

**AN ANALYSIS OF RAIL RATES
FOR GRAIN IN NORTH DAKOTA:
AN ALTERNATIVE TO THE CROW'S
NEST PASS RATES?**

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INTRODUCTION

The Canadian House of Commons recently voted to allow railroads to increase westbound grain rates nearly fivefold by the end of the decade. If the Crow's Nest Pass rate agreement does indeed fade away, it opens the door to possible alternative rail pricing by Canadian railroads. One option is a rate structure similar to what is in place in North Dakota.

OBJECTIVES

The objectives of this paper were primarily twofold. First, a descriptive analysis of rail rates for wheat from North Dakota was performed. Rates were examined for both eastbound (Duluth/Superior) and westbound (Portland) movements (see Figure 1 for locations). Rate spreads (differentials) were analyzed as well as rate/distance relationships. Second, applicable rail costs of a typical wheat movement from North Dakota were calculated. In addition, formulated rail costs were compared to rates to give a revenue/cost relationship.

RAIL RATE STRUCTURES IN NORTH DAKOTA

Eastbound

A four-tiered rail rate structure currently exists for eastbound wheat movements from North Dakota (Table 1). The four levels of service

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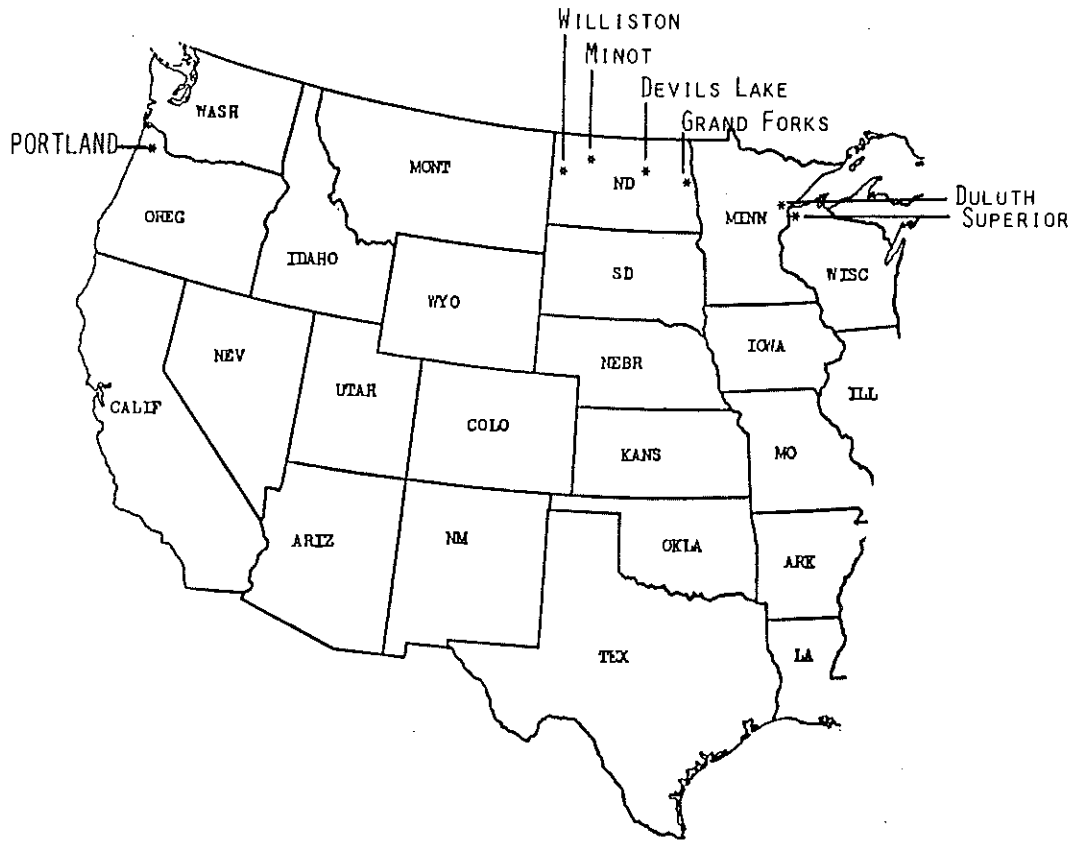


Figure 1. Locations of Portland Oregon, Duluth Minnesota and Superior Wisconsin and Four North Dakota Origins.

are: (1) single car, (2) 3-car, (3) 26-car and (4) 52-car. Rates for the various levels of service decrease as shippers utilize larger lot sizes. For example, the 3-car rate is lower than the single car rate, the 26-car rate is lower than the 3-car rate and the 52-car rate is lower than the 26-car rate. Thus, shippers receive an economic incentive (a lower rate) for shipping in quantities larger than a carload (single car service) at a time.

