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Marketing Hard Red Spring Wheat in 100-Car Trains

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in cooperation with

North Dakota Wheat Commission
Canadian Pacific Railway
North Dakota Grain Dealers
Red River Valley and Western Railroad
South Dakota Wheat Commission

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EXECUTIVE SUMMARY

100+ car rates are a recent innovation in rail grain pricing. Although the rates have been available via contract, a public offering last fall initiated much of the current interest in these larger units. The objective of this study is to provide an informational base that hard red spring wheat market participants can use in assessing the value of a 100-car marketing option for their business. This study was conducted in cooperation with industry participants, including the North Dakota Wheat Commission, Canadian Pacific Railway, North Dakota Grain Dealers Association, Red River Valley and Western Railroad Company, and the South Dakota Wheat Commission.

The implications of 100+ car rates may vary by region and commodity due to production and logistical characteristics. Information on production density, land use, transportation, and grain drawing economics for corn, wheat, and soybeans produced in North Dakota, South Dakota, Nebraska, Kansas, and Iowa are included in the study. Estimates of rail efficiency gains and returns on investment for elevator upgrades also are included.

The 100+ car facilities have important implications for the infrastructure and market processes that support hard red spring wheat procurement. A 100+ car marketing option may likely benefit market participants as it increases flexibility by adding another marketing alternative. The advent of larger trains will, however, likely contribute to further rationalization of the state's grain procurement system. Further rationalization may include fewer elevators, additional rail line abandonment and longer producer deliveries.

TABLE OF CONTENTS

INTRODUCTION 1
- Project Overview 5
- Data 9
- Organization 9

GRAIN PRODUCTION CHARACTERISTICS 11
- Crop Production Levels 12
- Land Use 15
- Production Density 16

GRAIN RAIL TRANSPORTATION CHARACTERISTICS 21
- Rail Rate Spreads 24
- Unit Train Shipments 25
- Unit Train Shipments from North Dakota Elevators 27

RAIL FROM SUPPLIER TO CUSTOMER 33
- HRS Wheat Customers 39
- Rail Shipments from North Dakota Elevators to Selected Export Regions 42

COST ANALYSIS 45
- URCS Costs for Alternate Grain Car Shipment Scenarios 45

ECONOMICS OF ELEVATOR INVESTMENT AND GRAIN DRAWING 49
- Greenfield Elevator Construction 51
- Producer Delivery Decisions 52
- Benefit/Cost Estimates for Alternative 100-car Investment Scenarios 53

CONCLUSION 59

REFERENCES 63

APPENDICES 65
- Appendix A. Wheat Rates from North Dakota Origins 67
- Appendix B. North Dakota Unit Train & 100-Car Loading Stations, 1997 68
- Appendix C. BNSF Public Contract Offering for 104-Car Wheat Trains 69
- Appendix D. Average Rail Car Load Factor for Corn, Wheat, and Soybean Originated from GORS, 1990-1995 70
- Appendix E. Rail Shipments of Corn, Wheat and Soybeans 71
- Appendix F. Average Annual Corn, Wheat, and Soybean Production by GOR, 1990-1995 72
- Appendix G. Top Five Countries for HRS Exports Out of the Lakes, Gulf, and Pacific Ports, 1990-1996 73
- Appendix H. URCS Parameters and Cost Procedures 74

Appendix I. URCS Cost Estimates 77
Appendix J. Loan Repayment and Complete Case Information for Benefit/Cost Scenarios 78

LIST OF TABLES

1. Rail Rate Spreads for Wheat Shipments from Minot, N.D. to Portland, Ore. 3
2. Unit Train Shipments as a Percent of Total Origination from N.D. Elevators, by Commodity and Crop-Year 29
3. U.S. Production and Export Volumes for Corn, Wheat and Soybeans, 1990-1996 34
4. Japan NS/DNS and Corn Purchase Contract Specifications 37
5. Dollars Spent on Rail Transportation, by Commodity 38
6. U.S. Historical Production/Usage for Hard Red Spring Wheat 40
7. Distribution of Exports Among Regions 41
8. Use of Unit Trains for Marketing HRS Wheat to Customers via Duluth and the PNW 44
9. Elevator Industry Characteristics 49
10. Producer Willingness to Delivery to Elevators Based on Differences in Board Price . . 52
11. Benefit/Cost of 108-car Marketing Option for Alternative Scenarios 55

LIST OF FIGURES

Figure 1. BNSF Tariff Rate Spreads for Wheat from Minot, N.D., to Portland, Ore. 4
Figure 2. Origination of HRS Wheat by N.D. Elevators 5
Figure 3. BNSF Car Ordering Program Premium or Discount, Per Car 7
Figure 4. CP Car Ordering Program Premium or Discount, Per Car 7
Figure 5. Grain Origination Regions Selected for 100-car Rate Project, Based on U.S. Public Use Waybill BEA's 12
Figure 6. Distribution of Average Annual Corn, Wheat and Soybean Production from 1990 to 1995, Among GORs 13
Figure 7. Average Annual GOR Corn, Wheat and Soybean Production, NASS 1990-1995 . . 14
Figure 8. Corn, Wheat, and Soybean Harvested Acres as a Percent of Total Land Area, By GOR Average 1990-1995 15
Figure 9. Grain Production Density by GOR, Including Corn, Wheat and Soybean Production 18
Figure 10. Ratio of Rail Shipments to Total Production for Each GOR, Avg. 1990-95 22
Figure 11. Ratio of Rail Shipments to Total Production by Commodity and GOR, Avg. 1990-95 23
Figure 12. Rate Spread between Single-car and Unit Train Shipments,1990-95 25
Figure 13. Unit Train Shipments, as Percent of Total Rail Shipments 27
Figure 14. Total Shipments and Mode for N.D. Elevator Origination of HRS Wheat 30
Figure 15. U.S. Production and Rail Shipments of Corn, Wheat, and Soybeans, 1990 to 1995 35
Figure 16. Rate/Cost Spread Estimates for 104-car Wheat Shipments from North Dakota to Export Markets 47

INTRODUCTION

The six major classes of wheat produced in the United States are hard red winter (HRW), hard red spring (HRS), soft red winter (SRW), hard white (HW), soft white (SW) and hard amber durum (DUR). A basic raw-kernel characteristic used to differentiate and value these wheats for end-product performance is protein.[1] Protein levels are an indicator of milling and baking characteristics. Among the wheat classes, HRS wheat is differentiated by its relatively high protein content. Higher protein flours are used in bread and bread products, such as bagels. In addition, high protein HRS wheat often is blended with the lower protein wheats in flour milling, depending on economics and desired end-product characteristics.

HRS wheat production is concentrated in the north-central region of the United States. North Dakota, Montana, Minnesota, and South Dakota account for more than 95 percent of the U.S. HRS wheat production. This region is located long distances from barge facilities and major markets, therefore, rail has inherent advantages in moving grain to most markets. Truck deliveries typically are limited to local hauls and terminal markets within a 300-mile radius, but may be extended depending on backhaul opportunities and niche markets.

Buyers of HRS wheat are a diverse group with a wide array of wheat uses and milling techniques. In recent years, HRS wheat premiums have been attached to increasingly stringent contract specifications. Privatization of foreign wheat buying, sophistication of buyers, and variation in crop quality have continued to put pressure on buyers and sellers in defining and

[1]Protein is an industry standard for measuring quality. Other considerations are falling numbers, test weight, damage, dough strength and water absorption. Several of the quality considerations are correlated to protein levels.

delivering wheat demanded by the market (Oades, 1997). The market value of the delivered product is influenced by factors such as quality, quantity, and timeliness.

Transportation efficiency and flexibility in marketing are vital to successful HRS wheat marketing. Thus, when carriers or buyers introduce new marketing options, elevators and producers assess potential value for their businesses. One example of this phenomenon is how private and producer-owned elevators in this region have adapted to take advantage of multiple-car and unit-train rail rates.

A 1978 study survey of North Dakota's 617 elevators was conducted to assess potential for using multiple car shipments (UGPTI, SP #4). The survey included questions regarding elevator handling capabilities and marketing. Average loadout capacity for the 257 survey respondents was 6.5 cars per eight-hour day. Thirty-nine percent of the survey respondents managed elevators equipped to load a shipment of 10 or more cars, given a 24-hour loading time. At the time of the 1978 survey, only 1 percent of the respondents believed their elevator could take advantage of a 50-car rate. Regardless of loadout capacity, elevator managers were asked their opinion on market acceptance of the larger shipments. While 71 percent thought they could negotiate five-car sales, only one-third thought they could negotiate a 10-car sale under existing market conditions. The survey results provide a basis for considering the potential for continued change in the grain marketing system.

These multiple-car rail rates were a major institutional change in the marketing of grain. Multiple-car rates were initiated for wheat in the north central region of the United States in December, 1980 (Table 1). Less stringent regulation of rail pricing, granted under recently passed legislation, allowed the railroads to offer the rates in competitive response to trucks.

Trucks had been expanding market share of eastbound wheat from eastern North Dakota and western Minnesota over the late 1970s (Griffin and Mielke, 1983).

Rail rate spreads offered in 1980 by Burlington Northern and Soo Line, were 13 cents per bushel between single-car and multicar rail shipments. An additional discount of two cents per bushel was provided for a unit train shipment (Table 1). The rate spreads gave elevators an opportunity to invest in their facilities and expand their trade area. A portion of the rate spread was internalized with the remainder being passed back to the producer through higher board prices.

Table 1. Rail Rate Spreads for Wheat Shipments from Minot, N.D. to Portland, Ore.

	Single-car[1] to Multicar[2]	Single-car to Unit Train[3]	Multicar to Unit Train
		cents/bushel	
December 1980	13¢	15¢	2¢
July 1981	12¢	15¢	3¢
January 1982	14¢	22¢	7¢
February 1984	14¢	23¢	8¢

[1]Single-car = 1 to 24 car shipment
[2]Multicar = 25 to 49 car shipment
[3]Unit Train = 25 to 49 car shipment

Source: BN Tariff, ICC BN 4016 & Soo Line Tariff, ICC Soo 4087-A: Rodriquez, 1985.

As illustrated in Table 1, initial spreads soon were adjusted to provide further incentive for unit train facilities. The rate spread between single and multicar shipments remained relatively stable between 1980 and 1984. The multicar to unit train spread increased six cents per bushel, a

300 percent increase in the rate spread over four years. This additional spread in the rate structure encouraged many elevators to make investments in their facilities.

Since the mid-1980s the rate spread between the single car and unit train shipment of wheat has narrowed, as illustrated in Figure 1. A rate spread that was at 23 cents per bushel in 1984 had narrowed to 12 cents per bushel by the fall of 1997. Thus, elevators that were able to take advantage of the wide initial rate spreads had an advantage in recouping the investments made to their facilities, over facilities making the investments more recently.

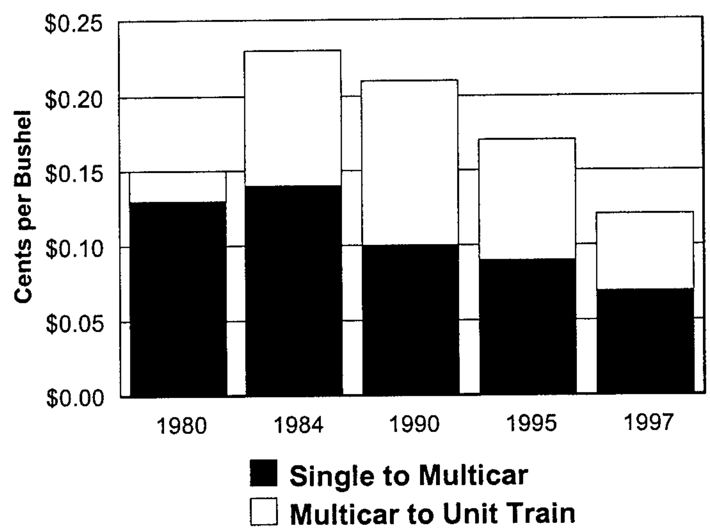

Figure 1. BNSF Tariff Rate Spreads for Wheat from Minot, N.D., to Portland, Ore.

Investment in unit train facilities for North Dakota agriculture is evident. In 1984, eight elevators in North Dakota were equipped to load and market unit trains of grain. By 1997 there was an 11-fold increase in the number of unit train facilities (Map - Appendix B). It is estimated that more than 100 of these facilities are located throughout the state. The unit train facilities accounted for 22 percent of licensed North Dakota grain facilities for the 1996/97 marketing year. This group of elevators accounted for 67 percent of the HRS wheat origination during the 1994/95 to 1996/97 marketing years (Figure 2).

Currently, unit train facilities dominate North Dakota HRS wheat origination. As the North Dakota agricultural sector continues to evolve, production patterns, transportation rates/service, customer demands, and producer and elevator marketing will influence investment decisions. Thus, it is important to continue to assess the potential for alternative investments in the context of a longer-term strategic vision.

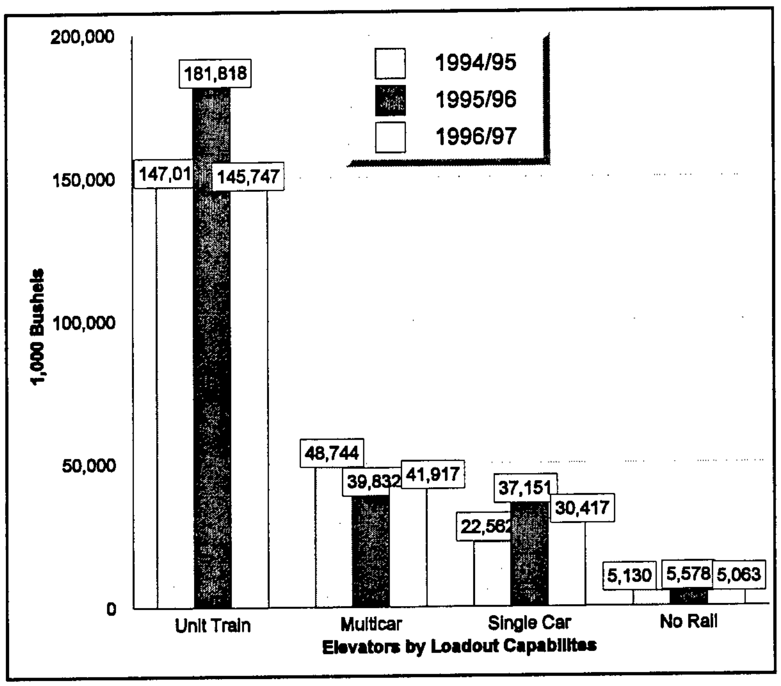

Figure 2. Origination of HRS Wheat by N.D. Elevators

Project Overview

A recent thrust in the evolution of the country grain marketing system has been toward larger grain export shipments. Although contract rates for 100+ car shuttle trains have been available for many years, published public rates for 100+ car trains were more widely introduced into the market by Union Pacific (UP) in July 1997 as a component of the corporate strategy for their grain unit. UP shippers were offered a $200 per car discount to the existing unit train tariff rate for loading a 108-car shuttle train within the established railroad program guidelines. The guidelines included 108-car single track configuration, loading time of 15 hours, and a 108-car equipped destination.

Burlington Northern-Santa Fe (BNSF) announced a104-car version of this increased train size in September 1997. BNSF publically published 104-car train contract rates for wheat shipments from Minnesota, Montana, North Dakota, South Dakota, and Wisconsin. Shipments that met origin and destination loading/unloading requirements were issued a $150 per car discount to the 52-car published (tariff) rate for shipments to the Pacific Northwest, Gulf, and St. Louis. A $100 per car discount to the 52-car published (tariff) rate was offered for shipments to Duluth/Superior (Appendix D).

Under the current BNSF program, shippers who use the 104-car rates are able to guarantee car acquisition at rates below the tariff rate for their 104-car shipments, regardless of car supply. In contrast, shippers using smaller shipment sizes can only guarantee car acquisition by using premium car ordering programs such as COTS and PERX. Under the current scenario, the spread between the 104-car rate and the rate being paid by non-104-car competitors fluctuates depending on use of car ordering programs and supply/demand conditions in the rail car market. Figures 3 and 4 illustrate BNSF and CP car ordering premiums and discounts over time, respectively, providing a base for assessing benefits/risks of guaranteeing the 100-car train deliveries at tariff rates.[2]

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[2]Figure 4 shows PERX bids falling below the tariff rate on several occasions. However, in early 1998, CP Rail announced that it would no longer accept bids at rates below tariff.

