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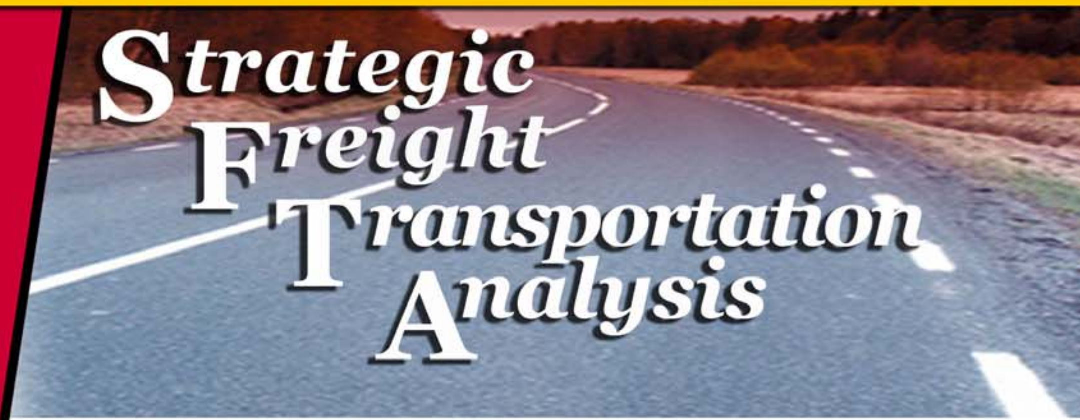

Implications of Rail-line Abandonment on Shipper Costs in Eastern Washington

Denver Tolliver

Eric L. Jessup
SFTA Co-Principal Investigator

and

Kenneth L. Casavant
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SFTA Research Report # 8

September 2003

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Washington State University
Department of Agricultural and Resource Economics
101 Hulbert Hall
Pullman, Washington 99164-6210

SFTA Research Reports:
Background and Purpose

This is the eighth of a series of reports prepared from the Strategic Freight Transportation Analysis (SFTA) study. SFTA is a six year comprehensive research and implementation analysis that will provide information (data and direction) for local, state and national investments and decisions designed to achieve the goal of seamless transportation.

The overall SFTA scope includes the following goals and objectives:

- Improving knowledge about freight corridors.
- Assessing the operations of roadways, rail systems, ports and barges – freight choke points.
- Analyze modal cost structures and competitive mode shares.
- Assess potential economic development opportunities.
- Conduct case studies of public/private transportation costs.
- Evaluate the opportunity for public/private partnerships.

The five specific work tasks identified for SFTA are:

- Work Task 1 - Scoping of Full Project
- Work Task 2 - Statewide Origin and Destination Truck Survey
- Work Task 3 - Shortline Railroad Economic Analysis
- Work Task 4 - Strategic Resources Access Road Network (Critical State and Local Integrated Network)
- Work Task 5 - Adaptive Research Management

For additional information about the SFTA or this report, please contact Eric Jessup or Ken Casavant at the following address:

Washington State University
Department of Agricultural and Resource Economics
101 Hulbert Hall
Pullman, Washington 99164-6210

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DISCLAIMER

PREVIOUS SFTA REPORTS NOW AVAILABLE

1. Casavant, Kenneth L. and Eric L. Jessup. "SFTA Full Scope of Work." SFTA Research Report Number 1. December 2002.

2. Clark, Michael L., Eric L. Jessup and Kenneth L. Casavant. "Freight Truck Origin and Destination Study: Methods, Procedures and Data Dictionary." SFTA Research Report Number 2. December 2002.

3. Casavant, Kenneth L. and Eric L. Jessup. "Value of Modal Competition for Transportation of Washington Fresh Fruits and Vegetables." SFTA Research Report Number 3. December 2002.

4. Ripplinger, Toby, Kenneth L. Casavant and Eric L. Jessup. "Transportation Usage of the Washington Wine Industry." SFTA Research Report Number 4. May 2003.

5. Clark, Michael L., Eric L. Jessup and Kenneth L. Casavant. "Dynamics of Wheat and Barley Shipments on Haul Roads to and from Grain Warehouses in Washington State." SFTA Research Report Number 5. September 2003.

6. Casavant, Kenneth L., Eric L. Jessup, and Joe Poire. "An Assessment of the Current Situation of the Palouse River and Coulee City Railroad and the Future Role of the Port of Whitman County." SFTA Research Report Number 6. September 2003.

7. Tolliver, Denver, Eric L. Jessup, and Kenneth L. Casavant. "New Techniques for Estimating Impacts of Rail Line Abandonment on Highways in Washington." SFTA Research Report Number 7. September 2003.