The rate spreads between the various levels of service vary little among stations, but the rates increase moderately as distance to market increases. For example, rate spreads at all locations are 4 cents per hundredweight (cwt.) for single-car versus 3-car service, 9 to 12 cents for 3-car versus 26-car service, and 5 to 7 cents for 26-car versus 52-car service. Single car rates vary from 73 cents per cwt. at Grand Forks to 161 cents per cwt. at Williston. Rates for 52-car service vary between 54 cents and 138 cents per cwt. at the two locations.

TABLE 1. WHEAT RAIL RATES TO DULUTH/SUPERIOR FROM FOUR NORTH DAKOTA ORIGINS, FEBRUARY, 1984.

Location	Service Level			
	Single-Car	3-Car	26-Car	52-Car
	(¢/cwt.)			
Grand Forks	73	69	60	54
Devils Lake	94	90	80	75
Minot	127	123	111	106
Williston	161	157	145	138

Westbound

Westbound rail rates for wheat from North Dakota to the Pacific Northwest (PNW)¹ are structured in the same manner as eastbound rates. Again, there are four levels of service (Table 2). However, the 3-car rate is replaced by a 26-car multiple origin rate (26 M.O.). The 26 M.O. rate may be loaded at two to four locations which allows smaller shippers to consolidate grain to utilize the lower rate.

Rate spreads on westbound rail rates are wider than rate spreads on eastbound rates. For example, the spread between the eastbound single-car rate and 52-car rate from Williston is 23 cents per cwt. while the spread between the two rates for westbound shipments is 36 cents per hundredweight. Therefore, a greater incentive exists for westbound shippers to ship in larger consignments.

TABLE 2. WHEAT RAIL RATES TO PORTLAND, OREGON FROM FOUR NORTH DAKOTA ORIGINS, FEBRUARY, 1984.

Location	Service Level			
	Single Car	26-Car M.O. (¢/cwt.)	26-Car S.O.	52-Car
Williston	207	194	187	171
Minot	221	207	199	184
Devils Lake	221	207	199	184
Grand Forks	221	207	199	184

¹The Pacific Northwest generally includes Portland, Oregon, and Seattle, Washington which are the two predominant areas for westbound grain shipments by rail from North Dakota. Rail rates to these two areas are typically identical for a given commodity.

Other than a few origins located in the western part of North Dakota, westbound rail rates do not fluctuate with distance. Minot, Devils Lake and Grand Forks all have identical rates, 221 cents per cwt. for single-car service, 207 cents per cwt. for 26-car M.O. service, 199 cents per cwt. for 26-car single origin (26 S.O.) service and 184 cents per cwt. for 52-car service. Rail rates from Williston are 12 to 14 cents per cwt. lower depending on the level of service.

Blanket Rates

Generally, rail rates tend to increase as distance increases. However, the group-rate system, which groups points of origin or destination, is a notable exception.² The group-rate system, or blanket or flat rates as they are commonly referred to, applies on westbound wheat rates from North Dakota. Thus, the same rate applies for a given level of service (i.e., single-car, 26 M.O., 26 S.O. or 52-car service) for all stations in North Dakota, with a few exceptions in the extreme western part of the state. Figure 2 depicts graphically the principle of a flat rate rail structure.³ This rate structure may be contrasted with the eastbound 26-car single origin rate (Figure 3). The eastbound rate does not "flatten" and continues to increase uniformly. The westbound rail rate begins to flatten for origins roughly 1,200 miles from destination and continues at a zero slope to the end of the scale (about 1,650 miles).

²Lieb, Robert C., Transportation: The Domestic System, 2d Edition, Reston Publishing Co., 1981, p. 174.

³Wheat rates from Montana were included in the analysis to give a better graphic depiction of rate/distance relationships. For a listing of westbound and eastbound wheat rates used in this paper see Appendix Tables I and II.