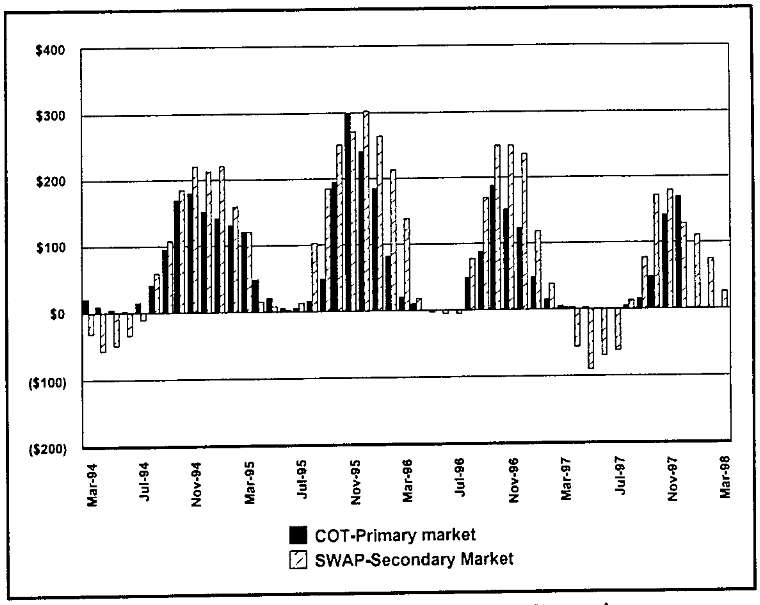

Figure 3. BNSF Car Ordering Program Premium or Discount, Per Car

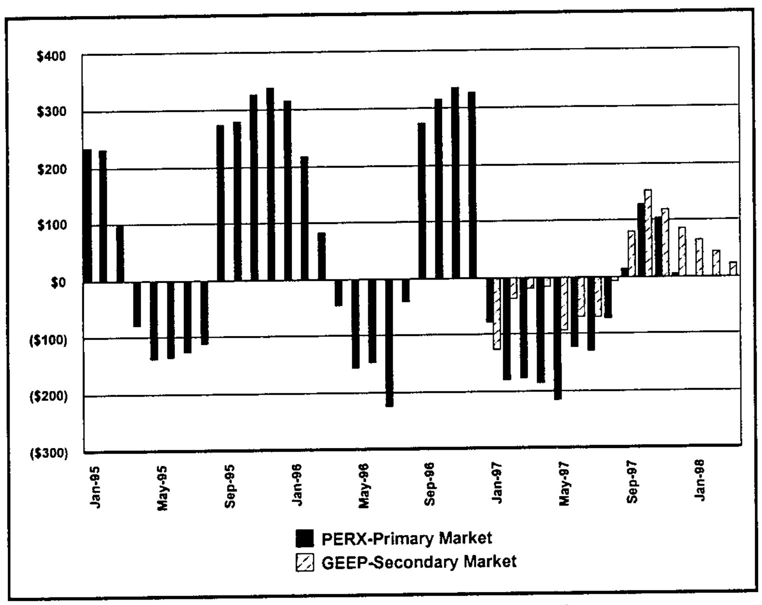

Figure 4. CP Car Ordering Program Premium or Discount, Per Car

The 100-car marketing alternative has important implications for grain market participants and the infrastructure used to gather and distribute products. The objective of the project is to provide a resource base that hard red spring market participants can use in evaluating the value of a 100-car[3] marketing option for their business. The scope and components of the analysis were defined through a project partnership with HRS wheat industry participants: the Canadian Pacific Railway, North Dakota Grain Dealers, North Dakota Wheat Commission, Red River Valley and Western Railroad Company, and the South Dakota Wheat Commission. The report includes seven components.

- Description of seven grain producing regions, including corn, wheat, and soybean, production densities and land use
- Profile of rail transportation characteristics for HRS wheat, corn, and soybean originated from the seven grain origination regions
- Overview of HRS wheat export and domestic market shipment destinations
- Review of tariff rail rate spreads
- Estimate of railroad costs for alternative 100-car shipping parameters using the Uniform Rail Costing System (URCS)
- Economics of elevator investment and grain drawing
- Discussion of the implications of current grain market trends for the country grain market participants and infrastructure

Collectively, these components provide information useful for analyzing potential investment decisions.

[3] 100-car refers to train configurations of 100 to 110 cars.

Data

Both primary and secondary data were required for the analysis. Primary data sources included project cooperators, North Dakota Public Service Commission Grain Movement Database, Erickson and Associates, and local construction companies. The secondary data resources were necessary for compiling production, land area, tariff rail rates, infrastructure profiles, and grain shipment characteristics. Production data, including county level corn, wheat and soybean yield, acres harvested, and total production were based on National Agricultural Statistics Service publications. County land area was estimated using the *TransCAD* geographic information program. Historical tariff rail rate data were compiled based on published BNSF tariffs. Multiple years of the U.S. Public Use Waybill sample were used to compile annual characteristics for the shipment of corn, wheat, and soybeans from selected Bureau of Economic Analysis (BEA) regions. Location and storage capacities for elevators in Nebraska, Iowa, and North Dakota were compiled based on federal and state agency data.

Organization

This report contains five sections. Grain production characteristics are covered in the initial segment of the report, providing the framework for regional comparisons and baseline characteristics. The second major section is grain rail transportation characteristics. Rail grain transportation is addressed specifically, including trends and profiles of regional rail shipments. The Uniform Rail Costing System analysis, in the subsequent project component, contains estimates of costs for alternative 100-car train configurations. Domestic and export HRS wheat markets are discussed within the context of a 100-car marketing scenario in the fourth section of the report. The next component of the analysis provides resources to address economics of elevator investment and grain drawing requirements. The final section completes the project with an overview of considerations, resources, and potential implications for marketing HRS wheat in 100-car trains.

GRAIN PRODUCTION CHARACTERISTICS

Regional commodity production characteristics are fundamental to a logistics-based analysis of the grain industry. For this project, the north-central region of the United States was divided into seven regions, referred to as Grain Origination Regions (GOR). GOR characteristics, including production volumes, land use and commodities grown, and draw area considered by producers and elevators will be highlighted in this project. These basic characteristics provide insight into similarities and differences of grain gathering economics among the seven regions. They also suggest how shuttle train rates may increase elevator grain draw areas and affect producer hauls.

Grain Origination Regions were defined by grouping counties within 19 Bureau of Economic Analysis (BEA) boundaries that encompass the north central United States. These BEA boundaries were considered because they are the geographic base for analysis in the U.S. Public Use Waybill components of this project. For the project, the BEAs were then grouped into seven Grain Origination Regions by the Project Consultation Committee based on production and transportation characteristics. The seven GORs are:

- GOR 1: western North Dakota and northeast Montana
- GOR 2: eastern North Dakota, northwest Minnesota and northeast South Dakota
- GOR 3: western South Dakota and northeast Colorado
- GOR 4: western Nebraska and east central Colorado
- GOR 5: includes parts of southern Minnesota, southeast South Dakota, eastern Nebraska, and western Iowa
- GOR 6: western and central Kansas
- GOR 7: Central Iowa

The BEA boundaries and thus, the GOR do not follow state boundaries. A map illustrating the boundaries is included in Figure 5.

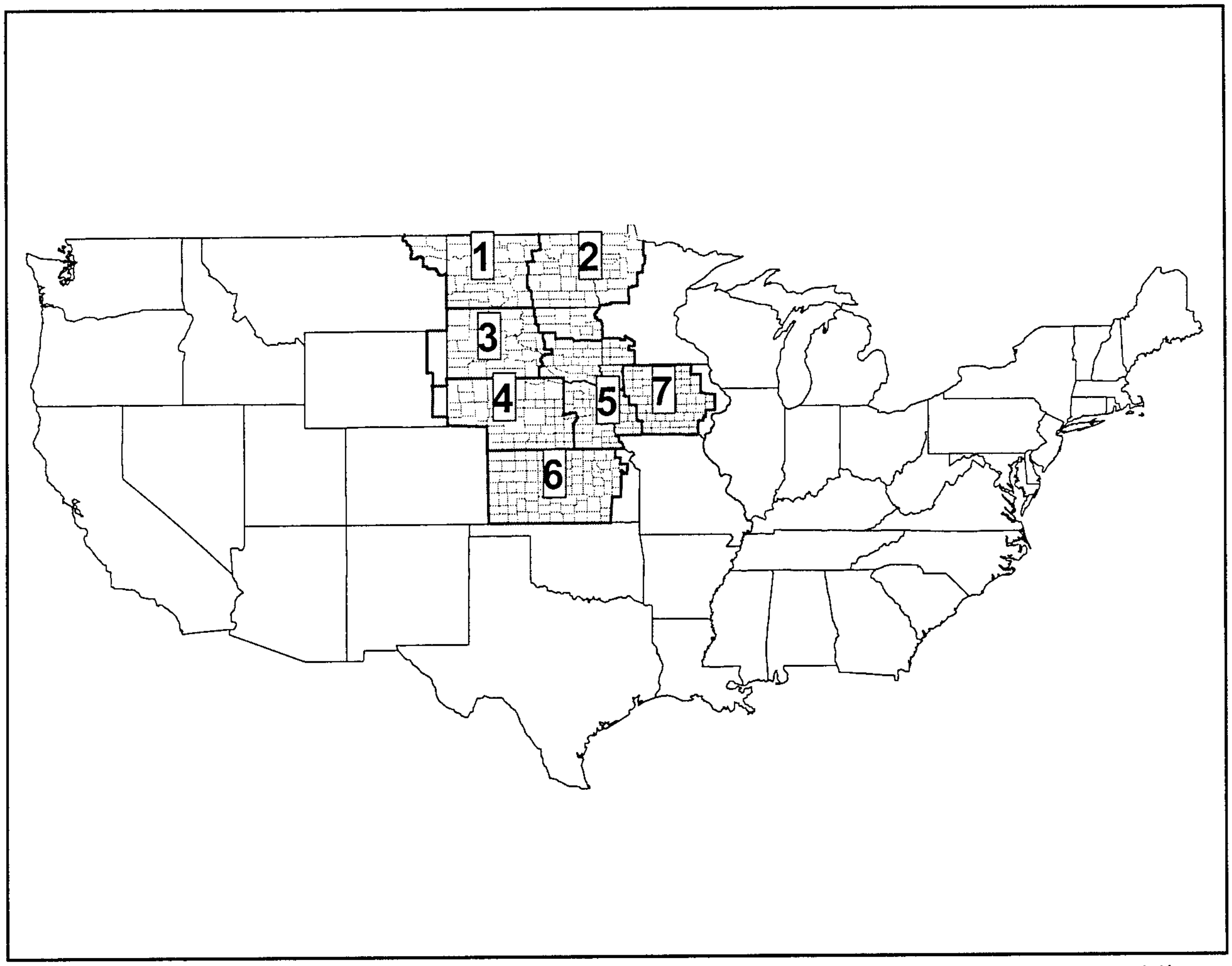

Figure 5. Grain Origination Regions Selected for 100-car Rate Project, Based on U.S. Public Use Waybill BEA's

Crop Production Levels

National Agricultural Statistics Service (NASS) data were used to estimate county level production of corn, wheat, and soybeans. County data were then aggregated in each of the GORs. Annual data for 1990 to 1995 were used to estimate production and land use characteristics. Regions 5 and 7 accounted for 58 percent of average annual corn, wheat, and soybean production among the seven regions, between 1990 and 1995. Regions 4, 6 and 2 accounted for 14, 13 and 10 percent, respectively. The remaining 5 percent was supplied by

Regions 1 and 3, as they grew four and one percent of the average production of corn, wheat and soybeans bushels over the six-year period (Figure 6). Production volumes of the three commodities provide a baseline for assessing potential use of the 100-car rates, as they are the commodities central to rail carrier 100-car shipping programs.

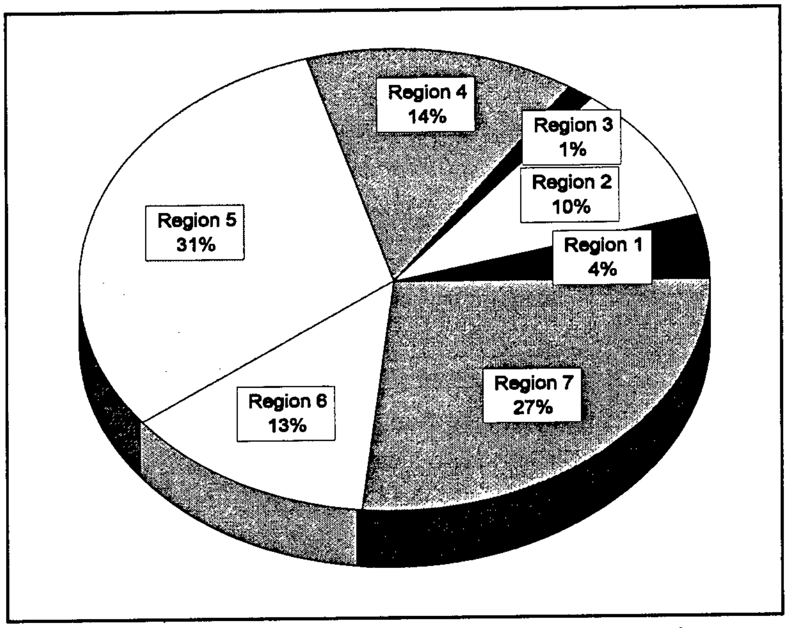

Figure 6. Distribution of Average Annual Corn, Wheat and Soybean Production from 1990 to 1995, Among GORs

The relative importance of each commodity, among the three commodities included in this analysis, should be considered because each commodity has its own origination and distribution patterns. The relative importance of each commodity varies among the GORs. In GORs 4, 5, and 7, corn is the dominate commodity, accounting for 82, 77, and 79 percent of the production of the three commodities, respectively. Production in GORs 1, 2, 3, and 6 is concentrated in wheat (Figure 7). Among the regions, the northern most regions, GOR 1 and 2, grow predominately HRS wheat and durum. Region 6, which covers much of Kansas, is a major supplier of HRW wheat. Region 3, western South Dakota and northeast Colorado, produces a mixture of HRS, durum, and HRW wheats. These commodity production characteristics and their individual grower and customer bases are important to consider in assessing the value of alternative marketing options.

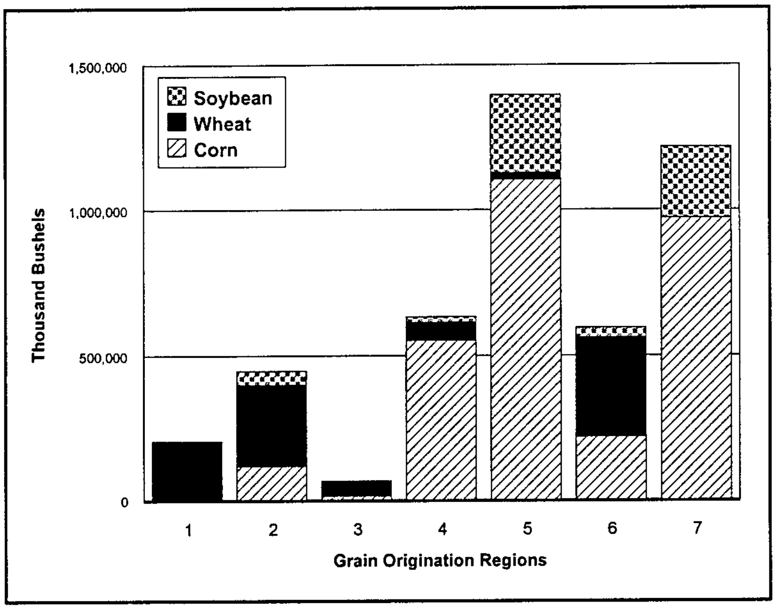

Figure 7. Average Annual GOR Corn, Wheat and Soybean Production, NASS 1990-1995

Land Use

Land use provides another means for considering the distribution of production within the GORs. Harvested acres of corn, wheat, and soybeans were used as a proxy for land in production. NASS data from 1990 to 1996 were used to estimated the number of corn, wheat, and soybean acres harvested in each GOR. As with production, there is a wide range in the percent of available land used in the production of these three major export grains. Region 7 (Iowa) employs the greatest share of available land in the production of the three grains, using 59

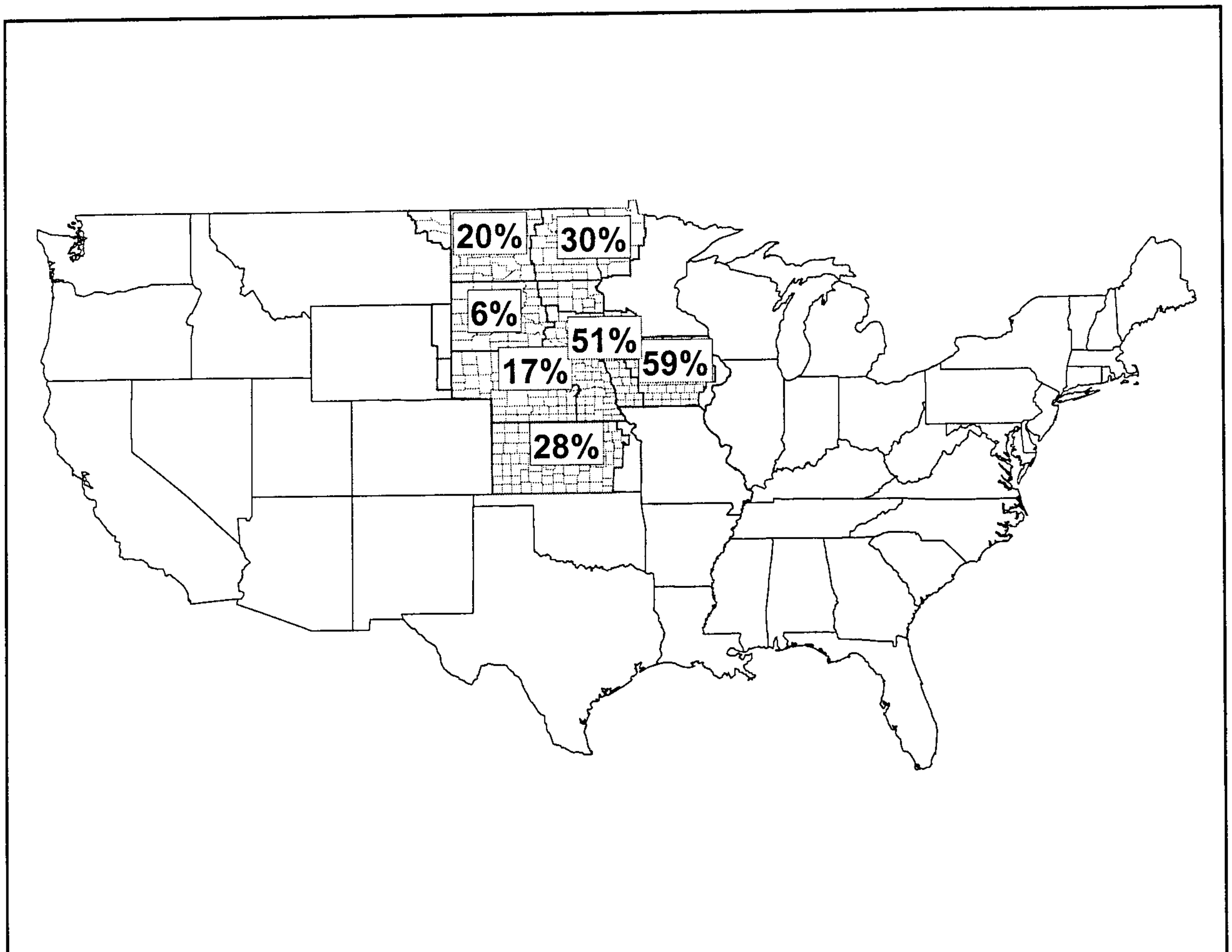

Figure 8. Corn, Wheat, and Soybean Harvested Acres as a Percent of Total Land Area, By GOR Average 1990-1995

percent of its available land in production of corn, wheat, or soybeans. This region bordering to the west, Region 5 is a close second, as 51 percent of the total land area was used to produce corn, wheat, and soybeans annually between 1990 and 1995.