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INTRODUCTION

The Palouse River and Coulee City Railroad (PCC) operates 372 miles of light-density lines in eastern Washington. PCC has raised the possibility that these lines could be abandoned in the next five years. If the lines are abandoned, elevators now shipping by rail will truck grain to river ports, where the grain will be transferred to barge for movements to Portland, Kalama, or Longview. Food manufacturers will truck products to the Tri Cities for subsequent reshipment by rail to markets in the eastern United States. In either case, these agricultural industries will experience higher shipping costs after abandonment than they experience today.

Rail Lines Subject to Future Abandonment

The PCC network consists of fours sets of lines or subsystems:

1. The Cheney-to-Coulee City line
2. The Marshall-to-Pullman line (P&L)
3. The Blue Mountain Railroad - North
4. The Blue Mountain Railroad - South

The northern division of the Blue Mountain Railroad (BLMR) runs from Hooper Junction through Winona and Colfax to Moscow, Idaho. A short branch of this line runs northeast from Winona to Thornton, a distance of 31 miles. The southern division of the Blue Mountain Railroad extends from the UP mainline at Wallula Junction to Walla Walla, where it connects with another line running from Dayton, Washington to Weston, Oregon.

Primary Commodities Transported on the PCC

Grain is the predominant commodity transported on the PCC, comprising 83 percent of the 10,700 carloads originated or terminated in 2000. Food products (mostly canned and frozen vegetables) account for another 8 percent. The remaining carloads consist of chemicals, coal, petroleum products, and farm equipment or machinery.

Objectives and Overview of Report

The objective of this report is to quantity the change in shipping cost that would occur if the PCC rail lines are abandoned. The prevention or avoidance of these costs is a benefit of maintaining short-line railroad service in eastern Washington. The direct shipping cost by rail is usually lower than the combined truck-barge cost from PCC stations to Portland Kalama, or Longview. On direct rail shipments, a transfer of cargo between vehicles and vessels is unnecessary. Moreover, railroads can move grain in units of 50 to 75 cars, realizing economies that are not possible with trucks.

The potential change in shipping cost is estimated by comparing the current costs incurred by PCC shippers to projected costs if the rail lines are abandoned. The components of this comparison include: railroad rates, trucking costs, transfer costs, and barge rates to Portland.

The report focuses solely on efficiency gains or losses. In this approach, it does not matter which party in the distribution chain incurs the costs: e.g., agricultural coops, elevators, or exporters. In the long-run, a net change in shipping cost has an impact on the agricultural economy of the state.

In general, the analysis involves the following steps:

1. Estimate the quantities of each commodity currently moving by rail and the baseline rail shipping cost
2. Determine the probable post-abandonment destinations and shipping patterns for each station and commodity
3. Estimate the highway miles from each station to its post-abandonment destinations
4. Determine the predominant truck type used to haul each commodity
5. Determine the maximum gross weight of each vehicle and the maximum payload tons that can be accommodated in a single trip
6. Based on the truck weight and predicted empty miles, estimate the trucking cost per ton-mile
7. Estimate post-abandonment trucking costs by applying the cost per ton-mile to the tons currently shipped by rail
8. Estimate barge transfer costs by multiplying the incremental tons transferred times the transfer cost per ton
9. Estimate barge shipping costs by multiplying the barge rate per ton to Portland by the incremental tons transferred at the port
10. Estimate the net change in shipping cost from the sum of the component costs

This generalized process is applicable to most grain shipments from PCC stations. However, there are exceptions to this generalized procedure. These exceptions will be discussed as they are encountered in the report.

PROJECTED POST-ABANDONMENT SHIPMENT PATTERNS

Grain

If the PCC rail lines are abandoned, the grain traffic currently moving by rail will be moved by truck to a final market, a rail mainline station, or a barge transfer facility. Because of the trip distances, direct trucking is an unlikely option. For example, it is 335 miles from Colfax - which is located on the BLMR North - to the primary market of Portland. It is even father from Coulee City to Portland: 350 miles. Thus, it is unlikely that grain will be trucked directly to final market. Instead, it will be trucked to a rail mainline or river port.

Rail Transshipment Option

If the PCC lines are abandoned, some grain could be trucked to the BNSF or UP. For example, grain from the Cheney-to-Coulee City line could be transshipped via Ritzville. However, Ritzville would become the shipper. Presumably, the grain would be resold to the Ritzville Warehouse Company. In essence, the PCC elevators would become satellites. Over time, farmers may bypass these facilities and deliver grain directly to Ritzville.[1] However, this adjustment process could take several years and may require a change in the farm truck fleet.