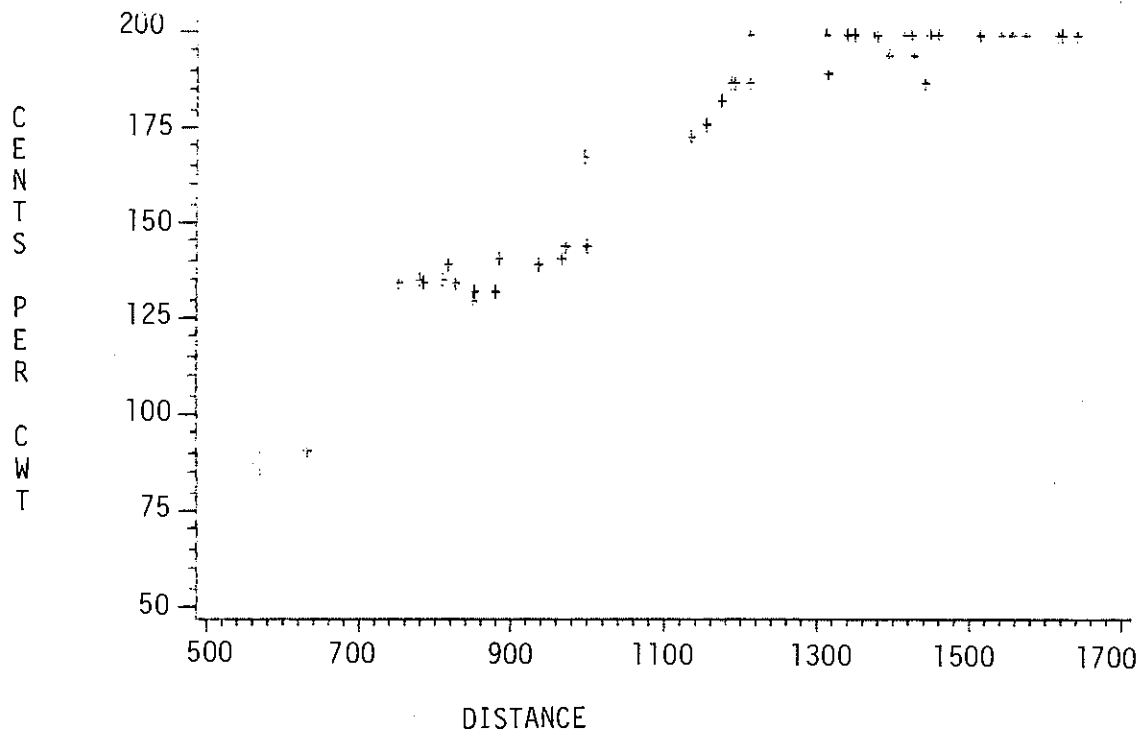


Figure 2. Illustration of Flat Rate Structure of Westbound 26-Car Single Origin Wheat Rates from 24 North Dakota Origins and 21 Montana Origins, February, 1984.