The regions covering western and eastern North Dakota (Region 1 and 2) employed 20 and 30 percent of their land, respectively, in production of the three commodities. Corn, wheat, or soybeans were harvested from about 17 and 28 percent of the land in central and western Nebraska and Kansas (Regions 4 and 6), respectively, during the six-year period. Region 3, western South Dakota and northeast Colorado, is characterized by the lowest land use ratio. Annually, only 6 percent of the land in this region was used for production of corn, wheat, or soybeans over the five-year period. This region does include the Badlands region of South Dakota, which is not a tillable land area. Although grain drawing analysis should be done on an individual basis, use of land is an important attribute that can be used in making general comparisons regarding the expansion of draw areas among GORs.

Production Density

Land use and production volume characteristics can be taken a step further in a measure of production density. Production density is a key component in assessing the economics of alternative grain procurement and investment strategies. The potential to increase the amount handled by expanding the size of the drawing area is directly related to the density of production in that expanded area of draw.

This measure of production density considers three primary export grains (corn, wheat, and soybeans). NASS county level production and TransCad county level land area data were used to estimate the densities. The measure of production density is defined by a ratio of corn, wheat, and soybean production to available acres of land. The GOR density ratio was calculated using six-year average county density ratios, weighted by available land.

$$D_{GOR} = \frac{\sum_{j=1}^{n} \left(\frac{P_j}{L_j} \right) L_j}{\sum_{j} L_j}$$

where:

GOR = grain origination region

j = county j

D = density of corn, wheat and soybean production (bushels per acre)

P = total production of corn, wheat, and soybeans in bushels

L = total land area in acres

Production densities for the GORs range from a low of 1.92 bushels per acre in Region 3, which covers western South Dakota and part of northeast Colorado, to a high of 52.39 bushels per acre in Region 7, which covers much of Iowa (Figure 9). The density for Region 5 was estimated to be 39.37 bushels per acre between 1990 and 1995. The HRS wheat production area in GORs 1 and 2, have densities of 6.20 and 11.27 bushels per acre, respectively. HRW wheat production regions in western and central Nebraska and Kansas had production densities of 16.41 and 13.07 bushels per acre, respectively over the six years.

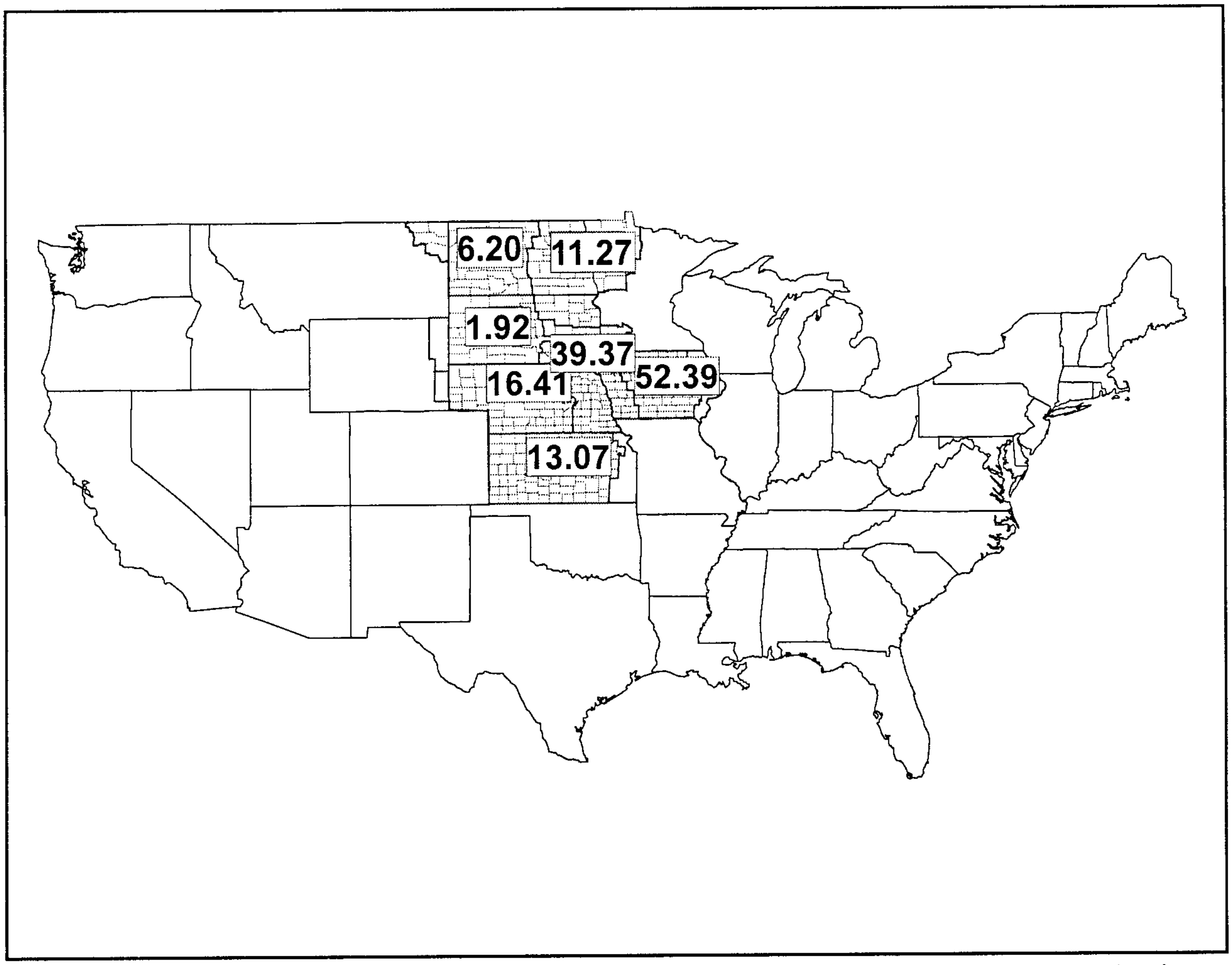

Figure 9. Grain Production Density by GOR, Including Corn, Wheat and Soybean Production

The density of production is valuable in comparing the relative value of expanded draw area for the GORs. For example, if elevators in GOR 7 (Iowa) and GOR 1 (western North Dakota) each expanded their draw areas in 100 acres, the net increase in bushels would vary substantially. With the increase in the draw area, the estimated net increase in handle would be 5,239 for the elevator in GOR 7 and 620 bushels for the elevator in GOR 1.

Although it is important to make individual assessments of production density in an expanded draw area, the GOR production densities suggest that there may be a fundamental difference in assessing the logistics of grain procurement among the regions. This wide variation in production densities has important implications for larger train sizes in individual GORs.

GRAIN RAIL TRANSPORTATION CHARACTERISTICS

Competitive transportation rates and services are vital to a healthy and profitable agricultural sector. Each of the three commodities and seven regions considered in this report have unique marketing opportunities and challenges. Thus, the potential value of marketing alternatives, specifically transportation options, also varies among regions and commodities. As provided by the directive of this report, efforts in the analysis were concentrated on providing resources that HRS wheat market participants may draw upon in assessing the value of a 100-car marketing option for their businesses.

The use of rail for "packaging" raw grain shipments originated from the seven GORs varies depending on factors such as local disappearance, product characteristics, truck and barge competition, and customer preferences. The importance of rail as a mode for marketing corn, wheat, and soybeans from the north and central regions of the United States is evident in examining the ratio of rail shipments to total production (Figure 10). The primary HRS wheat producing regions, GORs 1 and 2, marketed 79 and 73 percent of their average annual corn, wheat and soybeans via rail between 1990 and 1995. GORs 4 and 6 which cover western Nebraska and Kansas, respectively, shipped about half of their average annual production via rail over the six years. These ratios compare to 33 percent for GOR 7, which covers much of Iowa and 38 percent for GOR 5[4].

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[4](GOR 5 considers only corn and soybean production and rail shipments.) The wheat ratio for GOR 5 is not considered, as it is likely distorted due to rail billing and is not a true representation of rail grain origination. St. Louis, Missouri, is a rebilling market for rail wheat shipments. Rebilling allows railroads and merchandisers to use an initial local/gathering rate (first Waybill) into St. Louis, then a second rate (second Waybill) is issued if the shipment is destined beyond St. Louis via rail.

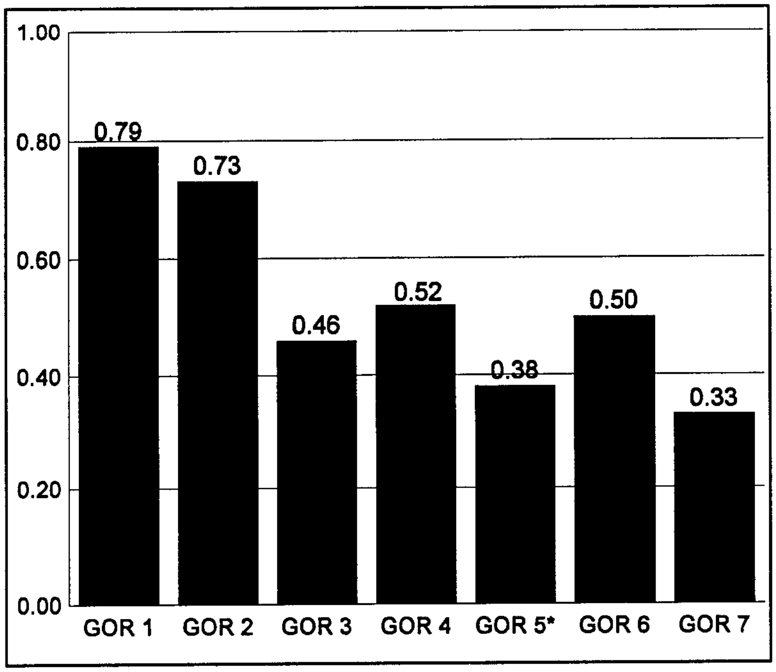

Figure 10. Ratio of Rail Shipments to Total Production for Each GOR, Avg. 1990-95

Figure 11 provides some insight into the relative importance of rail marketing alternatives for each of the three commodities among the GORs. This graphic illustrates the average annual ratio of rail shipments to production, between 1990 and 1995, by GOR, for each commodity. These ratios suggest that among commodities considered in this project, wheat producers and marketers generally are more dependent on rail for origination and marketing. The ratio of rail shipments to production for wheat ranges from 0.61 to 0.90[5]. This ratio means that, on average for each 10 bushels of wheat produced during the six years, six to nine bushels of wheat were originated via rail, depending on the region. The wheat ratios can be compared to corn and soybean ratios ranging from .03 to .49, and .18 to .70, respectively. A primary HRS wheat-producing region covering eastern North Dakota, GOR 2, was highly dependent on rail with a rail

[5]Please refer to previous footnote.

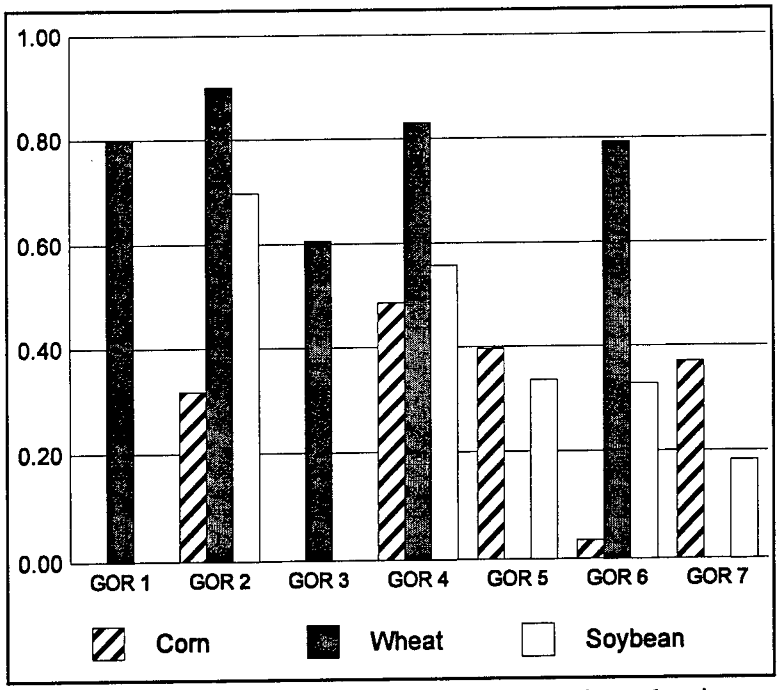

Figure 11. Ratio of Rail Shipments to Total Production by Commodity and GOR, Avg. 1990-95

wheat shipment to wheat production ratio of .90. This dependence on rail magnifies the value of rail shipping options for shippers of HRS wheat.

The commodity rail shipment volumes by GOR, and other rail shipment characteristics, including rate spreads, cars per shipment and load factors, also were estimated by analyzing the annual U.S. Carload Public Use Waybill Sample. The waybill sample contains shipment data from a stratified sample of rail waybills submitted by freight railroads[6] to the Surface Transportation Board.[7] The Public-Use version of the waybill sample contains non-confidential data at the BEA and 4-digit Standard Transportation Commodity Code level (Surface

[6]Railroads that have shipments terminated at least 4,500 carloads in the United States over the previous three years are included in the sample.

[7]1994 and earlier samples were collected by the Interstate Commerce Commission.

Transportation Board, 1995). Analysis of waybill sample data is valuable for making comparisons among regions and commodities with regard to rail transportation characteristics.

Rail Rate Spreads

Rail grain rates differ by market, commodity, and shipment size. Spreads between unit train and single-car rates segregate the markets allow sellers/customers options in packaging their products and provide incentive for investments that lend themselves to system efficiencies. For purposes of this analysis, grain movements were classified as unit train or non-unit train shipments. Non-unit train shipments were defined as rail shipments of 1- 44 cars. Unit train shipments were defined as consignments of 45 cars or more. Although a unit train shipment typically is 50 cars or more, a 45-car definition was used to allow for equipment problems.

The public-use waybill sample data were used to estimate the spread per car-mile between single car and unit train shipments of corn, wheat and soybeans, between 1990 and 1995. Trends in the rate spreads may provide insight into rail pricing, shipper investment, and customer characteristics. Figure 12 illustrates the rate spreads for the three commodities. The car-mile rate is used rather than a ton-mile rate because these commodities had similar load factors of 97 tons per car for corn and soybeans, and 98 tons per car for wheat, between 1990 and 1995 (Appendix D).