Truck-Barge Option

Many PCC elevators already use truck-barge. Jessup (1997) found that 24 percent of the grain originated from elevators located on the Cheney-to-Coulee City and Marshall-to-Moscow lines moved via truck-barge.[2] The elevators located on these lines are relatively far from river ports. In comparison, BLMR elevators are much closer to Pasco and Central Ferry, and may utilize truck-barge even more.

Costs of Transshipment Options

A comparison of potential post-abandonment shipping costs is presented in Tables 1 and 2 for wheat moving from Coulee City to Portland. The comparison reflects 2002 price levels. The sources of the unit costs shown in the tables are detailed later in the report.

Table 1 shows the total cost of a transshipment via Ritzville. In comparison, Table 2 shows the total cost of a transshipment via Pasco. In both cases, the wheat is assumed to move in a Rocky Mountain Double truck. As the comparison shows, the transshipment cost via Pasco is less than the transshipment cost via Ritzville.

Table 1. Cost per Ton for a Wheat Shipment from Coulee City to Portland Via Ritzville

Truck Cost per Mile	$ 1.40
Trip Distance	91
Cost per Round Trip	$ 255
Net Tons per Truck	36
Truck Cost per Ton	$ 7.08
Transfer Cost per Ton	$ 1.67
Rail Rate per Car in 110-Car Trains	$ 907
Rail Rate per Ton	$ 8.17
Total Shipment Cost per Ton	$ 16.92

1 Analysis if this scenario is beyond the scope of the study, which focuses on the most likely intermediate-run scenario.

2 Jessup, Eric. *Economic Evaluation of Grain Shipment Alternatives: A Case Study of the Coulee City and Palouse River Railroad*. EWITS Working Paper Number 8, March 1997.

Notes: Rates and costs reflect 2002 levels. Calculated values are rounded for purposes of presentation.

Table 2. Cost per Ton for a Wheat Shipment from Coulee City to Portland Via Pasco

Truck Cost per Mile	$ 1.40
Trip Distance	116
Cost per Round Trip	$ 325
Net Tons per Truck	36
Truck Cost per Ton	$ 9.02
Transfer Cost per Ton	$ 1.67
Barge Rate: Pasco-Portland	$ 5.53
Shipment Cost per Ton	$ 16.22

Notes: Rates and costs reflect 2002 levels. Calculated values are rounded for purposes of presentation.

Based on the shipping cost comparison, it appears that most of the grain will be trucked to Pasco, Windust, or Central Ferry. These ports have sufficient capacity to handle substantial increases in grain throughput. Moreover, they have good highway access. Presumably, grain produced in the Walla Walla region will be transshipped at Wallula.

Mode Choice Factors

Total shipment cost is the predominant factor in mode choice.[3] However, other variables may affect an elevator's post-abandonment shipping decisions. Institutional factors such as joint ownership or financial integration of elevator and port facilities are important considerations. Service factors such as total transit time, variability in transit time, and equipment availability are also important. In some instances, shippers may realize premiums in the export market if they can assemble and deliver a shipment of grain on short notice.[4] Another factor is the capacity and availability of equipment. If car supply isn't reliable or car-order cycles are lengthy, shippers may perceive that rail service is less reliable than truck-barge service.

Most Likely Post Abandonment Destinations

In 2000, over 80 percent of the grain originated by rail from PCC stations was destined for Portland, Vancouver, or Kalama.[5] The remainder moved to Puget Sound ports, or to dispersed

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3 In estimating post-abandonment shipping costs, highway distances and travel times were estimated for alternative port destinations from highway maps and Internet mapping services. Differences in downriver barge rates from alternative ports were computed from Tidewater Barge Lines rate schedule.

4 Tidewater Barge Lines advertises 36-hour transit times from Tri-Cities to Portland. Grain can be trucked from elevators on the Coulee City line to Tri-Cities in a matter of hours. Thus, the time consumed during a truck-barge shipment may be 48 hours or less.

5 Estimated from the 2000 Railroad Carload Waybill Sample.

markets in small quantities.[6] If the rail lines are abandoned, grain originated from PCC stations could move to the Puget Sound only if it is trucked there or transshipped via a mainline elevator. Without direct rail service, grain shipments to dispersed domestic markets would cease or shift to export markets. Thus, if the PCC lines are abandoned, all of the grain currently moving by rail would be trucked to river ports and transferred to barge for subsequent movement to Columbia River seaports.[7]

Alternative Ports for Palouse Region Grain

Some of the elevators located on the eastern end of the BLMR North and the P&L currently ship via Almota. However, Almota has no capacity for expansion. It is a small port consisting of 11 acres. Moreover, it has relatively poor highway access. It is not served by a state highway. Access from Colfax is via 13 miles of county and local roads.