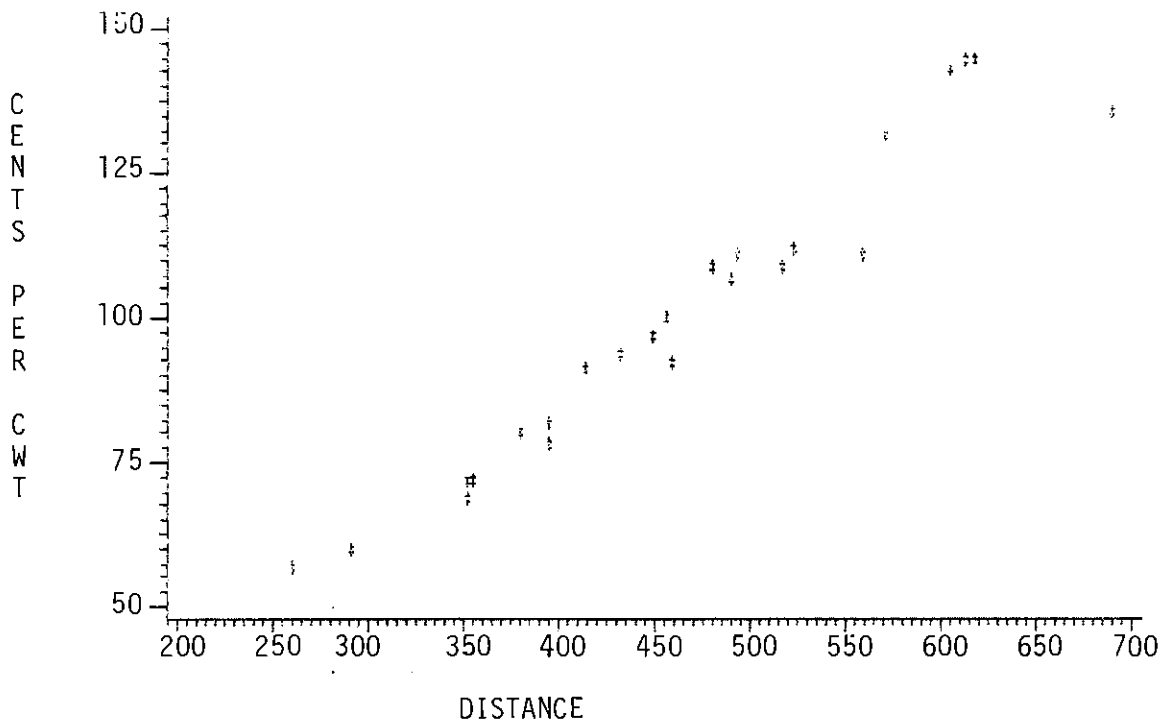


Figure 3. Illustration of Rate/Distance Relationships for Eastbound 26-Car Single Origin Wheat Rates from 24 North Dakota Origins, February, 1984.

Plotting both westbound (Figure 4) and eastbound (Figure 5) rates on a per cwt. per mile basis reveals a significant difference between the two rate structures. Westbound rates, on a per mile basis, tend to decline throughout two distinct ranges, 700 to 1,000 miles and 1,200 to 1,700 miles. Rates in the first range (700 to 1,000 miles) vary from about .145 cents per mile to about .180 cents per mile. Rates in the second range (1,200 to 1,700 miles) vary between .120 cents and .165 cents per mile.

Eastbound rates, on a per mile basis, exhibit widely fluctuating behavior. Rates vary from under .20 cents per cwt. per mile to over .23 cents per cwt. per mile throughout the 250 to 650 mile range. Unlike westbound rates, eastbound rates do not decline on a per mile basis, but rather are randomly dispersed regardless of distance. Thus, neither "tapered" nor "flat" rates are characteristic of eastbound wheat rates from North Dakota.