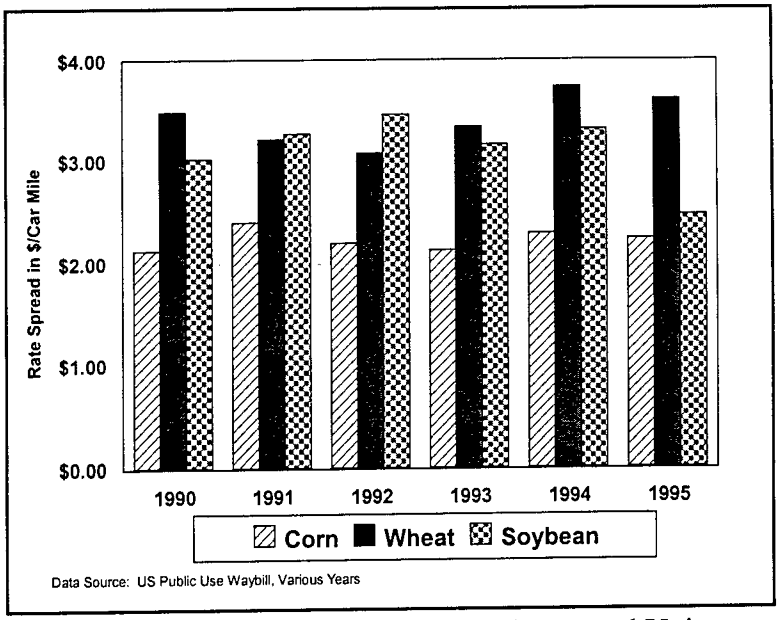

Figure 12. Rate Spread between Single-car and Unit Train Shipments,1990-95

Corn experienced the narrowest spread between single-car and unit-train rates for shipments between 1990 and 1995. The spread for corn shipments ranged from $2.13 to $2.41 per car-mile (U.S. Public Use Waybill). The wheat rate spread between the shipment sizes ranged from $3.08 to $3.74 per car-mile over the six-year period. Soybean rates have experienced the widest range for rate spreads, trending up to a peak of $3.47 per car-mile in 1992 and back to the smallest soybean rate spread of $2.47 in 1995. In comparison the rate spread for wheat has trended upward since a low in that same year. The rate spreads and their trends provide insight into to rail carrier pricing and incentives provided for investment to load larger rail units.

Unit Train Shipments

While rate spreads provide an incentive for investment to market in larger units, the ability and desire of customers to use the unit trains also is a key consideration in facility investments. Because the 100-car train rates were only recently made public, analysis of historical data regarding this size of shipment is not valid. The use of unit train size shipments may, however, provide some insight into the acceptance and use of the larger trains. Unit trains were the largest train alternative offered via the published rail tariff rates. Thus, commodity shipments currently made via the unit train configuration may more likely be candidates for sizing up to the 100-car train size.

The rate spreads illustrated in Figure 12 suggest that railroads provided lower rates as an incentive for shippers to use unit train rates for shipping corn, wheat, and soybeans between 1990 and 1995. Waybill data was summarized for the same six years to analyze the effect of the rate spreads on use of the unit train size shipments in the marketing of the three commodities. As Figure 13 shows, unit train shipments of corn ranged between 57 and 64 percent of total rail shipments from the seven GORs considered in this study. The use of unit trains for corn was relatively steady between 1990 and 1993, at 61 and 62 percent. In 1994 use of unit train shipments dipped to 57 percent of rail shipments, then peaked at 64 percent in 1995. In 1990, 41 percent of soybean rail shipments originated from north and central plains region were of unit train size. Although it dropped off slightly in 1994, soybean shippers have showed a propensity toward the unit train size shipment. Fifty-one percent of soybean shipments were of unit train size for 1995, based on public-use waybill sample data.

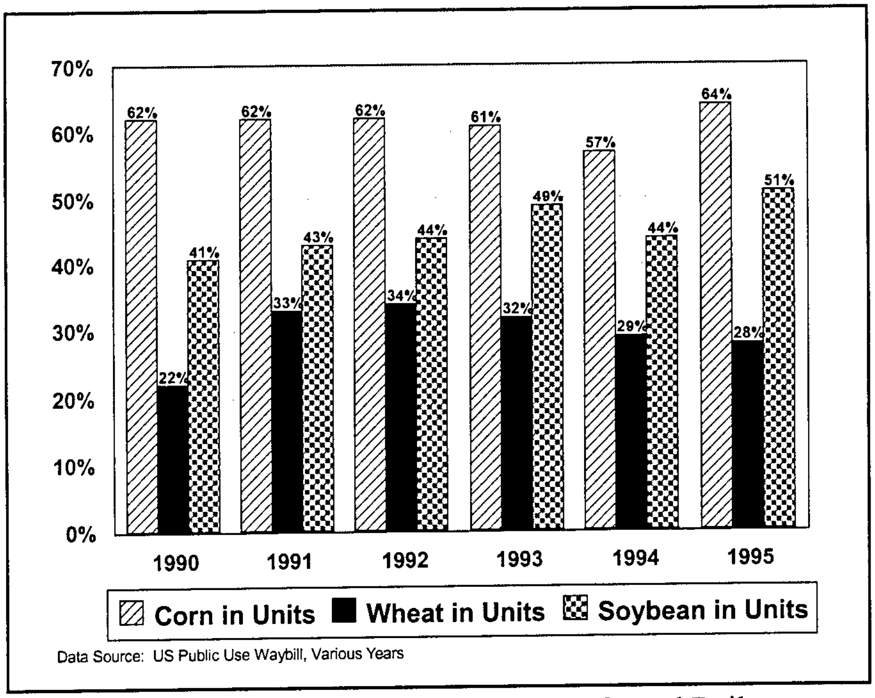

Figure 13. Unit Train Shipments, as Percent of Total Rail Shipments

Shippers in the wheat market were less inclined to make use of the unit train rates, compared to corn and soybean shippers (Figure 13). Unit train size shipments accounted for 22 to 34 percent of the annual rail wheat shipments from the seven GORs between 1990 and 1995. Use of the unit train size shipment peaked in 1992 at 34 percent, and declined to 28 percent of total rail shipments for 1995. 1992 was the largest wheat export volume year among the six years. As the export market is a primary destination for unit train-sized shipments of wheat, strong export demand likely contributed to shipper use of unit trains.

Unit Train Shipments from North Dakota Elevators

Establishing a relationship between sales volume and use of unit trains for HRS wheat origination may be useful in predicting use of a 100-car shipping alternative on a year-to-year basis. North Dakota has a unique database in place for monitoring transportation activity of its grain industry. This database may be valuable in addressing the issue of marketing HRS wheat in 100-car trains, as North Dakota is the primary U.S. supplier HRS wheat. To maintain the North Dakota Grain Movement Database, the North Dakota Public Service Commission collects grain shipment data from each elevator in the state on a monthly basis. Grain shipments are segregated by commodity, mode, and destination. Modes include truck and three rail shipment sizes: single car (1 to 24 cars), multicar (25 to 49 cars), and unit train (50 cars or more). These data can be summarized to illustrate shifts and trends in distribution of raw grain product origination for elevators in the state.

Unit trains are an alternative that about one-fourth of N.D.'s elevators can employ in packaging and distributing products to a global customer base. The use of the unit train size shipment fluctuates, as dynamic market forces perpetually influence supply and demand among commodities and regions. N.D. elevators' use of the unit train for marketing during the 1992-93 to 1996-97 crop years is illustrated in Table 2. HRS wheat was marketed via the unit train more frequently than other primary grains grown in the state, in part because it is the highest volume grain produced in the state.[8] The packaging preferences of HRS wheat customers are important to the success of many of the state's elevators, as this commodity accounted for more than half (54 percent) of the elevator shipments among five primary bulk commodities: HRS wheat, barley, durum, corn and soybeans. On average, 39 percent of the HRS wheat marketed by N.D. elevators was shipped via unit train allotments, over the past five years.

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[8]Sunflowers, oats, and flax accounted for eight, two, and less than one percent of annual N.D. elevator shipments between 1992/93 and 1996/97. These three commodities are not included in this report as less than one percent of each of these commodities was marketed annually via unit train between 1992/93 and 1996/97. (Vachal, *North Dakota Grain and Oilseed Transportation Statistics*)

Barley accounted for 23 percent of the quantity of grains produced in North Dakota over the past five crop-years. Six percent of the barley shipments were made via unit train in 1992-93. In 1996-97, selection of this mode had doubled, as unit train size shipments were used for 12 percent of the barley origination. Elevators have shown an increasing trend in use of unit train for marketing barley due to increased export sales and due to an increased proportion of North Dakota barley used for feed purposes.[9] Although the export market for unit trains of barley has grown in recent years, strong domestic feed and malting industries continue to purchase truck and less-than-unit-train rail size lots.

Table 2. Unit Train Shipments as a Percent of Total Origination from N.D. Elevators, by Commodity and Crop-Year

	HRS Wheat	Durum	Barley	Corn	Soybean
1992-93	47%	26%	6%	25%	29%
1993-94	38%	26%	5%	6%	23%
1994-95	34%	18%	9%	25%	18%
1995-96	40%	22%	9%	31%	29%
1996-97	37%	20%	12%	29%	29%
Average	**39%**	**22%**	**8%**	**23%**	**26%**
Avg. Shipments (1,000 bushels)	268,754	76,394	115,131	22,396	16,392

Unit trains were used in distributing 26 percent of durum originated from N.D. elevators for the 1992-93 and 1993-94 crop years. These 50+ car units were used to market only 18, 22, and 20 percent, respectively, of the durum during the following three marketing years. Sales

[9]Scab in barley has contributed to an increased proportion of North Dakota barley being used for feed rather than malting.

volumes seem to be positively related to use of unit train for durum, as the decline in use of unit trains coincided with lower sales over the latter three-year period. Average annual durum sales volumes were 20 percent lower during the 1994-95-1996-97, compared to 1992-93 and 1993-94.

Corn and soybean shipments accounted for three and four percent of the N.D. elevator shipments among the five grains, respectively. North Dakota elevators are residual suppliers of both grain markets, unlike the HRS wheat, malting barley, and durum markets. About 23 percent of corn and 26 percent of soybeans originated by elevators over the five-year period were shipped to destinations in unit train quantities. Thus, it is evident that commodities originated by N.D. elevators are shipped in many transportation packages. The use of larger shipment sizes depends on ever-changing customer demands, production densities, and grain qualities.

As previously mentioned, HRS wheat accounts for a majority of the unit train shipments originated by N.D. elevators. The distribution of HRS wheat shipments by N.D. elevators, among modes, is presented in Figure 14. This information is overlaid on a graph of the total bushels of HRS wheat shipped by N.D. elevators for each marketing year. Unit train shipments, as the mode of choice for marketing HRS wheat, trended upward from 24 percent in 1989-90 to account for 47 percent of the HRS wheat marketed in 1992-93. Since then, the use of unit trains has declined somewhat, but seems to have followed the trend in sales of wheat by North Dakota producers. The share of HRS wheat marketed via single car and truck shipments have declined relative to 1989-90 levels. Single car shipments represented 29 percent of the HRS wheat shipments in 1989-90. In 1995-96 and 1996-97 only 15 and 16 percent, respectively, of N.D. elevators' HRS wheat was packaged in single car lots for shipment to customers. N.D. elevators used trucks to market about one in four bushels of the 1989-90 HRS wheat shipments. In 1995-96 and 1996-97 the share of HRS wheat marketed by truck had declined by about 20 percent, to account for 19

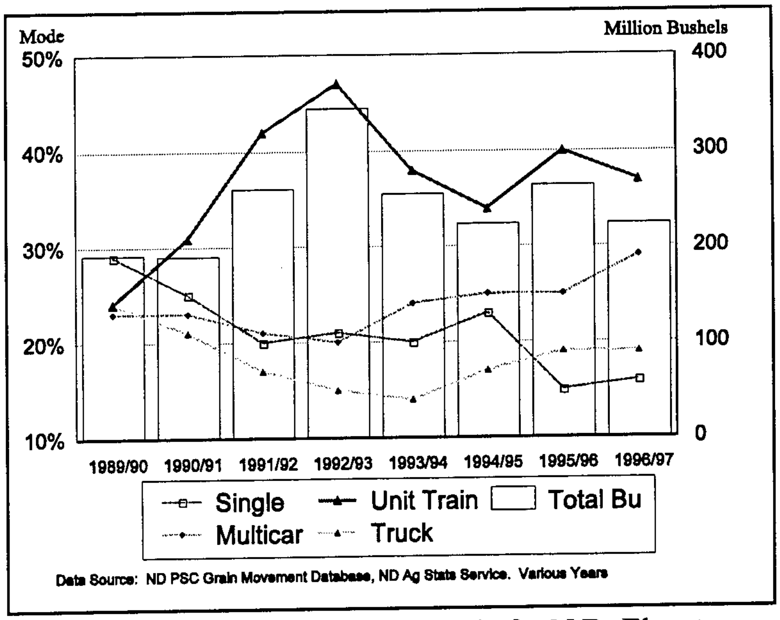

Figure 14. Total Shipments and Mode for N.D. Elevator Origination of HRS Wheat

percent of N.D. elevator shipments of HRS wheat. More specific summaries regarding the use of unit trains for export regions will be provided in the next section.

Although corn, wheat, and soybeans all are categorized as bulk grain commodities, it is evident that each has its own distinctive transportation characteristics. Reliance on rail, product competition, customer demands, and rail carrier pricing are unique for each of them. General transportation characteristics, such as ratios of production to rail shipments, rate differentials, and use of unit trains for rail shipments, contribute to a framework for making comparisons and identifying synergies for the transportation requirements of the commodities. Having described production and transportation characteristics of corn, wheat, and soybean shipments, the next steps in adding to a resource base for HRS market participants are to profile customers and discuss the rail rates and costs.

RAIL FROM SUPPLIER TO CUSTOMER

Independent elevators and large grain companies continually adapt raw grain product packaging to serve a wide array of customers in an efficient and profitable way. The value of a 100+ car rail packaging alternative for individual grain shippers varies depending on the customers they serve. In discussing market efficiencies and the potential for applying a 100+ car rail packaging option to major grains, it should be noted that U.S. wheat suppliers have a unique marketing environment that sets them apart from their corn and soybean counterparts.

The first attribute that differentiates wheat, and more specifically the higher protein wheats, such as hard red spring wheat, from corn and soybeans, are the consistency and quality demands of customers. The higher protein wheats often are marketed profitably as specialty products. A speciality product is one that is tailored to suit specific customer demands and end-uses. A growing segment of high protein wheat customers have become more demanding regarding the consistency and quality of products they purchase.

John Oades (1998) attributed the increasing pressures to deliver a more consistent and often better quality wheat product to three factors. (1) Wheat customers are becoming more sophisticated. The consumer base they serve has access to more disposable income for food. With this latitude in buying, consumers are demanding more variety and better quality wheat food products. (2) Mechanization of milling and end-product manufacturing are rapidly advancing, even in third-world countries. The automation requires consistent inputs for proper end-product characteristics. The advancements also contribute to the need for wheat that is uniform in quality. (3) The final and most important contributing factor is the privatization of import buyers. Ten years ago, 85 percent of imported wheat was purchased by government entities. It has decreased by one-quarter, to between 60 and 75 percent. While governments are typically focused on generic product purchases with a goal of minimizing cost, private buyers are profit motivated. Private buyers are willing to invest in product-specific characteristics to optimize quality of their end-product. As the world wheat market continues to mature, the quality and consistency requirements likely will become even more pronounced.

Another attribute that differentiates wheat from these commodities, is the presence of the United States in the world export market. United States participation in the world wheat market is far different than its presence in either the world corn or soybean markets. The United States supplied only 29 percent of the world export wheat, compared to 81 and 68 percent of the export corn and soybeans, respectively, between 1994 and 1996 (USDA). This lack of dominance in the world market is rather significant, considering that more than half (52 percent) of the wheat grown annually in the United States, between 1990 and 1996, was destined for export (Table 3). Corn and soybeans are relatively less dependant on the export market as only 22 and 34 percent, respectively, of the average annual production was delivered to foreign markets between 1990 and 1996. Wheat market dependence on foreign demand and the exposure to global competition make product differentiation and timely delivery paramount in maintaining and expanding market share.

Table 3. U.S. Production and Export Volumes for Corn, Wheat and Soybeans, 1990-1996

	Corn	**Wheat**	**Soybean**
Average Annual Production (million bushels)	8,117	2,348	2,111
Average Annual Exports (million bushels)	1,784	1,226	715
Ratio of Exports to Production	**22%**	**52%**	**34%**

A third factor that should be considered, when evaluating rail packaging alternatives for wheat, corn, and soybeans, is use of rail in distribution channels. Although annual production volumes of corn are nearly four times that of wheat, yearly rail shipment volumes of the two commodities are similar because rail is more often the mode of choice for wheat than corn. The proximity of major corn and soybean producing regions to domestic markets and barge facilities allows shippers of these commodities more discretion in selecting a mode to route grain to market. On average, between 1990 and 1995, 64 percent of the wheat grown in the United States was loaded on rail for shipment to market. This compares to 24 percent of either corn or soybeans (NASS, U.S. Public Use Waybill). So, although, corn production volumes are much greater than wheat, the relative importance of the commodities to the rail industry is similar based on rail grain volumes (Figure 15).