The Almota Road, which all traffic must use, includes a 7 percent grade. According to the Port of Whitman County, the steepness of the grade causes several truck accidents each year.[8] As many as 100 trucks per day may travel the road during peak periods.[9] Moreover, the road is heavily used by recreational traffic.[10] During spring thaw, the Almota road is closed to trucks.[11]

In comparison, Central Ferry has good highway access, via SR-26 and SR-127. Several shipper associations own facilities at Central Ferry, including Cooperative Agricultural Producers and Rosalia Producers. In addition, Columbia Grain and Wilbur Ellis are located at Central Ferry. Although trip distances to Almota may be shorter from some elevators, in most cases the travel times to Central Ferry are actually less (Appendix). Moreover, there is a slight barge rate advantage at Central Ferry.

For the reasons cited above, it is assumed that the grain handled at stations on the eastern end of the BLMR North and P&L will be transshipped primarily through Central Ferry if the rail lines are abandoned. However, the report includes a sensitivity analysis and a comparison of costs under the two alternative scenarios.

Food Products

Food products shipments originated from stations on the BLMR South are destined primarily for the eastern and southeastern United States. In some cases, these commodities are moved nearly 3,000 miles by rail. If the PCC lines are abandoned, food manufacturers will truck their products to the Tri-Cities for subsequent re-shipment by rail.

6 Ibid.

7 Central Washington Grain Growers, Cooperative Agricultural Producers, St John Grain Growers, and Rosalia Producers provided information about post-abandonment destinations. Their information confirmed the analysis presented in this paragraph.

8 Port of Whitman County. *Port Comprehensive Plan*. December, 2000.

9 Ibid.

10 Ibid.

11 Ibid.

Other Commodities

A small quantity of coal moves into the area from origins southeast of Washington. These shipments travel approximately 1,000 miles by rail. Inbound chemical shipments are originated from Canada or locations east of the PCC. These shipments are destined primarily for stations located on the BLMR North. They are moved 700 to 1,100 miles by rail. Inbound shipments of farm equipment originate primarily from the Great Plains region, as far away as Illinois. These shipments are very infrequent. However, they move long distances. For example, shipments of farm equipment travel 1,000 to 1,900 miles by rail to stations on the PCC.

The sources of these commodities are dispersed across the United States and Canada. Truck deliveries may be impractical from distant origins. A reasonable assumption is that these commodities will move into a regional distribution center by rail, where they will be transferred to truck. Since most of the chemical and farm machinery shipments are originated east or north of the study area, it is assumed that these commodities will be transferred at Spokane. Presumably, the coal traffic that is originated south of the study area will be transferred at Tri-Cities.

TRUCK CONFIGURATIONS AND COST FACTORS

Data Sources

Two sources of information were used to determine the predominant truck type for each commodity: (1) a survey of PCC shippers, and (2) truck size and weight studies conducted by the U.S. DOT. Telephone interviews were conducted with shippers in eastern Washington in late 2001 and 2002. Shippers were asked about the types of trucks used, their trucking costs, and the river ports to which they would deliver grain if the PCC rail lines are abandoned.

In addition to the survey, a series of working papers used in the U.S. DOT's *Comprehensive Truck Size and Weight Study* were reviewed for background information. Some of these papers include estimates of the operating costs associated with relevant truck configurations.

Rocky Mountain Double Trucks

If the PCC rail lines are abandoned, grain now moving by rail will be trucked to river ports in Rocky Mountain Doubles. A Rocky Mountain Double (RMD) consists of a tractor pulling a semitrailer, followed by a smaller "pup" trailer. Overall, this truck has 7 axles:

- A single steering axle on the tractor
- Two sets of tandem axles: a tractor driving axle and a tandem axle underneath the semitrailer
- Two single axles underneath the pup trailer

Maximum Gross Weight

When fully loaded, a RMD weighs 105,500 pounds. However, the tare weight of the truck varies with the trailers' dimensions and materials. Both the semitrailer and pup trailer are "hopper" trailers, constructed with one or more hopper bins. However, there are many variations in length, width, and number of bins. Semitrailers may range from 40 to 45 feet in length, with 1 or 2 hopper bins. A pup trailer may range from 18 to 28 feet in length. Some trailers of the same dimensions are heavier than others due to differences in materials.