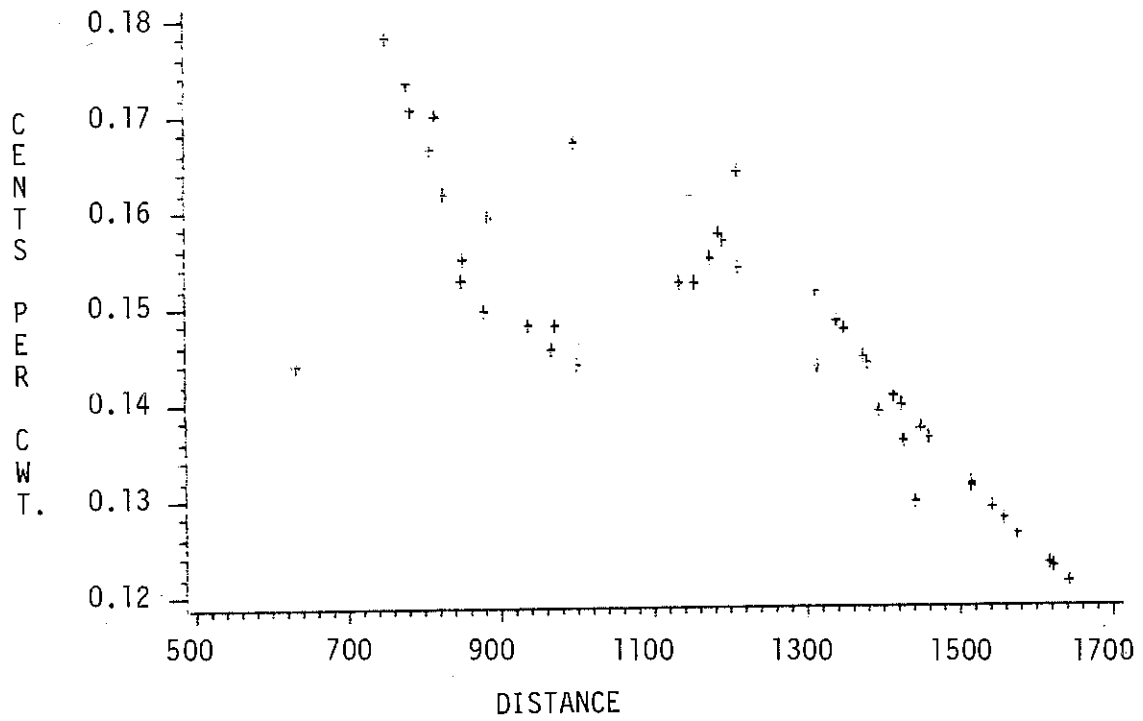


Figure 4. Plot of Westbound Wheat Rail Rates on a Per Cwt. Per Mile Basis.

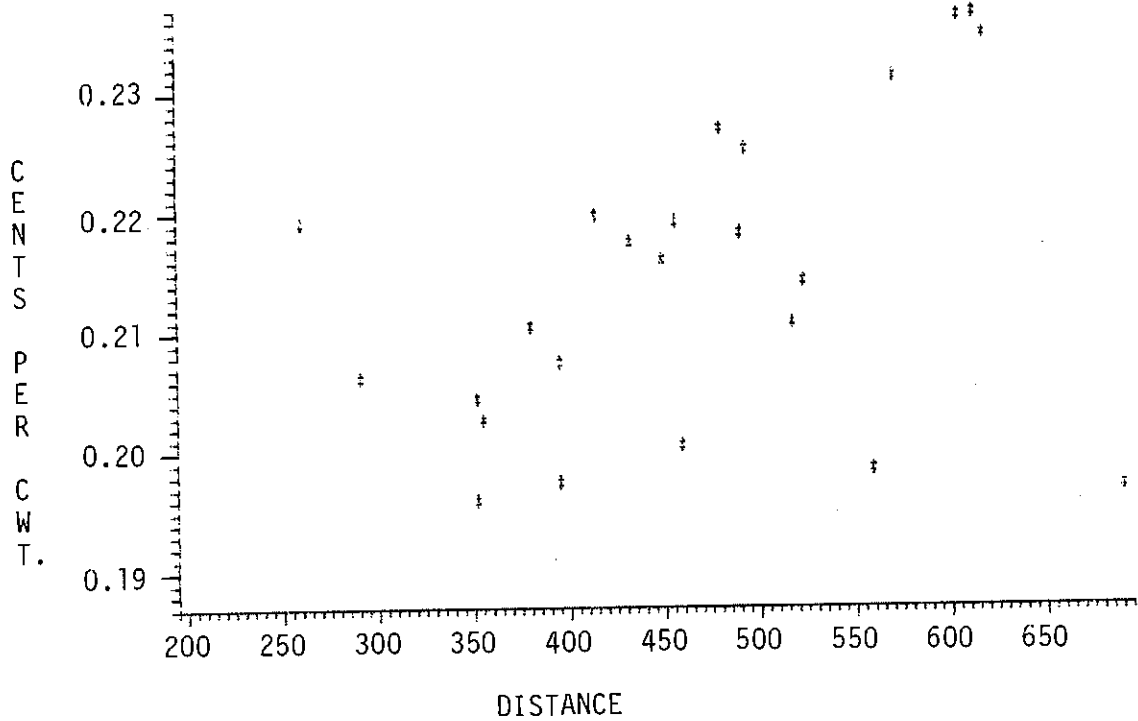


Figure 5. Plot of Eastbound Wheat Rail Rates on a Per Cwt. Per Mile Basis.

Distance is one factor contributing to the difference between eastbound and westbound rail rates from North Dakota. Grain moving to eastern markets is relatively short-haul traffic when compared to grain moving to western markets. Thus, railroads cannot economically spread their terminal costs over distance. This phenomena results in eastbound rates increasing progressively with distance and westbound rates remaining constant at some point regardless of mileage. While the flat rate rail structure overstates the theoretical pricing of a declining-cost industry, such as the railroad industry, it nonetheless accounts for both the practical realities of competitive pricing and cost of service considerations.

