2]
251 - 500 inc.	$2.67	$1.65	$3.50	$2.19
501 - 1,000	3.50	2.19	3.50	2.19
1,001 - 1,500	4.38	2.73	4.38	2.73
1,501 - 2,000	5.25	3.29	5.25	3.29
2,001 - 2,500	7.00	4.38	7.00	4.38
2,501 - 3,000	8.75	5.48	8.75	5.48
3,001 - 4,000	10.50	6.56	10.50	6.56
4,001 - 5,000	12.25	7.66	12.25	7.66
5,001 - 6,000	14.00	8.75	14.00	8.75
6,001 - 7,000	15.75	9.85	15.75	9.85
7,001 - 8,000	17.50	10.94	17.50	10.94
8,001 - 9,000	19.25	12.04	19.25	12.04
9,001 - 10,000	21.00	13.13	21.00	13.13
10,001 - 11,000			22.75	14.23
11,001 - 12,000			24.50	15.33
12,001 - 13,000			26.25	16.43
13,001 - 14,000			28.00	17.53
14,001 - 15,000			29.75	18.63
15,001 - 16,000			31.50	19.73
16,001 - 17,000			33.25	20.83
17,001 - 18,000			35.00	21.93
18,001 - 19,000			36.75	23.03
19,001 - 20,000			38.50	24.13
20,001 and over	$1.75 per 4 hours per 1000 Tons	$1.10 per 4 hours per 1000 Tons	$1.75 per 4 hours per 1,000 Tons	$1.10 per 4 hours per 1,000 Tons

[1]Column A is the charge for an idle vessel.

[2]Column B is the charge for a working vessel.

N.B.- All charges are for a four (4) hour period or fraction thereof.

Sources:

1. Port of Seattle, Seattle Terminals Tariff No. 100-A, March 18, 1966.

2. Commission of Public Docks of the City of Portland, Oregon, Terminal Tariff No. 3-A, April 15, 1966.

APPENDIX X

MAJOR STATISTICS OF SASKATCHEWAN WHEAT POOL TERMINAL AT NORTH VANCOUVER, B.C.

Capacity	Work house	570,000	bushels
	Storage Annex 1	2,300,000	"
	Storage Annex 2	2,300,000	"
	Total	5,170,000	"

Handling Rates:

1. Two car dumpers handling a total of 128 boxcars per 8 hour shift.
2. Two 54 inch belts in the shipping gallery with combined loading capacity of 100,000 bu./hr.

Berths: Two ship berths adequate to load vessels up to 45,000 tons capacity.

Cleaning: 32 cleaners.[a]

Drying: 1 dryer.[a]

[a]Capacities not given.

Source: Personal correspondence, June 1966.