Tare Weight

Several of the elevator and grower associations in eastern Washington own Rocky Mountain Doubles and provide their own trucking services. On average, these associations report tare weights ranging from 32,000 to 35,500 pounds. U.S. Department of Transportation studies provide some information about the tare weights of commercial trucks. A working paper prepared for the *Comprehensive Truck Size and Weight Study* lists a tare weight of 33,000 pounds for a long-wheel base tractor, a 42-foot semitrailer, and a 28-foot pup trailer.[12]

Because of variations in equipment weights, a midpoint tare weight of 33,500 pounds is used in this study. This tare weight yields a net weight of 36 tons per truck. This load factor was verified through conversations with shippers in the area. Since the maximum gross weight of the truck is 105,500 pounds, the corresponding tare weight must be 33,500 pounds.

Cost per Mile

The cost of moving wheat in a 7-axle Rocky Mountain Double is approximately $1.40 per mile.[13] The truck's hopper trailers are very efficient, allowing for rapid bottom discharge of grain. However, it is difficult for truckers to obtain a backhaul for these trailers. Certain dry fertilizers and other finely-divisible commodities can be hauled in them. However, a backhaul usually requires that the trailers be cleaned thoroughly before they are reloaded with grain.

Empty-Mile Ratio

Because of the specialized nature of the equipment and risks of contamination, the RMD runs empty half of the time on short trips.[14] In essence, the trucker unloads the grain and returns home empty.

This empty-mile factor is slightly higher than the 40 percent factor used for hopper trailers in the U.S. DOT Comprehensive Truck Size and Weight Study.[15] However, the majority of trucks used

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12 The RMD tare weight is shown in Table 1.10 of: *Comprehensive Truck Size and Weight (TS&W) Study Phase 1-Synthesis, Truck Costs and Truck Size and Weight Regulations- Working Paper 7*, February 1995. Prepared for the U.S. Department of Transportation by the Battelle Team.

13 This average is based on conversations with several shippers in the area including Whitman County Grain Growers.

14 Source: telephone interviews with grain shippers in eastern Washington.

15 The empty-mile ratio is derived from Appendix A of a report by Jack Faucett Associates: *The Effects of Truck Size and Weight Limits on Truck Costs.* A Working Paper prepared for the U.S. Department of Transportation, October 1991.

to haul grain to Snake or Columbia River ports are owned or leased by shipper associations. Very few backhaul opportunities exist for these trucks.

Total Trip Cost

In this study, total trip cost is obtained by dividing the loaded miles by the proportion of trip miles that are loaded, and multiplying by the cost per mile. Thus, the cost per loaded mile in a Rocky Mountain Double is $2.80. Since the Rocky Mountain Double can accommodate 36 payload tons, the cost per ton-mile is 7.8 cents.

Combination Five-Axle Trucks

For the most part, manufactured and processed goods move in 5-axle tractor-semitrailer combinations, as do sporadic shipments of other commodities. The 5-axle tractor-semitrailer is the most common commercial truck on the road. It is legal in all 50 states. In comparison, the Rocky Mountain Double can operate only in designated states, and in some cases, only on designated highways.

Table 3 shows typical tare and gross weights of trucks used to move commodities to and from PCC stations. Because of the tandem-axle exception to Bridge Formula B, many 5-axle trucks can be loaded to 80,000 pounds.[16] However, trucks with wheel bases of less than 36 feet may be restricted to 78,000 pounds.

Table 3. Typical Truck Weights (in Pounds) for Primary Truck Types

Truck Configuration	Tare Weight	Gross Weight	Net Weight
7-Axle Rocky Mountain Double	33,500	105,500	72,000
5-Axle 48’ Dry Van Semitrailer	26,800	78,000	51,200
5-Axle 48’ Reefer Semitrailer	28,700	78,000	49,300
5-Axle 48’ Flatbed Semitrailer	26,400	78,000	51,600
5-Axle 48’ Tanker Semitrailer	23,400	78,000	54,600
5-Axle 40’ Dump Trailer	26,900	78,000	51,100
5-Axle 42’ Hopper Trailer	26,400	78,000	51,600

With the exception of the RMD, the weights shown in Table 3 are derived from Faucett (1991). For 5-axle trucks, the implication is that the additional cost of a longer-wheel base tractor and/or a longer trailer is not worth the additional expense.

16 Bridge Formula B allows 68,000 pounds on any consecutive set of tandem axles when the distance from the center of the first axle to the center of the fourth axle is at least 36 feet. This exception allows some shorter wheel-base vehicles to operate at 80,000 pounds with a sufficient tractor wheel base so that the “tractor bridge” is not in violation of the bridge formula.