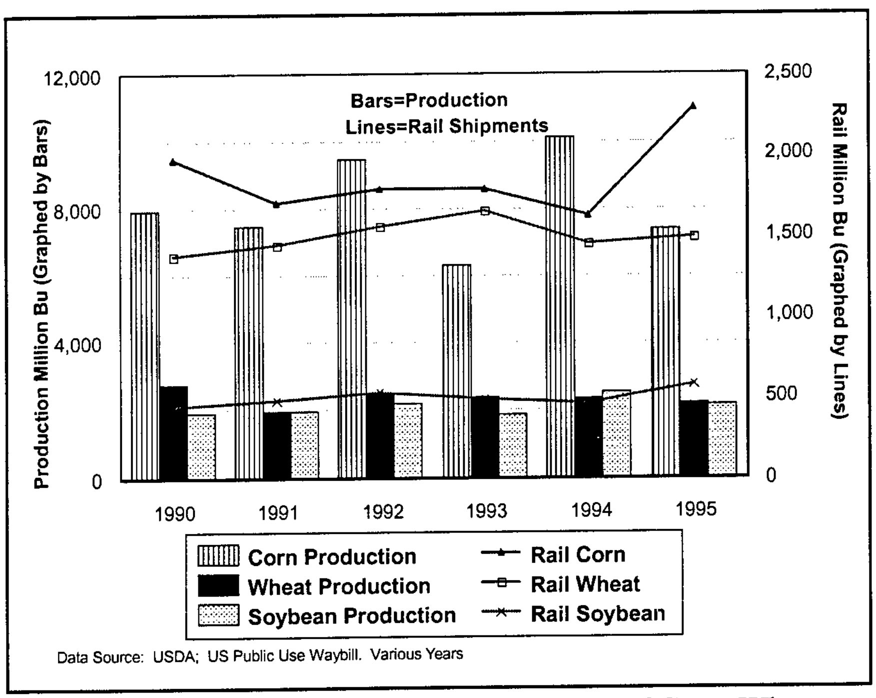

Figure 15. U.S. Production and Rail Shipments of Corn, Wheat, and Soybeans, 1990 to 1995

A final consideration in comparing corn and soybean rail packaging to HRS wheat are the market structures, which are unique to each commodity and region. The density of production and lack of on-farm storage attributed to primary corn producing areas in the central plains means the local logistical system is positioned to move large volumes over a short span of time. For a commodity such as corn this volume intense, less-descript product marketing chain means few tests for quality factors, minimal segregation of product, and limited packaging options for customers. This type of marketing system contrasts to that of the north central plains where HRS wheat is originated. In this region, ample on-farm storage and extensive testing and segregation programs are commonplace.

As noted, each commodity and region has its own logistical infrastructure and process. The differences are evident in comparing rail-receiving capabilities of domestic corn and wheat customers. When considering the opportunities associated with rail packaging alternatives, the benefits to a supplier are based on customer demands. Tom Kraemer of the Burlington Northern Santa Fe Railroad, and Mark Houston of the Union Pacific Railroad, offered in separate presentations, that a majority of their domestic corn-receiving customers were equipped to handle trains of at least 75 cars. In comparison, only three domestic wheat mills (less than 5 percent of the population) have track space and storage to facilitate rail deliveries of 75 cars or more. The three mills are Amber Milling Company in Houston, Texas, ConAgra Company at Buffalo, N.Y., and Bay State Milling in Tolleson, Ariz. Beyond the physical capabilities of the facilities, it has been suggested that the likelihood that these wheat mills would demand large shipments of higher protein wheats, such as HRS wheat on a regular basis is unlikely. As noted, HRS wheat typically is a blending wheat, thus, most mills would not commit a majority of their inventory resources to it.

The dissimilarities in logistics for corn and wheat also can be shown in routine export market transactions. A simple illustration of the difference in the packaging rigors for HRS wheat and corn is a comparison of contract specifications for a single foreign buyer. For instance, Japan is considered a "quality" buyer in that it will buy only from suppliers who are consistent in delivering a product that satisfies specified parameters (Table 4).

Table 4. Japan NS/DNS and Corn Purchase Contract Specifications

	DNS	Corn
Grade	US #2/OB, Avg. 0.0% heat damage, Max. 3% S&B	#3Y Corn
Class	NS/DNS	
Protein	Minimum 14%	
Moisture	Avg. not greater than 13.5%	Avg. not greater than 15%
Dockage	Maximum 0.5%	
Foreign Material		Maximum 4%
Falling Number	Maximum 300	
Sprout	Avg. not greater than 0.5%	
Other	Maximum ergot 0.04% Avg. scab not to exceed 0.0% 0.0% treated kernels Maximum residue tolerances on 72 pesticides	Maximum damage 7%

The quality parameters established in Japan's contract specifications for dark northern spring wheat[10] (DNS) and corn purchases do differ substantially. Beyond the grade and class

[10]Dark northern spring wheat (DNS) is another nomenclature for HRS wheat.

specifications, shippers seeking to fulfill Japan's DNS contract must meet requirements for heat damage, shrunken and broken kernels, protein, moisture, dockage, sprout, falling number, scab, ergot, and residue. To fulfill the corn contract, shippers must only meet grade, class, damage, foreign material, and moisture specifications. This distinct difference in customer expectations regarding characteristics of the delivered product have important implications for shippers as they make investments to position their businesses for the future.

A final note in this section addresses expenditures by each of the commodities on the rail service. Wheat shippers compete for many of the same resources and support many of the same investments as corn and soybean shippers within the rail sector. Table 5 illustrates the total amount spent on rail transportation for raw grain products. Buyers of U.S. wheat paid just under one billion dollars for rail transportation annually between 1990 and 1996. This expenditure compares to an average $1.2 billion for corn and about $200 million for soybeans. These expenditure comparisons suggest that wheat accounts for an important portion of U.S. rail business.

Table 5. Dollars Spent on Rail Transportation, by Commodity

	Corn	Wheat	Soybean
1990	$1,180,503,638	$822,090,500	$157,938,483
1991	$1,032,470,192	$901,773,281	$192,449,661
1992	$1,144,989,854	$912,663,909	$208,754,960
1993	$1,129,980,622	$1,102,317,465	$193,623,155
1994	$1,118,473,891	$1,206,385,284	$181,858,188
1995	$1,582,740,209	$1,032,190,553	$259,314,789
Average	$1,198,193,068	$996,236,832	$198,989,873

Source: *U.S. Public Use Waybill*, Various Years

In positioning for the future in a global marketplace, rail expenditures made by the grain industry influence infrastructure investment/divestiture. Therefore, it is important to understand the significance of a viable rail option for individual commodities. The competitive advantage U.S. wheat producers have, relative to other wheat exporters, in an effective grain procurement system, seems vital to their future industry success. Currently, the grain logistics network allows the United States to gather products economically from an extensive plot of independent producers, package it through means such as storing, testing, drying blending, sizing and timing, and deliver it to inland domestic feeding and processing customers and to outlying export terminals for foreign buyers. As agricultural markets continue to evolve, it is imperative that the logistics network is flexible and responsive in reacting to domestic and global market signals.

Managing risk and making investments for the future are critical components in advancing a healthy, competitive logistics system. Some of the greatest challenges in predicting/managing logistics for grain are its rather unpredictable volumes, corridors, and demand cycles. The demand for rail grain transportation is influenced by factors, such as production patterns, weather, production volumes, foreign production, foreign demand, availability of barge and truck capacity, ocean freight rates, etc. Rail grain transportation for individual commodities is explained both by overall market interactions and more specific factors such as quality, rail carrier service, and producer delivery patterns. The balance of this section will address HRS wheat rail markets, specifically their conduciveness to a shuttle train marketing program.

HRS Wheat Customers

The demand for HRS wheat is defined by domestic and export sales. The annual sales volumes to domestic and export receivers are influenced by competitive factors, such as availability and attributes of HRS wheat and substitutes. The domestic use ratio for HRS wheat, which compares production to domestic disappearance, averaged 49 percent between 1990-91 and 1996-97 (Table 6). Domestic use of U.S. grown HRS wheat varies as millers adjust their buying patterns among the wheat classes depending on the HRS wheat price and quality, relative to other wheats. The quality available within each of the wheat classes fluctuates year-to-year with producer decisions for varietal plantings and uncontrollable microclimate influences across the wheat producing regions. Substitutes may include certain winter wheat and Canadian grown wheats, depending on factors such as comparative protein, test weight, and damaged kernels.

Table 6. U.S. Historical Production/Usage for Hard Red Spring Wheat

Year	Production (Million Bu.)	Domestic Use (Million Bu.)	Export Use (Million Bu.)	Domestic Use Ratio	Export Use Ratio
1990-91	555	239	201	43%	36%
1991-92	431	215	380	50%	88%
1992-93	702	256	438	36%	62%
1993-94	512	282	266	55%	52%
1994-95	515	282	292	55%	57%
1995-96	475	262	330	55%	69%
1996-97	631	324	300	51%	48%
Average	**546**	**266**	**315**	**49%**	**59%**

Foreign and domestic buyers are often inflexible in purchasing among the wheat classes. However, foreign buyers have a global market from which they purchase wheat. Thus, the year-to-year purchases of U.S. HRS wheat exports are influenced by global supplies of higher protein wheats. As previously mentioned, U.S. production accounted for about 29 percent of the world wheat exports between 1994 and 1996. Therefore, fluctuations in quality and quantity of domestic and export supplies of competitors directly impact the HRS wheat market.

Table 7 illustrates the export positions used by HRS wheat, corn, and soybean buyers between 1991 and 1996. Exports of HRS wheat shifts between the Gulf, Pacific, and Great Lakes

Table 7. Distribution of Exports Among Regions

Total in 1,000 Bushels

	1991	1992	1993	1994	1995	1996
HRS						
Lakes	8%	0%	12%	14%	18%	24%
Atlantic	0%	0%	0%	0%	0%	0%
Gulf	51%	56%	44%	21%	25%	27%
Pacific	41%	33%	43%	65%	56%	48%
Interior	0%	0%	1%	0%	0%	1%
Total	288,093	395,060	380,973	267,168	317,523	321,915
% of 6-yr Avg	88%	120%	116%	81%	97%	98%
Corn						
Lakes	2%	3%	3%	3%	4%	3%
Atlantic	4%	1%	3%	1%	2%	1%
Gulf	75%	80%	78%	83%	67%	73%
Pacific	18%	15%	15%	11%	26%	21%
Interior	0%	0%	0%	2%	1%	2%
Total	1,752,116	1,691,804	1,553,410	1,330,564	2,329,883	2,006,439
% of 6-yr Avg	99%	95%	87%	75%	131%	113%
Soybean						
Lakes	2%	5%	3%	8%	7%	8%
Atlantic	6%	7%	6%	3%	3%	3%
Gulf	81%	77%	78%	78%	75%	75%
Pacific	6%	6%	5%	4%	9%	7%
Interior	5%	6%	7%	7%	6%	7%
Total	638,771	757,169	711,661	668,800	864,124	935,441
% of 6-yr Avg	84%	99%	93%	88%	113%	123%

Source: *Grain & Feed Market News*. Federal Grain Inspection Service, USDA port terminals. Exports of HRS wheat were concentrated in the Gulf during 1991 and 1992. Since 1993, the Lakes export region has experienced strength in export market share for HRS wheat, going from 12 percent in 1992 to 24 percent in 1996. During the 1994 to 1996 marketing years, the Gulf and Pacific export regions accounted 24 and 56 percent, respectively, of the HRS wheat exports annually among U.S. ports.

This shift of exports among the export regions is quite distinctive for HRS wheat compared to corn and soybeans. Corn and soybean exports are heavily concentrated in the Gulf region. About 75 percent of the corn and soybean exports between 1991 and 1996 were originated via the Gulf port region. The proximity of production regions to rivers with barge systems that flow into the U.S. Gulf and the port itself make the U.S. Gulf a competitive origination position for U.S.-grown corn and soybeans.

The positioning for U.S. grain exports is influenced by factors, such as location of foreign buyers, rail carrier programs, ocean freight rates, and variations in product attributes and customer demands. The erratic demand and market flow patterns make transportation planning challenging for both shippers and carriers. Because 100-car trains are targeted for export shipments, further review of HRS wheat market flows were included as the final component of this section.

Rail Shipments from North Dakota Elevators to Selected Export Regions

Some insight into HRS wheat logistics is available through analysis of the North Dakota Public Service Commission Grain Movement Database (GMDB). This database is based on monthly reports from each of the elevators in North Dakota. The reports describe grain shipments for the month by commodity, destination, and shipment size. The data were summarized to review historical shipping patterns and identify trends in N.D. elevators' packaging of HRS wheat for customers.

The offer of 100-car rate incentives for shipment from N.D. origins to export regions is aimed at decreasing costs. The estimated cost-saving attributed to the 100-car shipment, compared to origination of smaller lots will be covered in the next section. To provide a basis for estimating the efficiencies that might be gained with the 100-car shipment, the N.D. Grain Movement Database (GMDB) was used to analyze the historic shipment size to two primary export regions: the Pacific Northwest (PNW) through ports in Oregon and Washington and the Great Lakes at Duluth.

The GMDB defines four modes for shipments:

- single car: 1 to 24 car rail shipment
- multicar: 25 to 49 car rail shipment
- unit train: 50 or more car rail shipment, and
- truck.

Shipments for alternative commodities and markets may be typified by shipment size using aggregate data for all elevators in the state. Because the largest rail shipment currently defined in the GMDB is the unit train, this mode was used to illustrate how individual markets have incorporated this origination option.

Table 8 illustrates the use of unit trains for HRS wheat from N.D. elevators to Duluth and the Pacific Northwest (PNW). In 1987-88 only 15 percent of the HRS wheat shipped to Duluth was marketed via unit train. In the past decade, the use of the unit train size shipment has increased 180 percent, as it accounted for 42 percent of the HRS wheat shipped to Duluth in 1996-97.

Table 8. **Use of Unit Trains for Marketing HRS Wheat to Customers via Duluth and the PNW**

	Duluth		PNW		All HRS Shipments	
	Bushels	% by Unit Train	Bushels	% by Unit Train	Bushels	% by Unit Train
			Bushels in 1,000			
1987-88	36,755	15%	23,549	42%	187,835	15%
1988-89	26,239	11%	29,789	35%	135,640	14%
1989-90	38,510	31%	25,131	44%	192,485	24%
1990-91	39,229	39%	39,521	54%	191,072	31%
1991-92	23,892	32%	29,290	55%	261,420	42%
1992-93	38,573	40%	62,457	59%	344,261	47%
1993-94	36,159	38%	66,186	66%	255,376	38%
1994-95	34,839	35%	52,971	64%	233,886	33%
1995-96	28,842	38%	56,223	72%	264,379	40%
1996-97	36,028	42%	37,722	72%	223,145	38%

N.D. elevator shipments to the PNW can also be characterized by an increasing use of unit train size shipments. In 1987-88, 42 percent of the HRS wheat originated by N.D. elevators for shipment to the PNW was packaged in unit trains. Over the past decade, this package has become more prevalent as unit trains accounted for 72 percent of the shipments in 1995-96 and 1996-97. The trends in use of unit trains to these markets may provide insight into specific market acceptance of an even larger train. The data also may be used in conjunction with cost spreads for alternative shipment configurations to estimate railroad cost savings that might be recognized by serving the markets with larger units.

COST ANALYSIS

An important component in considering an investment to originate 100-car trains is the cost savings railroads realize as a result of the larger train configuration. The latitude that railroads have in promoting alternative shipment configurations is closely tied to the cost differentials among those configurations. An estimate of railroad savings may provide a base for understanding current rate spreads between alternative shipment sizes, and whether these spreads will continue at current levels, widen or narrow over time.

Rail costs were estimated for this study with the Uniform Railroad Costing System (URCS). URCS is a primary rail shipment costing method used by shippers and other transportation consultants. URCS allows shippers to estimate the cost of a particular railroad movement. Because the 100+ grain car shipment is not currently in widespread use, certain adjustments were made to URCS costs in accordance with the projected characteristics of these movements. A brief overview of rail cost procedures and adjustments is presented in Appendix H.

URCS Costs for Alternate Grain Car Shipment Scenarios

The economics of investment and origination of single origin 104-car trains is based on the efficiencies gained compared to existing alternatives. This section compares 104-car and 52-car costs to better understand the relative efficiencies. URCS estimates were generated for three configurations:

Train A. 52-car shipment with cars trailing - A 52-car shipment joined with other single car shipments in a through train.

Train B. **Two 52-car shipments** destined for the same location that were each originated at different elevators and joined at the classification yard.

Train C. **104-car train** originated at one location and destined for one location, within the bounds of these parameters:

- BNSF 104-car shipment,
- origins are located on mainlines,
- three locomotives remain with the cars, and
- load/unload time at origin and destination each 15 hours.

Trains A and B show costs associated with two different 52-car shipments. The first shows a 52-car shipment that is integrated into a system average through train, while the second shows two 52-car shipments consolidated. The gains associated with transferring shipments between alternative train sizes largely depends on train size currently attributed to that traffic. For example, if two markets of equal volume and distance exist with one served exclusively with a single-car rail shipments and one exclusively served with 52-car shipments, the savings associated with converting the single-car market to a 100-car market is greater than those realized by converting the 52-car market to a 100-car market. Because N.D. has a diverse elevator population and a commodity marketing patterns that vary year-to-year, the savings that would be recognized though efficiencies gained with the 104-car shipment would fall in a range between those when comparing Train C to Train A and Train C to Train B, depending on the characteristics of existing traffic.[11]

[11]Because the URCS cost estimates do not reflect the additional savings resulting from a dedicated service (e.g. improved equipment utilization), the savings may be much larger than those estimated here.

Figure 16 illustrates the cost spreads for the alternative train configurations. The cost spreads were based on URCS variable cost estimates for shipments originated from North Dakota and destined for each of the three export markets (Appendix H). Costs for each of the scenarios were generated for three North Dakota origins — Devils Lake, Jamestown and Minot, to three export regions — Portland, Ore.; Houston, Texas; and Duluth, Minn. Costs for specific origin-destination pairs are provided in Appendix I.