RAIL COSTS

Rail costs were calculated for mainline and branchline movements from selected North Dakota origins to Portland, Oregon (westbound) and Duluth, Minnesota (eastbound). Costs to the railroad were then compared to rates from the specified origins. Uniform Rail Costing System (URCS) was used to estimate rail carrier costs.⁴ Costs include variable costs and line segment fixed costs, but do not include system fixed costs.

Westbound Costs

Rail carrier costs were calculated for westbound 26-car single origin wheat movements for 16 origins (Table 3). Costs varied from a low of 96 cents per cwt. from Williston to a high of 130 cents per cwt. from Turtle Lake. Rate/cost ratios varied between 1.53 and 1.95,

⁴For a detailed description of rail costing methodology see Tolliver, Denver D., Economies of Density in Railroad Cost-Finding: Applications to Rail Form A, Proceedings, Transportation Research Forum, Volume XXIV, No. 1, 1983.

meaning that rates were 53 percent and 95 percent above estimated costs, respectively.

TABLE 3. RAIL CARRIER COSTS, AND RATES, AND DISTANCES TO PORTLAND, OREGON, FOR 26-CAR SINGLE ORIGIN WHEAT MOVEMENTS FROM SELECTED NORTH DAKOTA ORIGINS, FEBRUARY, 1984.

Origin	Line Type	Distance (miles)	Rail Carrier Cost ----- (cents per cwt.)	Rate	Rate/Cost Ratio -----
Cavalier	Branch	1,588	126	199	1.58
Crosby	Branch	1,428	114	194	1.70
Devils Lake	Main	1,426	114	199	1.75
Dickinson	Main	1,314	106	189	1.78
Fargo	Main	1,543	123	199	1.62
Grand Forks	Main	1,514	120	199	1.66
Horace	Branch	1,554	123	199	1.62
Jamestown	Main	1,515	121	199	1.64
Killdeer	Branch	1,536	122	199	1.63
Lakota	Branch	1,450	116	199	1.72
Mandan	Main	1,414	113	199	1.76
Minot	Main	1,312	106	199	1.88
Mohall	Branch	1,375	110	199	1.81
Pingree	Branch	1,536	122	199	1.63
Turtle Lake	Branch	1,643	130	199	1.53
Williston	Main	1,187	96	187	1.95

Eastbound Costs

Carrier costs were also estimated for eastbound 26-car single origin shipments from the 16 origins (Table 4). Costs varied from 28 cents per cwt. to 55 cents per cwt. Rate/cost ratios varied from 1.85 to 2.65.

Ratios and costs would deviate from those contained in Tables 3 and 4 for alternative levels of service (single-car, 3-car, 52-car, etc). However, the costs and ratios calculated for eastbound and westbound 26-car wheat movements are representative of those that could be estimated for remaining service levels. That is, relative rate/cost relationships would not vary significantly between service levels.

TABLE 4. RAIL CARRIER COSTS, AND RATES, AND DISTANCES TO DULUTH, MINNESOTA, FOR 26-CAR SINGLE ORIGIN WHEAT MOVEMENTS FROM SELECTED NORTH DAKOTA ORIGINS, FEBRUARY, 1984.

Origin	Line Type	Distance (miles)	Rail Carrier Cost ----- (cents per cwt.) -----	Rate	Rate/Cost Ratio
Cavalier	Branch	364	36	78	2.17
Crosby	Branch	605	54	143	2.65
Devils Lake	Main	380	37	80	2.16
Dickinson	Main	559	50	111	2.22
Fargo	Main	260	28	57	2.04
Grand Forks	Main	291	31	60	1.94
Horace	Branch	270	29	57	1.97
Jamestown	Main	270	35	72	2.06
Killdeer	Branch	581	52	122	2.35
Lakota	Branch	355	39	72	1.85
Mandan	Main	459	43	92	2.14
Minot	Main	493	45	111	2.47
Mohall	Branch	523	50	112	2.24
Pingree	Branch	373	37	79	2.14
Turtle Lake	Branch	480	45	109	2.42
Williston	Main	613	55	145	2.64

SUMMARY AND CONCLUSIONS

Wheat shipments from North Dakota origins are typically bidirectional, east and west. Rail rates from the state to market destinations in these areas exist for four basic levels of service. Levels of service for eastbound rates are single-car, 3-car, 26-car and 52-car. Westbound service levels are single-car, 26-car multiple origin, 26-car single origin and 52-car. Rates generally decrease as the lot size or volume increases.