Refrigerated Van Trailers

A significant quantity of canned and frozen vegetables is shipped on the PCC in refrigerated boxcars. If these perishable products are shifted to trucks, they will be shipped in refrigerated van trailers (reefers). The typical tare weight of a combination 5-axle truck with a refrigerated van trailer is 28,700 pounds (Table 3). This tare weight includes the weight of a conventional tractor (13,900 pounds) and a tandem-axle semitrailer weighing 13,300 pounds.[17] If this truck operates at 78,000 pounds, it can accommodate 49,300 pounds of payload.

Refrigerated van trailers are more flexible than hopper trailers and can be used to backhaul similar commodities in canned, packaged, or boxed form. According to Faucett (1991), refrigerated van trailers incur 15 percent empty miles per year.[18]

Tanker Trailers

Chemical and petroleum products move in specialized tanker trailers. According to Faucett (1991), the cost of a tanker trailer is approximately 2.3 times the cost of a hopper trailer of comparable length. The typical tare weight of a tanker truck with a conventional tractor is 23,400 pounds (Table 3). If this truck operates at 78,000 pounds, it can accommodate 54,600 pounds of payload. According to Faucett (1991), tanker trailers incur 45 percent empty miles per year.[19]

Flatbed Trailers

A small amount of farm equipment or machinery moves to stations located on the PCC. Heavy machinery and equipment typically move on railroad flatcars. If shipped by truck, these products would move on flatbed trailers.

The typical tare weight of a 48-foot flatbed semitrailer and tractor is 26,400 pounds (Table 3). This includes the weight of a conventional tractor and a tandem-axle semitrailer weighing 12,500 pounds.[20] The typical net weight of a flatbed truck operating at 78,000 pounds is 51,600 pounds. However, the net weight may be significantly less for farm equipment. Farm tractors and machinery are non-divisible loads that tend to occupy the space of a flatbed trailer before the truck reaches its weight limit.

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17 The refrigerated van tare weight is computed from equipment weights shown in Table 1.5 of *Comprehensive Truck Size and Weight (TS&W) Study Phase 1-Synthesis, Truck Costs and Truck Size and Weight Regulations: Working Paper 7*, February 1995. Prepared for the U.S. Department of Transportation by the Battelle Team.

18 The empty-mile ratio for refrigerated vans is derived from Appendix A of a report by Jack Faucett Associates: *The Effects of Truck Size and Weight Limits on Truck Costs*. A Working Paper prepared for the U.S. Department of Transportation, October 1991.

19 Ibid.

20 The flatbed truck tare weight is computed from equipment weights shown in Table 1.5 of *Comprehensive Truck Size and Weight (TS&W) Study Phase 1-Synthesis, Truck Costs and Truck Size and Weight Regulations: Working Paper 7*, February 1995. Prepared for the U.S. Department of Transportation by the Battelle Team.

In this study, the average truck payload is assumed to be the same as the average flatcar load - 21 tons or 36,000 pounds.[21] According to Faucett (1991), flatbed semitrailers incur 25 percent empty miles per year.[22]

Dump Trailers

The typical tare weight of a 40-foot dump trailer that might be used to haul coal is 26,900 pounds (Table 3). At a gross weight of 78,000 pounds, this truck can accommodate 51,100 pounds of payload.

Truck Costs

As noted earlier, the operating cost of a Rocky Mountain Double was obtained from shippers located on the PCC who operate these trucks in shuttle service. Other truck costs are derived from this value, using cost relationships shown in the U.S. DOT Truck Size and Weight Study.

U.S. DOT Estimates

Table 4 shows unit costs for a 7-Axle Rocky Mountain Double operating at 105,500 pounds and a variety of 5-axle semitrailer trucks operating at 78,000 pounds. The costs reflect 1994 price levels.

Table 4. Cost Relationships between Rocky Mountain Double and 5-Axle Trucks

Truck Configuration	Cost per Mile	Percent of RMD Cost
7-Axle Rocky Mountain Double	$ 1.36	
5-Axle 48' Dry Van Semitrailer	$ 1.19	88%
5-Axle 48' Reefer Semitrailer	$ 1.29	95%
5-Axle 48' Flatbed Semitrailer	$ 1.19	87%
5-Axle 48' Tanker Semitrailer	$ 1.49	110%
5-Axle 40' Dump Trailer	$ 1.15	84%
5-Axle 42' Hopper Trailer	$ 1.14	84%

Source: Jack Faucett Associates (1991). Costs indexed to 1994 price levels.