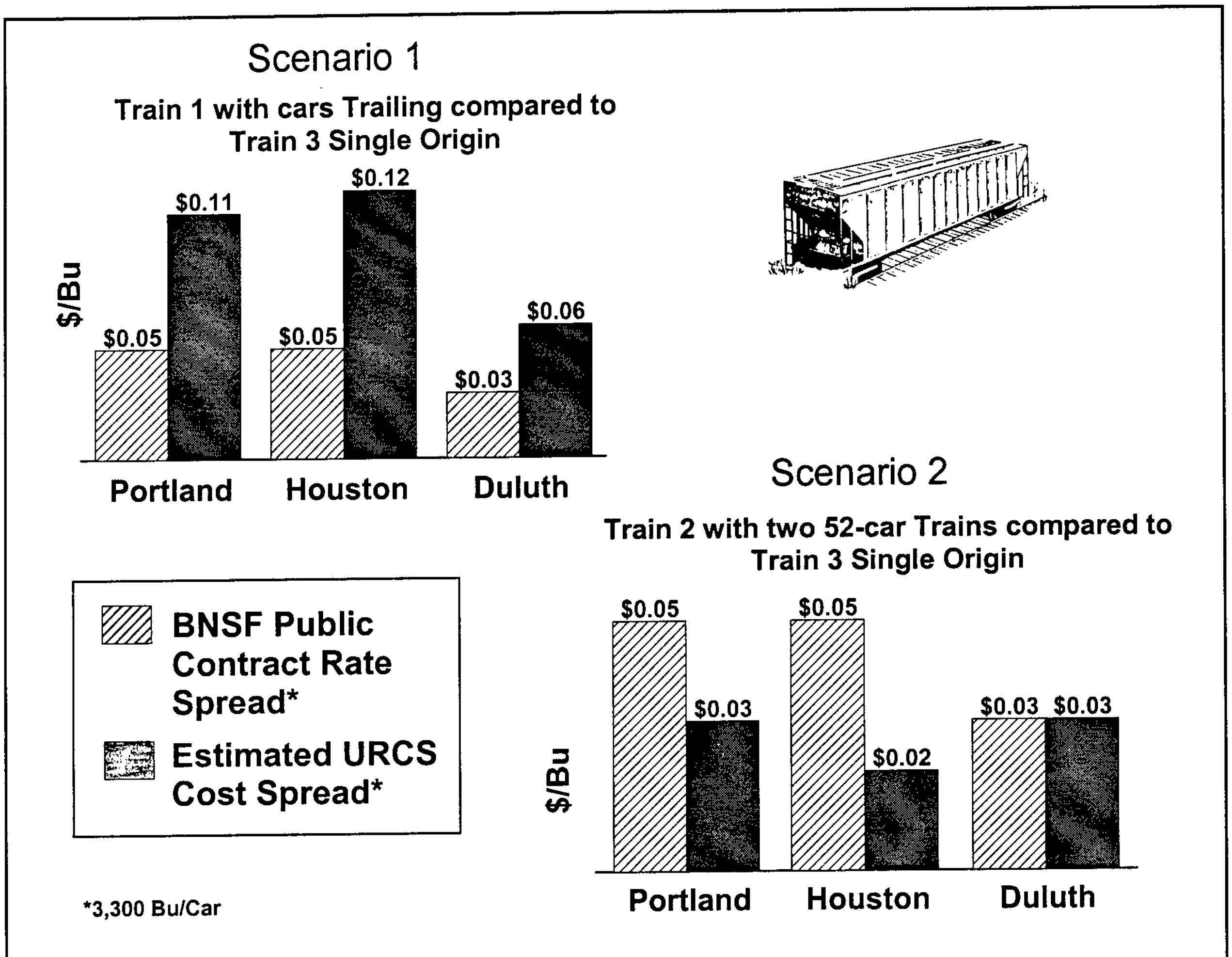

Figure 16. Rate/Cost Spread Estimates for 104-car Wheat Shipments from North Dakota to Export Markets

Scenario 1 shows the cost spreads between Train A, a train that was formed at the classification yard with cars trailing, and Train C, a single origin 104-car train. The cost spreads illustrated in the bar graph are equal to the difference in URCS variable cost estimates for the two scenarios. Houston and Portland offer the railroads the widest spreads for single origin 104-car train origination, as spreads estimated via URCS were 12 and 11 cents per bushel, respectively. Duluth, with a substantially shorter haul, offered only a six cent per bushel spread. These costs spreads mean that it is approximately between 12 and 6 cents per bushel cheaper to originate a 104-car train from a single origin than to ship a 52-car train under this scenario.

Cost spreads in Scenario 2 illustrate the difference between originating Train B, a two 52-car shipment on-line and combining them at the classification yard and Train C, which contains 104 cars originated at a single location. The cost spreads for shipments from North Dakota to Portland, Houston, and Duluth are narrower than in Scenario 1 at $.03, $.02 and $.03 per bushel, respectively. Thus, as expected, the savings realized from shifting two 52-car blocks to 104-car trains is substantially less beneficial than shifting a 52-car shipment integrated with other single car traffic to 104-car trains.

Rate incentives (spreads), based on the BNSF public offering, also are included as a means for assessing economics of the current rail market pricing. For example, BNSF offered a $150 per car discount to the 52-car tariff rate for a single origin 104-car shipment from North Dakota origins to Portland and Houston. This $150 per car is equal to approximately $.045 per bushel.

ECONOMICS OF ELEVATOR INVESTMENT AND GRAIN DRAWING

The North Dakota elevator infrastructure has undergone structural and ownership rationalization over recent decades. In assessing alternatives for investment and in developing strategic plans, individual elevators should consider, that although elevators are located throughout the plains states, no elevators share identical marketing environments. To provide a macro example of the differences in structure, selected characteristics for elevators currently operating in Iowa, Nebraska, and North Dakota are compared in Table 9. The elevator density ratios (ED) are used to summarize basic market structure information.

ED1 compares corn, wheat, and soybean production to number of elevators. In Iowa and Nebraska there are 2.3 and 3.1 million bushels, respectively, of corn, wheat, and soybeans available on average per elevator. North Dakota, in comparison, has approximately 1.1 million

Table 9. Elevator Industry Characteristics

	Iowa	**North Dakota**	**Nebraska**
Number of Elevators	773	437	480
Total Storage (1,000 Bu)	793,928	242,352	432,014
Number of ED Observations (Counties)	85	50	76
ED1*: production/number of elevators	2,364,540	1,069,364	3,121,662
ED2*: production/storage	3.68	2.30	4.72
ED3*: land area/number of elevators	42,469	119,643	93,102

*Only counties included within designated GORs
ED-Elevator Density Ratios, Averages for Counties Weighted by Production of Corn, Wheat, and Soybeans

bushels of corn, wheat, and soybeans available per elevator. This 1.1 million bushels is less than half the average volume per elevator for either Iowa or Nebraska.

ED2 also is a production-based density measure, as it compares production volumes of the three commodities to total available elevator storage. This ratio illustrates that North Dakota elevators have more invested, per bushel, in storage capacity than do either Iowa or Nebraska. North Dakota elevators house one bushel of storage for each 2.3 bushels of corn, wheat, or soybeans produced. Iowa produces about four bushels of corn, wheat and soybean production for each bushel of storage capacity. Nebraska is slightly higher with about five bushels of production for each bushel of storage.

The final density ratio is a broad comparison of the elevator industry density among the states, based on land area. The actual density of elevators varies substantially across each state, but the ratio does provide a means for differentiating elevator infrastructures among the states. North Dakota has the lightest density of elevators as 119,643 acres of land area are available, on average, per elevator. Nebraska has a slightly higher density of elevators, with an elevator for each 93,102 acres of land area. Iowa has the greatest density of elevators, as one elevator exists for each 42,469 acres of land. The density of the elevator industry should be considered in applying grain drawing information among the states.

Given this broad context for applying a nationally-published rail rate structure among states and regions, the final component of this report establishes some additional resources that may be valuable in analyzing investment and grain drawing capabilities for a 100-car facility in North Dakota. Beyond the production and marketing foundation that has been laid in previous sections, individual elevators may customize the resources to analyze individual investment strategies. Three components of the resource base are (1) financial estimates for greenfield (new) elevator construction, (2) producer delivery decisions as they relate to grain drawing, and (3) benefit/cost estimates for alternative 100-car investment scenarios.

Greenfield Elevator Construction

Each of the elevators in North Dakota that may consider an investment to enter into the 100-car market has a unique existing facility. Timing of investments and the capabilities of the existing facility will influence the value of additional investments that are targeted at accessing a 100-car market. In an informal survey of several North Dakota elevator managers, investment costs to upgrade existing facilities to load 100-car trains ranged from $500,000 to $3.5 million. Because of this wide range of investment requirements, a rather generic approach was employed to evaluating a 100-car investment.

The first step in the analysis was to ascertain an estimate for a newly-constructed "greenfield" site. The greenfield elevator construction cost estimate serves as an upper level benchmark for upgrading the current building to facilitate 100-car trains. A telephone survey of local construction firms was conducted to ascertain the cost for a new 100-car train facility. Parameters established for the greenfield facility included 1.2 million bushels of storage. This storage was to be segregated into four 300,000 bushel silos. The estimate also was to include the costs for a rail loadout system that would allow the elevator to load rail cars at a rate of 50,000 bushels per hour. The average cost estimate for the greenfield facility was $4.6 million. The track cost was estimated to be an additional $1 million. The facility and track costs, assuming no ground work was required, equal $5.6 million for new construction of a 100-car elevator facility. This greenfield facility cost estimate may serve as an upper threshold of investment when considering the economics of refurbishing an existing elevator facility.

Producer Delivery Decisions

The second component in the resource base for the 100-car investment decision is a review of the North Dakota wheat producer responses regarding the influence of price on their delivery decision. The producer response to differences in board price among elevators is a key element in the equation for elevators basing a part of their investment decision on an increase in volume handled annually.

A 1994 Upper Great Plains Transportation Institute survey of North Dakota wheat producers was used to provide basic marketing decision information (Vachal, et. al., 1995). In this survey, producers were asked the number of miles they would travel to deliver to an elevator that was offering a higher board price than a closer elevator. Based on the responses, producers would travel an additional three miles to deliver to an elevator offering $0.02 per bushel more than a closer elevator (Table 10). The same group of producers would travel an additional 10 miles to gain $0.05 per bushel. For an additional $0.10 per bushel respondents were willing to go an additional 24 miles.

Table 10. Producer Willingness to Delivery to Elevators Based on Differences in Board Price

Gain in Board Price:	Additional Miles a Producer will Haul	Revenue/Mile for Additional Miles
2 cents per bushel	3	.7 cents
5 cents per bushel	10	.5 cents
10 cents per bushel	24	.4 cents

Source: 1994 Survey of ND Wheat Producers, UGPTI, NDSU.

To interpret this in the context of the 100-car investment analysis, the average producer will travel about 10 additional miles to deliver to a 100-car elevator that is offering a board price that is $0.045 per bushel higher than a closer 52-car elevator. The $0.045 per bushel differential is based on the $150 per car rate spread between the 52-car and 104-car trains served by the BNSF. In using a $0.045 per bushel incentive to expand its draw area, the 104-car facility is not internalizing any of the rate spread provided by the railroad, it is all passed on to the producer.

This information regarding producer delivery decisions is a generic guideline that might be applied in initial 100-car investment analysis. The potential for increasing draw area and sensitivity of producers to differences in board prices should be customized to reflect an individual elevator's market area. Actions and capabilities of competitors, producer truck equipment, and the local road infrastructure are examples of factors that may influence producer delivery decisions, and thus, potential elevator drawing capabilities.

Benefit/Cost Estimates for Alternative 100-car Investment Scenarios

The diversity of North Dakota elevator facilities and drawing regions makes benefit/cost analysis unique to each case. This component of the resource base provides several benefit/cost scenarios. The alternative scenarios may allow individual elevators an opportunity to more quickly complete a basic initial analysis of the return on investment (ROI) they might realize with a 100-car facility investment. The methodology for developing the benefit/cost scenarios was developed in cooperation with Todd Erickson of Erickson and Associates.[12]

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[12]The benefit/cost comparisons included in this study examine the first year benefits and costs of upgrading to a 100-car facility. However, in order to make a full assessment of the benefits and costs of such an investment, the lifecycle benefits and costs should be compared.

Table 11 includes seven columns that provide that framework for comparing alternative investment and marketing scenarios. The column headings define these investment analysis parameters:

Current HRS Wheat Volume: The bushels of HRS wheat the elevator currently handles that is destined for **export**.

Current Loadout: Current Rail Loadout Capabilities of the Elevator (eg. Single Car, Multicar, or Unit Train).

Bid Increase to Producer: Amount of the rail rate spread between the current loadout rail rate and the 100-car rate that will be passed back to the producer in a higher board price.

Projected Additional HRS Wheat Export Volume: The additional bushels of **export** HRS wheat the elevator will handled by increasing draw area through higher board price.

The benefit for each scenario is presented alongside the annual payment for a $2 million dollar loan for facility investment at a 9 percent cost of capital. The repayment of the loan is scheduled over a 7-year period. Interest costs for the term of the loan and annual payments for $1 million, $2 million and $3 million over 5, 7 and 10 year repayment schedules are presented in Appendix J.

Table 11. Benefit/Cost of 108-car Marketing Option for Alternative Scenarios

Case	Current HRS Wheat Export Volume (Bu)	Current Loadout	Bid Increase to Producer	Additional HRS Export Volume (Bu)	Benefit Year 1*	Payment Year 1**	Net Benefit Year 1
A	6,000,000	54	$0.000	0	$245,593	$386,138	$-140,545
B	6,000,000	54	$0.005	1,000,000	$251,388	$386,138	$-134,750
C	8,000,000	54	$0.005	2,000,000	$369,345	$386,138	$-16,793
D	8,000,000	54	$0.010	4,000,000	$383,036	$386,138	$-3,102
E	10,000,000	54	$0.000	0	$425,593	$386,138	$39,455
F	10,000,000	54	$0.005	2,000,000	$450,571	$386,138	$64,433
G	10,000,000	54	$0.020	2,000,000	$270,140	$386,138	$-115,998
H	12,000,000	54	$0.000	0	$515,593	$386,138	$129,455

* Short-term cost of capital - 10%
**Payment Based on $2,000,000 Loan for Upgrade Investment - 9% interest, 7-year repayment plan
Note: Complete tables of the analysis for each case are provided in Appendix I.

Nine cases are used to illustrate the economics of alternative 108-car facility investments. Table 11 describes the parameter for each of the cases, A through I. The final three columns provide a benefit/cost summary. The benefit is the decrease in rail transportation costs that is realized as wheat previously shipped to export markets via the 54-car rate is marketed at the lower 108-car rate, less any portion of this decrease passed on to shipppers and an additional short-term capital requirement attributed to holding the first 54-cars longer to gather the additional volume to needed to load the second 54-cars of the 108-car train. The bushels that require additional carry is set at 75 percent of the total additional bushels, as these bushels will likely accumulate over time, not all on day one. The cost listed as annual payment is equal to an annual payment on a $2,000,000 loan at 9 percent interest to be repaid over seven years. The net benefit is the benefits less the costs.

In Case A, the elevator currently handles 6 million bushels of HRS wheat that is destined for export. The elevator needs to internalize the entire $0.045 rate spread to pay for $2 million investment to upgrade to load 108-car trains. Thus, with no increase in board price the volume handled by the elevator remains unchanged. The benefit in year 1 for the elevator is approximately $245,000. The payment due on a 9 percent interest, seven-year loan is $386,000. The net benefit comparison for this case is negative.

The elevator in Case C currently handles 8 million bushels of HRS wheat that is destined for the export market. In this scenario the a half cent of the 54-car to108-car spread is passed back to the producer through a higher board price. This higher board price generates an additional 2 million bushels of HRS wheat export handle. The net benefit in Year 1 is -$16,793. The net benefit increases to -$3,102 if the same elevator had generated an additional 4 million bushel HRS wheat export handle by increasing the board price by a full cent (Case D).

Cases E through H suggest that an elevator with a current export HRS wheat handle of over 10 million bushels annually, could profitably make a $2 million investment to upgrade its current 54-car facility to facilitate 108-car trains. This investment could be made without needing to increase handling of HRS wheat export volumes. Because volumes do not need to be increased, the entire $0.045 rate spread could be internalized. Cases G and H illustrate the impact of increasing board price to expand the existing draw area.

The scenarios presented in Cases A through H provide a range of benefit/cost estimates that elevators may consider in initial analysis they might do regarding upgrade to load 100-car trains. The rate spread offered publicly by the railroads is rather small compared to the rate spreads that have existed between the 52-car and smaller shipments (Figure 12). Therefore, in making individual analysis of the investment it is important to consider the potential for utilizing this rate on a consistent basis and the potential for this rate to widen or disappear.

CONCLUSION

HRS wheat production is concentrated in the north central plains of the United States. Efficient and flexible grain procurement infrastructure and processes are vital to the future of this region's grain industry. Producers and elevators in the region continue to adapt to market demands with innovative means of procuring and packaging products to meet customer demands. New technologies, rail industry structure, customer demands, and an increasing globalization of product markets will have future implications for marketing and packaging the commodities.