Westbound rates exhibit a structure that "flattens" as distance from market increases. Thus, wheat rail rates to the west coast from North Dakota origins are identical regardless of distance, with a few exceptions in the western fringe of the state. Eastbound rail rates do not exhibit a flattening effect and increase positively as distance from market increases.

Rail rates on westbound movements are generally about 75 percent greater than carrier's costs (not including system fixed costs). Rates on eastbound movements are typically double carrier's costs. Thus, ignoring allocation of system fixed costs, eastbound movements are more profitable to rail carriers than westbound movements.

APPENDIX TABLE I. WHEAT RAIL RATES AND DISTANCES TO PORTLAND, OREGON,
FROM SELECTED NORTH DAKOTA AND MONTANA ORIGINS, FEBRUARY, 1984.

State/Origin	Distance	Level of Service			
		1-Car	26-Car M.O. ^a	26-Car S.O. ^b	52-Car
		(cents per cwt.)			
North Dakota:					
Antler	1,449	221	207	199	184
Appam	1,442	207	194	187	180
Barton	1,382	221	207	199	184
Cando	1,460	221	207	199	184
Carrington	1,558	221	207	199	184
Crosby	1,428	215	202	194	187
Deering	1,341	221	207	199	184
Devils Lake	1,426	221	207	199	184
Dickinson	1,314	211	197	189	174
Esmond	1,622	221	207	199	184
Fargo	1,543	221	207	199	184
Glasston	1,576	221	207	199	184
Grand Forks	1,514	221	207	199	184
Jamestown	1,515	221	207	199	184
Lakota	1,450	221	207	199	184
Langdon	1,618	221	207	199	184
Mandan	1,414	221	207	199	184
Minot	1,312	221	207	199	184
Mohall	1,375	221	207	199	184
Northgate	1,395	215	202	194	187
Towner	1,349	221	207	199	184
Turtle Lake	1,213	221	207	199	179
Williston	1,187	207	194	187	171
Montana:					
Bainville	1,155	196	183	176	169
Choteau	881	155	143	132	118
Conrad	811	158	146	135	120
Glendive	1,213	207	194	187	169
Great Falls	850	153	141	130	116
Havre	884	165	152	141	126
Helena	752	152	140	134	120
Huntley	1,000	167	153	144	132
Laurel	972	163	150	144	132
Lewiston	968	167	153	141	127
Manhattan	828	152	140	134	120
Miles City	1,135	200	184	173	154
Missoula	632	114	97	91	80
Moccasin	938	163	150	139	124
Power	852	155	143	132	118
Saco	998	194	179	167	149
Shelby	779	158	146	135	120
Sidney	1,192	206	194	187	169
Sweet Grass	818	163	150	139	124
Terry	1,174	206	190	182	162
Whitehall	785	152	140	134	124

^a26-Car multiple (2 to 4) origin.

^b26-Car single origin.

APPENDIX TABLE II. WHEAT RAIL RATES AND DISTANCES TO DULUTH MINNESOTA,
AND SUPERIOR WISCONSIN, FROM SELECTED NORTH DAKOTA ORIGINS, FEBRUARY,
1984.

Origin	Distance	Level of Service			
		1-Car	3-Car	26-Car	52-Car
		----- (cents per cwt.) -----			
Antler	517	124	121	109	104
Appam	618	161	157	145	138
Barton	449	111	108	97	92
Cando	414	105	100	91	84
Carrington	395	96	93	82	77
Crosby	605	159	155	143	136
Deering	490	122	118	107	101
Devils Lake	380	94	90	80	75
Dickinson	559	127	123	111	106
Esmond	432	108	103	94	88
Fargo	260	71	67	57	52
Glasston	352	83	79	69	64
Grand Forks	291	73	69	60	54
Jamestown	352	86	82	72	67
Lakota	355	86	82	72	67
Langdon	395	92	87	78	72
Mandan	459	106	103	92	86
Minot	493	127	123	111	106
Mohall	523	128	124	112	107
Northgate	571	148	144	132	126
Towner	456	115	111	100	95
Turtle Lake	480	124	121	109	104
Watford City	690	153	149	136	131
Williston	613	161	157	145	138