The Rocky Mountain Double unit cost is close to the cost per mile provided by Whitman County Grain Growers, which reflects late 2001 - early 2002 levels. One of the reasons the costs are similar is that highway diesel fuel prices were almost identical during the two periods. For example, highway diesel fuel prices ranged from $1.10 to $1.15 per gallon during the last quarter

21 This value is computed from 1998-2000 sample waybill data.

22 This empty-mile ratio is derived from Appendix A of a report by Jack Faucett Associates: *The Effects of Truck Size and Weight Limits on Truck Costs*. A Working Paper prepared for the U.S. Department of Transportation, October 1991.

of 1994.[23] In comparison, highway diesel fuel prices ranged from $1.14 to $1.25 per gallon from November 2001 through March 2002.

Truck Unit Costs and Empty-Mile Factors

The truck unit costs and empty-mile factors used in this study are shown in Table 5. Grain shippers could potentially use the 7-axle Rocky Mountain Double or the 5-axle 42-foot hopper trailer. However, the cost per ton-mile is less in the Rocky Mountain Double, even though the cost per mile is greater. The RMD can haul 10 additional tons of grain per trip, thus making it the preferred truck for hauling grain to river ports.

Table 5. Truck Unit Costs, Empty-Mile Factors, and Costs per Ton-Mile

Truck Type	Cost per Mile	Percent Empty Miles	Cost per Ton-Mile
7-Axle Rocky Mountain Double	$ 1.40	50%	$ 0.078
5-Axle 48' Dry Van Semitrailer	$ 1.23	15%	$ 0.056
5-Axle 48' Reefer Semitrailer	$ 1.33	15%	$ 0.063
5-Axle 48' Flatbed Semitrailer	$ 1.22	25%	$ 0.063
5-Axle 48' Tanker Semitrailer	$ 1.53	45%	$ 0.102
5 Axle 40' Dump Trailer	$ 1.18	50%	$ 0.092
5 Axle 42' Hopper Trailer	$ 1.17	50%	$ 0.091

SHIPPING COST COMPONENTS

Highway distances for outbound commodities were computed from each station to the preferred river port. Highway distances for inbound commodities were computed from Spokane or Tri Cities to the station. Trucking costs were based on these distances and the costs and backhaul factors shown in Table 5.

Grain

Rail Grain Rates

Wheat rates from stations located on the Cheney-to-Coulee City line to Pacific Northwest ports were derived from BNSF tariff item 43590. Assumedly, future shipments from this line will move in 52-car units of heavy-axle load cars weighing 286,000 pounds each. At the time of this study, the applicable rate was $1,366 per car for this type of car and service level.

23 Energy Information Administration, U.S. Department of Energy. *Weekly Retail On-Highway Diesel Prices*. http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp

Stations on the Marshall-to-Pullman line are still utilizing 268,000-pound cars. Future shipments from this line are assumed to occur in 52-car units. At the time of this study, the applicable rate shown in tariff item 43591 was $1,120 per car for this type of car and service level.

Rail grain rates from stations on the BLMR North were obtained from the PCC and UP's Internet rate retrieval service. These tariff rates vary from $909 to $1,009 per car depending upon the service level and car weight. However, several stations on the BLMR North participate in a shuttle movement to Wallula. These stations ship only a portion of their grain under public tariff rates. The remainder is shipped under shuttle rates, which are substantially lower than the standard covered hopper car rates.[24]

The percentage of cars originated on the BLMR North under each rate level was provided by the PCC. These percentages were used to distribute the rail traffic at each station among service levels.

Transfer and Barge Shipping Costs

According to shippers, the transfer or transloading cost for grain is 5 cents per bushel or approximately $1.67 per ton. At the time of this study (in 2002) the barge rate from Central Ferry to Portland was $6.78 per ton. The barge rate from Windust to Portland was $6.03 per ton. In comparison, the barge rate from Pasco to Portland was $5.53 per ton. The barge rate at Wallula was $5.46 per ton.

Net Change in Grain Shipping Cost

The net change in grain shipping cost is computed as:

> *(1) The trucking cost to the river + Transfer cost + The barge rate to Portland - The current rail rate*

Shuttle movements to Wallula are a major exception to this rule. Under an agreement with UP, the PCC operates a shuttle from several stations on the BLMR North to Wallula. At Wallula, the grain is transferred to barge for subsequent shipment to Portland. In essence, a barge transfer cost is already incurred for these shipments. Therefore, the barge transfer cost shown in Equation (1) is a wash.

For shuttle stations, barge rates would be incurred in both the pre- and post-abandonment scenarios. Therefore, the change in barge shipping cost is computed as the difference between the lower barge shipping rate at Wallula and the higher barge shipping rate at upriver ports such as Central Ferry. In essence, Equation (1) can be restated for grain shuttle train movements as:

> *(2) The trucking cost to the river + The incremental barge rate to Portland - The current rail rate*

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24 Shuttle rates are confidential and cannot be presented in this paper.