The objective of this project was to provide a resource base that shippers might employ in assessing the value of 100-car marketing options for their businesses. Production and rail transportation characteristics were used to construct a base for discussing logistical requirements of regions and commodities. The northern and central plains of the United States was divided into seven grain origination regions (GORs). Production and rail shipment analysis was limited to corn, wheat, and soybeans because they are the commodities currently being offered a 100-car rail packaging option. Specific analyses included: land use/productivity, market proximity, customer demands, rail efficiencies, investment requirements, and producer marketing patterns. In comparing the grain procurement infrastructure across the central plains, it is important to understand how each of the factors may impact the economics of rail packaging alternatives among regions and commodities.

The percent of land employed in the production of the three commodities (corn, wheat, and soybeans) varied across the regions with a high of 59 percent in central Iowa to a low of 6 percent in western South Dakota. Production densities illustrated vast differences in availability of corn, wheat, and soybean bushels among seven grain producing regions considered in this report. Central Iowa (Region 7) was characterized by a density of 52.39, compared to 11.27 in Region 2, which covered eastern North Dakota and western Minnesota. In practice, this means that an additional 10 acres of draw in central Iowa equates to an additional 5,239 bushels of corn, wheat, or soybean production. In comparison, to an additional 1,127 bushels of production is attributed to an additional 10 acres of draw area in eastern North Dakota. The land use and productivity are critical in discussing fundamental differences in grain procurement and the value of expanded draw areas among regions.

Beyond crop production, another important factor in assessing the value of rail packaging alternatives are the demands of customers. Corn, wheat, and soybean production is distributed to domestic and foreign customers. A majority of the domestic corn customers have the ability to receive 100-car shipments. In comparison, only two domestic wheat buyers have facilities that are configured so they might accept delivery of a 100-car train. These distinct differences in customer demands are evident in public use waybill summaries regarding rail shipment sizes for corn and wheat. Between 1990 and 1995 more than 60 percent of corn shipments originated from the seven GORs were packed via unit trains compared to about 30 percent of the wheat shipments. These packaging characteristics are based on customer demands. As the unit train rate has been the largest packaging option offered to elevators over the last decade, its use may provide some insight into an elevator's ability to use an even larger rail shipment size.

In addition to the production and distribution patterns, the economics surrounding the 100-car rail shipment were reviewed in the context of estimated railroad efficiencies and potential elevator investments. The Uniform Rail Costing System (URCS) was used to estimate costs for 104-car train configurations. Based on the results, rail efficiency gains were between 12 and two cents per bushel for a single origin 104-car train, compared to 52-car shipments under various scenarios for shipment from North Dakota to select export destinations. The variation in rail efficiency gains depended on distance and whether the 52-car train was joined with another 52-car train or shipped with a system through train. Other train operating scenarios are potentially possible, but were not analyzed in this study. The estimates of rail efficiency gains provide insight into the potential for wider/narrower spreads among alternative rail shipment configurations in the future.

In the final component of this study, the economics of elevator investment and grain drawing were visited. The goal was to provide a framework that individual elevators might adapt to assess their individual investment decision. The $5.6 million estimate for a newly constructed 100-car equipped grain loading facility provides a ‘ceiling’ for assessing the economics of investing in an existing facility. This $5.6 million includes, a $4.6 million facility cost and track costs of $1 million.

Results of a 1994 survey of N.D. wheat producers was included, as it may be used in estimating potential gains from an increased draw area. Based on that survey, the average producer would haul grain an additional 10 miles to gain $0.05 per bushel. The rate spread offered in the September 1997 BNSF public contract offering ranged from $0.03 to $0.045 cents per bushel, so the opportunity to expand one’s draw area by including all or part of the rate spread in elevator board price might be rather limited. The shape and expanse of an elevator’s draw area is, however, unique to each competitive situation and should be treated as such in any investment analysis. The benefit/cost analysis included in the final section includes a range of volume, investment, and drawing scenarios. The net benefit associated with each of the scenarios may allow elevators the opportunity to complete an initial analysis more quickly.

Expansion of the100-car elevator network has important implications for the infrastructure and market processes that support HRS wheat procurement. A 100-car marketing option will likely benefit market participants as it increases flexibility by adding another marketing alternative. The advent of facilities that originate the larger trains will, however, likely contribute to further rationalization of the state's grain procurement system. This rationalization may include fewer elevators, additional rail line abandonment and longer producer deliveries. The objective of this study was to provide a resource base that may be used in analyzing individual decisions to invest in facilities to load 100-car trains of HRS wheat. The benefit of having the 100-car option available as a HRS wheat rail packaging option varies by case and over time. Therefore, it is important that individual market participants consider how facility investments will enhance their competitive position within the context of their market territory.

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APPENDICES

APPENDIX A

WHEAT RATES FROM NORTH DAKOTA ORIGINS

Table A-1. Wheat Rates from North Dakota Origins to Houston, TX

	Minot, ND			Devils Lake, ND		
	Unit Train Rate	Single to Multicar Spread	Multicar to Unit Train Spread	Unit Train Rate	Single to Multicar Spread	Multicar to Unit Train Spread
			cents/bushel*			
1990	$0.77	8.6¢	5.3¢	$0.55	8.6¢	5.3¢
1992	$0.74	9.7¢	5.2¢	$0.55	9.7¢	5.2¢
1993	$0.72	9.5¢	5.0¢	$0.55	9.5¢	5.0¢
1995	$0.75	9.3¢	5.0¢	$0.59	9.3¢	5.1¢
1996	$0.71	7.7¢	5.2¢	$0.54	7.7¢	5.2¢
1997	$0.81	7.7¢	5.2¢	$0.64	7.7¢	5.2¢

*Estimate Assumes 3,330 Bushels per Car
Source: BNSF Tariff, Various Years

Table A-2. Wheat Rates from North Dakota Origins to Portland, OR

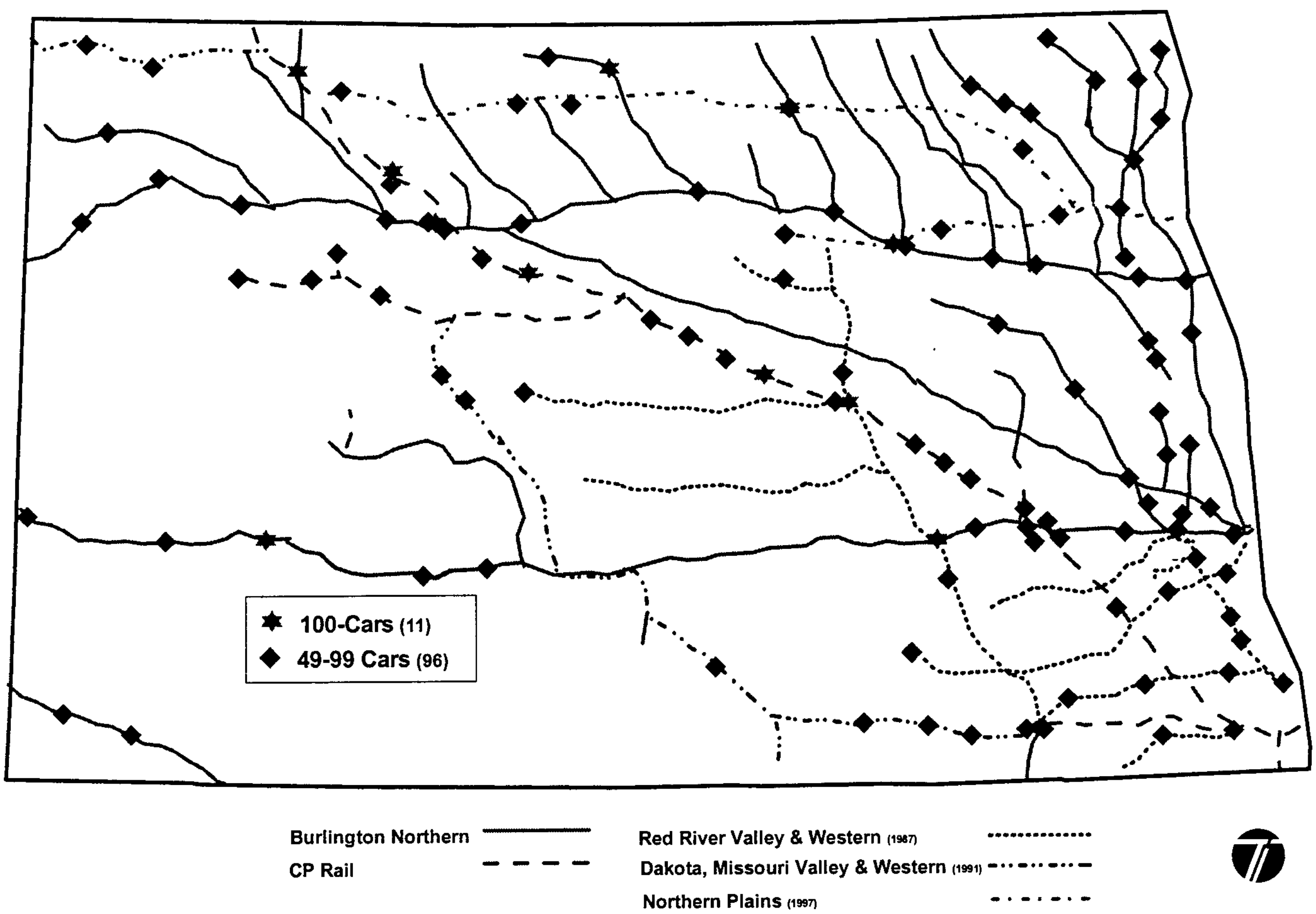
	Minot, ND			Devils Lake, ND		
	Unit Car Rate	Single to Multicar Spread	Multicar to Unit Train Spread	Unit Car Rate	Single to Multicar Spread	Multicar to Unit Train Spread
			cents/bushel*			
1990	$1.17	10.3¢	10.3¢	$1.17	10.3¢	10.3¢
1992	$1.12	9.7¢	9.1¢	$1.19	9.7¢	9.1¢
1993	$1.13	9.4¢	7.6¢	$1.19	9.5¢	7.6¢
1995	$1.13	9.3¢	7.5¢	$1.20	9.3¢	7.5¢
1996	$1.22	6.3¢	6.3¢	$1.29	6.3¢	6.3¢
1997	$1.22	6.3¢	6.3¢	$1.22	6.3¢	6.3¢

*Estimate Assumes 3,330 Bushels per Car
Source: BNSF Tariff, Various Years

APPENDIX B

NORTH DAKOTA UNIT TRAIN & 100-CAR LOADING STATIONS, 1997

North Dakota Unit Train & 100-Car Loading Stations, 1997



Appendix C. BNSF Public Contract Offering for 104 Car Wheat Trains

09/17/97
PUBLIC CONTRACT OFFERING FOR 104 CAR WHEAT TRAINS

Effective October 1, 1997, BNSF will be offering 104 car rate contracts for wheat (STCC5-01137) for all origin facilities which bill and can load 104 cars in one initial placement of cars (initial switch) to a facility which can receive 104 cars in one initial placement of cars (initial switch).

104 car rates from MN, MT, ND, SD, and WI will be issued at a $150 discount to the PNW, Gulf and St Louis off the applicable 52 car rate published in items 43521, 43538, 45060, and 45080 of BN-4022-I and a $100 discount to Duluth/Superior off the applicable 52 car rate published in items 45627 and 45636 of BN-4022-I.

The following list includes qualified origins and destinations. Please call your account manager or 817-352-6720 for information on facilities not listed and to obtain contract. Failure to obtain contract will result in movement being rated at the applicable 52 car rate.

ORIGINS

ND
Bisbee
Boyle
Bottineau
Bowbells
Devils Lake
Jamestown
Minot (Farmers Union)

DESTINATIONS

IL
East St Louis (Continental, PV-ICBN (TRRA))

OR
Portland (Columbia)

TX
Beaumont
Galveston (Farmland, Port of Galveston)
Houston (Cargill, HP#2)

WI
Superior (Peavey, Harvest States)

MO
St Louis (ADM, Bulk Services (TRRA))

WA
Kalama (PV)
Vancouver
Seattle (Cargill)

MN
Duluth (Cargill)

LA
Remy (Peavey)

APPENDIX D

AVERAGE RAIL CAR LOAD FACTOR FOR CORN, WHEAT, AND SOYBEAN ORIGINATED FROM GORS, 1990-1995

Commodity	1990	1991	1992	1993	1994	1995	Average
				tons per car			
Corn	96	96	97	96	97	99	97
Wheat	97	97	98	98	97	99	98
Soybean	95	95	96	97	99	98	97

APPENDIX E

RAIL SHIPMENTS OF CORN, WHEAT AND SOYBEANS

	Corn	Wheat	Soybean
		Tons	
1990	70,569,951	45,661,202	14,779,896
1991	60,674,043	48,182,681	15,955,820
1992	63,968,249	51,791,162	17,440,202
1993	63,996,312	55,018,658	16,098,901
1994	58,241,653	48,208,593	15,337,245
1995	82,010,076	49,623,692	19,024,528

Source: *U.S. Public Use Waybill*, various year

APPENDIX F

AVERAGE ANNUAL CORN, WHEAT, AND SOYBEAN PRODUCTION BY GOR, 1990-1995

	GOR 1 W ND& NE MT	GOR 2 E ND & NE SD	GOR 3 W SD & NE CO	GOR 4 W NE & EC CO	GOR 5 River	GOR 6 KS	GOR 7 IA
			(1,000 Bushels)				
Corn	3,761	119,373	16,649	549,736	1,103,201	219,633	970,751
Wheat	200,752	278,631	50,181	62,911	26,878	341,305	633
Soybeans	34	47,039	291	17,713	268,218	30,915	245,759
Total	204,547	445,043	67,121	630,360	1,398,297	591,853	1,217,143

APPENDIX G

TOP FIVE COUNTRIES FOR HRS EXPORTS OUT OF THE LAKES, GULF, AND PACIFIC PORTS, 1990-1996

1000 bu

Great Lakes and St. Lawrence Seaway Ports

1991		1992		1993		1994		1995		1996	
ITALY	4,112	ITALY	5,937	VENEZUELA	5,323	VENEZUELA	5,389	ITALY	5,969	VENEZUELA	7,536
BELGIUM	1,923	BELGIUM	2,324	ITALY	5,179	ITALY	3,979	VENEZUELA	5,045	ITALY	5,362
ALGERIA	1,235	VENEZUELA	1,913	BELGIUM	4,605	NORWAY	2,587	BELGIUM	2,838	TURKEY	4,412
CANARY IS	1,080	NIGERIA	1,272	MOROCCO	2,044	NIGERIA	2,155	GHANA	1,412	BELGIUM	3,617
MALTA	735	TOGO	1,225	NORWAY	1,968	BELGIUM	2,080	NORWAY	1,390	REP S AFRICA	3,378

Gulf Ports

1991		1992		1993		1994		1995		1996	
EGYPT	17,832	USSR	60,426	EGYPT	20,385	VENEZUELA	8,008	VENEZUELA	8,863	REP S AFRICA	8,729
USSR	16,615	EGYPT	41,049	MOROCCO	16,705	GUATEMALA	4,760	REP S AFRICA	8,426	VENEZUELA	7,544
SRI LANKA	9,542	CHINA MAIN	26,626	REP S AFRICA	15,946	COSTA RICA	3,971	DOMINICN REP	6,319	ECUADOR	6,668
BRAZIL	8,853	VENEZUELA	12,413	VENEZUELA	14,300	GHANA	3,672	ECUADOR	5,158	DOMINICN REP	6,161
COLOMBIA	8,237	NIGERIA	5,532	GHANA	8,272	NIGERIA	3,142	COSTA RICA	4,528	MEXICO	5,036

Pacific Ports

1991		1992		1993		1994		1995		1996	
JAPAN	40,051	JAPAN	48,912	JAPAN	45,182	JAPAN	59,761	PHILIPPINES	45,541	JAPAN	44,770
PHILIPPINES	34,963	PHILIPPINES	38,441	PHILIPPINES	44,200	PHILIPPINES	50,817	JAPAN	45,210	PHILIPPINES	42,403
KOREA REP	13,445	CHINA T	12,386	CHINA T	17,037	CHINA T	17,823	CHINA T	17577	CHINA T	19,221
CHINA T	12,938	KOREA REP	11,735	KOREA REP	12,641	BANGLADESH	14,734	KOREA REP	13,938	KOREA REP	15,025
THAILAND	3,979	BANGLADESH	7,271	SRI LANKA	9,558	KOREA REP	12,462	THAILAND	9,425	PERU	7,215

Source: *Grain & Feed Market News*. Federal Grain Inspection Service, USDA

APPENDIX H

URCS PARAMETERS AND COST PROCEDURES

The URCS computations consists of three phases: statistical regression analysis, estimation of variable unit costs and constant cost ratio, and estimation of shipment costs. The latter phase is emphasized in this study. The shipment characteristics define the service units attributable to each shipment. These service units are multiplied by unit costs to make an estimate of the variable costs associated with a rail movement.

Two sets of parameters are contained in Phase III. The minimal or required set includes nine user-defined variables:

- carrier code
- distance of the shipment
- type of shipment (as related to carrier)
- type of car (choice of 18 car type codes)
- number of cars, movement costing type (individual, multi-car, or unit train)
- car ownership (private or railroad)
- commodity type (STCC code)
- weight of shipment (tons per car)

The other type of inputs, called detailed parameters, are default values, unless modified by the user. The detailed parameters actually include operating statistics and costing factors. Examples of these factors are actual distance by type of train service, movement circuity, frequency of intermediate yard switches, and empty-to-loaded car-mile ratio.

Comparative Cost Methodology

The costs of a 52 -car and a 104-car shipment are compared by making line-haul and terminal adjustments.

Costing Methodology Type (CMT).

A CMT of "3" or unit train is selected for 104-car shipments, while a CMT of "2" or multi-car shipment is selected for a 52-car shipment.[13]

[13]Although the 52-car shipments currently made by grain elevators have been referred to as unit trains, most are not really true unit trains. A unit train is one that is dedicated to the movement of a particular commodity from a specific origin to a specific destination. The 100+ car shuttle trains are true unit trains.

Circuity and Empty Return Ratio.

Circuity is set to 1.0 for both cases. However, since the 52-car shipment is first hauled to a classification yard for blocking, an additional 50 miles is added to the loaded car miles for the 52-car shipment. Since the 104-car and the 52-car blocks are assumed to be headed for the same consignee at destination, then no additional circuitous routing should be experienced after the origin blocking occurs. Even if some limited destination circuity occurs, the 50-mile estimate should be ample.

If the URCS circuity factor of 1.126 for covered hopper cars had been applied to a 1,400 52-car movement instead, it would have resulted in approximately 175 miles of out of line loaded movement. There is no reason to assume that this extent of circuitous routing exists.

URCS automatically sets the empty return ratio to 2.0 for the 104 car train. This compares to a system average of about 1.98 for railroad covered hopper cars..

Way Train Distance and Train Size.

As noted above, 50 loaded way train miles are assumed for a 52-car shipment, and zero for the 104-car movement. However, the 52-car shipment will occur in a much larger than average way train and thus will be more efficient than a typical way train shipment. URCS should reflect the efficiency gains via the computed weight of consignment.

I & I Switching.

URCS automatically eliminates intertrain and intratrain switches for the 104-car trainload. Two 52-car scenarios are analyzed in this study. In scenario 1, the 52-car block is assumed to be integrated into a system average through train at the origin classification yard. In scenario 2, the 52-car block is assumed to be matched with another 52-car block at the origin yard, both destined for the same station, although not necessarily the same consignee. In scenario 2, the 52-car blocks function as a solid train between origin and destination yards.

For a 1,400-mile loaded movement, URCS would predict seven intertrain or intratrain switches for a multi-car block. This estimate is clearly excessive for a 52-car block. In this analysis, it is assumed that the 104-car and the 52-car shipments are destined for major grain export and milling locations in major cities, such as Portland, Seattle, or Houston; and that the consignees are located in the terminal switching limits at destination. Given this operating scenario, two I & I switches are assumed for scenario 1 and one for scenario 2. The two switches for scenario 1 would allow for a way train to through train switch at origin and one switch at a major gateway in between. Under scenario 2, the two 52-car blocks function as a solid train between origin and destination yards, and thus should require no more than one I & I switch.

Train Weights.

Under 52-car scenario 2, the 52-car shipment is assumed to move from origin to the origin classification yard in a train that resembles the system average through train, rather than the system average way train. The 52-car consignment will create a larger train with more trailing tons than would be the case for a system average way train. To implement this adjustment, the weight of the way train is set equal to the system average through train weight (which is 5,199 tons for the BNSF) and the way train locomotives are set equal to the system average through train locomotives. For the movement from the classification yard to destination under scenario 2, the weight of the train is set to the average trailing weight of a 104 car train (8,465 tons).

Industry Switching Adjustment.

The approximate difference in switching minutes between the two shipments is reflected by costing the 52-car block as a multi-car shipment and the 104-car movement as a unit train.

Locomotive Time at Origin.

Under the 104- car scenario, the locomotive is assumed to stay with the block. Some excess time may occur beyond active switching time, during which time the locomotive unit is setting idle. Since the free time at origin and destination is 15 hours each, and only seven hours is reflected in the URCS switching time, an additional 23 hours of opportunity costs are computed for the locomotive set.

Car Time at Origin & Destination.

The car hours at origin and destination are based on tariff-free times; 30 hours for the 104-car shipment and 72 hours for the 52-car shipment (48 hours at origin, 48 hours at destination).

Clerical and Billing Costs.

URCS adjusts station clerical costs based on the number of cars in the shipment. No further adjustment is needed.

APPENDIX I

URCS COST ESTIMATES

Table 1. URCS Cost: 52-Car Shipment with 52 Cars Trailing Compared to Single Origin 104-Car Train (BNSF)

			Variable Cost		**Discount**	
Origin	**Destination**	**Distance**	52 Cars	104 Cars	Dollars	Percent
Devils Lake, ND	Portland, OR	1,431	$1,634	$1,282	$352	21.5%
Jamestown, ND	Portland, OR	1,481	$1,683	$1,323	$360	21.4%
Minot, ND	Portland, OR	1,313	$1,520	$1,185	$335	22.0%
Devils Lake, ND	Houston, TX	1,671	$1,868	$1,479	$389	20.8%
Jamestown, ND	Houston, TX	1,591	$1,790	$1,413	$377	21.1%
Minot, ND	Houston, TX	1,736	$1,931	$1,533	$398	20.6%
Devils Lake, ND	Duluth, MN	383	$617	$420	$197	31.9%
Jamestown, ND	Duluth, MN	355	$590	$397	$193	32.7%
Minot, ND	Duluth, MN	497	$728	$514	$214	29.4%

Table 2. URCS Cost: Two 52-Car Shipments Combined at Classification Yard Compared to Single Origin 104-Car Train (BNSF)

			Variable Cost		**Discount**	
Origin	**Destination**	**Distance**	52 Cars	104 Cars	Dollars	Percent
Devils Lake, ND	Portland, OR	1,431	$1,372	$1,282	$90	6.6%
Jamestown, ND	Portland, OR	1,481	$1,412	$1,323	$89	6.3%
Minot, ND	Portland, OR	1,313	$1,277	$1,185	$92	7.2%
Devils Lake, ND	Houston, TX	1,671	$1,565	$1,479	$86	5.5%
Jamestown, ND	Houston, TX	1,591	$1,501	$1,413	$88	5.9%
Minot, ND	Houston, TX	1,736	$1,617	$1,533	$84	5.2%
Devils Lake, ND	Duluth, MN	383	$528	$420	$108	20.5%
Jamestown, ND	Duluth, MN	355	$505	$397	$108	21.4%
Minot, ND	Duluth, MN	497	$619	$514	$105	17.0%

APPENDIX J

LOAN REPAYMENT AND COMPLETE CASE INFORMATION FOR BENEFIT/COST SCENARIOS

Loan Figures for Alternative Capital Requirements and Loan Terms

108-car Facility Investment Capital Requirement		$1,000,000	
		Interest over Term of Loan	Annual Payments
Loan Figures for Alternative Terms:	5-Year	$245,502	$249,100
	7-Year	$351,483	$193,069
	10-Year	$520,110	$152,011

108-car Facility Investment Capital Requirement		$2,000,000	
		Interest over Term of Loan	Annual Payments
Loan Figures for Alternative Terms:	5-Year	$491,003	$498,200
	7-Year	$702,965	$386,138
	10-Year	$1,040,218	$304,022

108-car Facility Investment Capital Requirement		$3,000,000	
		Interest over Term of Loan	Annual Payments
Loan Figures for Alternative Terms:	5-Year	$736,504	$747,301
	7-Year	$1,054,447	$579,207
	10-Year	$1,560,328	$456,033

ENTER INDIVI . INFORMATION INTO BOXES

Current HRS Wheat Export Handle	6,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	115,385	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.000	$0.045	6,000,000		$270,000	$0	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					6,000,000	0	$270,000	$0	
									$270,000

COSTS

Short-term:	Current Shipment: 54 cars	Market Price	$4.00	Bushel	Short-Term Interest Rate 10%
	Weeks to Accumulate Current Train Size:	2		Weeks to Accumulate 108 Cars	3
	Additional Carrying Charge	$0.011	Bushel		
	Bushels that will Require Additional Carry	2,186,827	Bushels	(Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)	
Carry Charges					$24,407

NET BENEFIT OF LARGER TRAIN - YEAR 1	$245,593

A

Current HRS Wheat Export Handle	6,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	115,385	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]		*Rate/Bushel*							
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.005	$0.040	6,000,000	1,000,000	$240,000	$40,000	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					6,000,000	1,000,000	$240,000	$40,000	
									$280,000

COSTS

Short-term: Current Shipment: 54 cars — Market Price $4.00 Bushel — Short-Term Interest Rate 10%

Weeks to Accumulate Current Train Size: 2 — Weeks to Accumulate 108 Cars 3

Additional Carrying Charge $0.011 Bushel

Bushels that will Require Additional Carry 2,551,298 Bushels (Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)

Carry Charges $28,612

NET BENEFIT OF LARGER TRAIN - YEAR 1	$251,388

B

BENEFIT/COST OF 108-CAR MARKETING OPTION

ENTER INDIVII INFORMATION INTO BOXES

Current HRS Wheat Export Handle	8,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	153,846	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.005	$0.040	8,000,000	2,000,000	$320,000	$80,000	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					8,000,000	2,000,000	$320,000	$80,000	
									$400,000

COSTS

Short-term: Current Shipment: 54 cars Market Price $4.00 Bushel Short-Term Interest Rate 10%

Weeks to Accumulate Current Train Size: 1 Weeks to Accumulate 108 Cars 2

Additional Carrying Charge $0.008 Bushel

Bushels that will Require Additional Carry 3,644,712 Bushels (Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)

Carry Charges $30,655

NET BENEFIT OF LARGER TRAIN - YEAR 1	$369,345

ENTER INDIVIL INFORMATION INTO BOXES

Current HRS Wheat Export Handle	8,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	153,846	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.010	$0.035	8,000,000	4,000,000	$280,000	$140,000	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					8,000,000	4,000,000	$280,000	$140,000	
									$420,000

COSTS

Short-term:	Current Shipment:	54 cars	Market Price	$4.00	Bushel	Short-Term Interest Rate 10%
	Weeks to Accumulate Current Train Size:	1		Weeks to Accumulate 108 Cars	2	
	Additional Carrying Charge	$0.008	Bushel			
	Bushels that will Require Additional Carry	4,373,654	Bushels	(Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)		
Carry Charges						$36,964

NET BENEFIT OF LARGER TRAIN - YEAR 1	$383,036

D

BENEFIT/COST OF 108-CAR MARKETING OPTION

ENTER INDIVI... INFORMATION INTO BOXES

Current HRS Wheat Export Handle	10,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	192,308	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]		*Rate/Bushel*							
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.000	$0.045	10,000,000		$450,000	$0	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					10,000,000	0	$450,000	$0	
									$450,000

COSTS

Short-term: Current Shipment: 54 cars — Market Price $4.00 Bushel — Short-Term Interest Rate 10%

Weeks to Accumulate Current Train Size: 1 — Weeks to Accumulate 108 Cars 2

Additional Carrying Charge $0.007 Bushel

Bushels that will Require Additional Carry 3,644,712 Bushels (Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)

Carry Charges $24,407

NET BENEFIT OF LARGER TRAIN - YEAR 1	$425,593

ENTER INDIVIL INFORMATION INTO BOXES

Current HRS Wheat Export Handle	10,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	192,308	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.005	$0.040	10,000,000	2,000,000	$400,000	$80,000	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					10,000,000	2,000,000	$400,000	$80,000	
									$480,000

COSTS

Short-term: Current Shipment: 54 cars Market Price $4.00 Bushel Short-Term Interest Rate 10%

Weeks to Accumulate Current Train Size: 1 Weeks to Accumulate 108 Cars 2

Additional Carrying Charge $0.007 Bushel

Bushels that will Require Additional Carry 4,373,654 Bushels (Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)

Carry Charges $29,429

NET BENEFIT OF LARGER TRAIN - YEAR 1	$450,571

F

BENEFIT/COST OF 108-CAR MARKETING OPTION

ENTER INDIVIDUAL INFORMATION INTO BOXES

Current HRS Wheat Export Handle	10,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	192,308	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.020	$0.025	10,000,000	2,000,000	$250,000	$50,000	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					10,000,000	2,000,000	$250,000	$50,000	
									$300,000

COSTS

Short-term: Current Shipment: 54 cars — Market Price $4.00 Bushel — Short-Term Interest Rate 10%

Weeks to Accumulate Current Train Size: 1 — Weeks to Accumulate 108 Cars 2

Additional Carrying Charge $0.007 Bushel

Bushels that will Require Additional Carry 4,373,654 Bushels (Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)

Carry Charges $29,860

NET BENEFIT OF LARGER TRAIN - YEAR 1	$270,140

G

ENTER INDIVII INFORMATION INTO BOXES

Current HRS Wheat Export Handle	12,000,000	Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity	54	Cars	
Accumulation of HRS Export Wheat/Week	230,769	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045	$0.000	$0.045	12,000,000		$540,000	$0	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					12,000,000	0	$540,000	$0	
									$540,000

COSTS

Short-term:	Current Shipment: 54 cars		Market Price $4.00 Bushel		Short-Term Interest Rate	10%
	Weeks to Accumulate Current Train Size:	1	Weeks to Accumulate 108 Cars	1		
	Additional Carrying Charge	$0.006	Bushel			
	Bushels that will Require Additional Carry	4,373,654	Bushels	(Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)		
Carry Charges						$24,407

NET BENEFIT OF LARGER TRAIN - YEAR 1	$515,593

H

BENEFIT/CC OF 108-CAR MARKETING OPTION

ENTER INDIVIDU.. INFORMATION INTO BOXES

Current HRS Wheat Export Handle		Bushels	*Assumes 100% of these bushels will be marketed via 108-car Trains*
Current Rail Load Out Capacity		Cars	
Accumulation of HRS Export Wheat/Week	0	Bushels	

BENEFITS

Expected Change in HRS Wheat Shipments - Transportation/Volume		Estimated Differential*	Less Increase in Bid to Farmer	Net Rate Benefit	Current HRS Export Bushels	Additional HRS Export Bushels	Benefit on Current Bushels	Benefit on Additional Bushels	Totals
Destination[1]			*Rate/Bushel*						
Group 1	Single car to 108-car	$0.170		$0.170			$0	$0	
	Multicar to 108-car	$0.110		$0.110			$0	$0	
	Unit Train to 108-car	$0.045		$0.045			$0	$0	
Group 2	Single car to 108-car	$0.159		$0.159			$0	$0	
	Multicar to 108-car	$0.082		$0.082			$0	$0	
	Unit Train to 108-car	$0.030		$0.030			$0	$0	
					0	0	$0	$0	
									$0

COSTS

Short-term: Current Shipment: 0 cars   Market Price [ ] Bushel   Short-Term Interest Rate [ ]

Weeks to Accumulate Current Train Size: ??   Weeks to Accumulate 108 Cars ??

Additional Carrying Charge   Bushel

Bushels that will Require Additional Carry   Bushels (Set at 75% of bushels that will require additional carry, as these bushels will not all accumulate on day one.)

Carry Charges $0

NET BENEFIT OF LARGER TRAIN - YEAR 1	$0

ATTACHMENT OF DEFINITIONS AND BACKGROUND FOR BENEFIT/COST TABLE

BNSF Tariff. February 1998

Destination

up 1: East St. Louis (Continental. PV-ICBN (TRAA)), St. Louis (ADM, Bulk Services (TRRA)); Portland (Columbia); Kalam (Peavey); Vancouver; Seattle (Cargill); Beaumont; Galveston (Farmland, Port of Galveston): Houston (Cargill. HP #2); Louisiana Remy (Peavey)

Group 2: Duluth (Cargill)

Results of 1995 Wheat Producer Survey

Gain in Elevator Board Price	**Additional Miles Producer will Haul**
2 cents per bushel	3 miles
5 cents per bushel	10 miles
10 cents per bushel	24 miles

1 sq mile=640 acres

ical Report Documentation Page

PB98-175102

1. Report No.	3. Recipient's Catalog No.
4. Title and Subtitle Marketing Hard Red Spring Wheat in 100-Car Trains	5. Report Date August 1998 6. Performing Organization Code
7. Author(s) Kimberly Vachal, Denver Tolliver, John Bitzan, Bridget Baldwin — North Dakota State University	8. Performing Organization Report No. MPC 98-93
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16. Abstract

The objective of this study is to provide an informational base that hard red spring wheat market participants can use in assessing the value of a 100-car marketing option for their business. This study was conducted in cooperation with industry participants, including the North Dakota Wheat Commission, Canadian Pacific Railway, North Dakota Grain Dealers Association, Red River Valley and Western Railroad Company, and the South Dakota Wheat Commission.

The implications of 100+ car rates may vary by region and commodity due to production and logistical characteristics. Information on production density, land use, transportation, and grain drawing economics for corn, wheat, and soybeans produced in North Dakota, South Dakota, Nebraska, Kansas, and Iowa are included in the study. Estimates of rail efficiency gains and returns on investment for elevator upgrades also are included.

The 100+ car facilities have important implications for the infrastructure and market processes that support hard red spring wheat procurement. A 100+ car marketing option may likely benefit market participants as it increases flexibility by adding another marketing alternative. The advent of larger trains will, however, likely contribute to further rationalization of the state's grain procurement system. Further rationalization may include fewer elevators, additional rail line abandonment and longer producer deliveries.

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