Other Commodities

A similar calculation is performed for other commodities. However, instead of a river port, the trucking cost reflects a movement from Spokane or Tri Cities. Assumedly, shipments coming from the East and North will be transferred at Spokane. However, coal shipments originated south of Washington will probably be transferred at Tri Cities.

Typically, railroads group stations together for purposes of making rates. For long-distance movements, such as those originating from the Great Plains or Saskatchewan, the rate basis is likely to be the same for most stations in eastern Washington. For example, the rate on farm machinery from Chicago is likely to be the same whether the destination is Spokane, Palouse, Colfax, or the Tri Cities. Even within Washington, destination ports are grouped for rate-making purposes. For example, wheat rates from PCC stations are the same to Portland, Kalama, Longview, Tacoma, or Seattle.

Based on this simplifying assumption, the change in shipping cost for other commodities is assumed to be the cost of transfer to truck and the trucking cost from Spokane or Tri Cities to the destination station. This computational equation is shown below:

(3) The trucking cost from transfer center + Transfer cost

Transfer Costs of Chemicals and Coal

The only transfer cost provided by shippers is the cost of transferring grain. However, the transfer cost of chemicals should be similar to the transfer cost of grain. Instead of a dry bulk commodity, the transfer involves a liquid. Thus, in the absence of a specific transfer cost for liquid fertilizer, the grain transfer cost of $1.67 per ton is used. The same unit cost is used for coal. However, the transfer of discrete units of farm equipment is markedly different from the transfer of bulk commodities. The former is much more labor-intensive.

Transfer Costs of Farm Equipment

According to the carload waybill sample, the average weight of farm machinery shipments is 21 tons per flatcar. This weight could represent one very large combine, two small tractors, or 2 or 3 small combines and tractors. It may require more than an hour to transfer 2 or more units of farm equipment from a railroad flatcar to trucks. At a cost of $100 per hour, a typical cost per flatcar may range from $100 to $150. This translates into a transfer cost of $4.76 to $7.14 per ton. The lesser of the two transfer costs is used in this study.

RESULTS OF ANALYSIS

Prime Scenario

The results of the analysis are shown in Table 6, assuming that the grain shipments in question from the P&L and BLMR North are transferred at Central Ferry. As the table shows, abandonment of the PCC would increase shipping costs in eastern Washington by $2.29 million per year.

Table 6. Estimated Change in Shipping Costs from Potential PCC Line Abandonment: Scenario 1

Rail Line	Trucking Cost	Transfer Cost*	Barge Cost	Rail Cost	Net Change in Shipping Cost
BLMR North	$1,412,882	$501,385	$1,590,708	$3,062,023	$442,953
BLMR South	$186,582	$506,904	$198,919	$382,352	$510,053
Cheney-Coulee City	$3,490,147	$675,205	$2,383,192	$5,424,386	$1,124,158
Marshall-Pullman	$792,900	$297,402	$1,156,736	$2,032,800	$214,237
Total: PCC	$5,882,511	$1,980,896	$5,329,555	$10,901,561	$2,291,401

* Also includes drayage costs of food products shipments from BLMR South line

Alternative Scenario

The results of the alternative scenario are shown in Table 7, assuming that the grain shipments in question from the P&L and BLMR North are transferred at Almota instead of at Central Ferry. Under this scenario, abandonment of the PCC would increase shipping costs in eastern Washington by $2.14 million per year.

Table 7. Estimated Change in Shipping Costs from Potential PCC Line Abandonment: Scenario 2

Rail Line	Trucking Cost	Transfer Cost*	Barge Cost	Rail Cost	Net Change in Shipping Cost
BLMR North	$1,356,193	$501,385	$1,590,708	$3,062,023	$386,264
BLMR South	$186,582	$506,904	$198,919	$382,352	$510,053
Cheney-Coulee City	$3,490,147	$675,205	$2,383,192	$5,424,386	$1,124,158
Marshall-Pullman	$697,099	$297,402	$1,156,736	$2,032,800	$118,436
Total: PCC	$5,730,021	$1,980,896	$5,329,555	$10,901,561	$2,138,911

* Also includes drayage costs of food products shipments from BLMR South line

Several points should be considered in assessing the alternative scenario. (1) The grain trucking cost per mile used in this analysis reflects typical over-the-road operations. The same unit cost is applied to movements to all destinations. However, vehicle maintenance expenses are likely to be greater for extreme operations, such as ascending and descending the 7 percent grade near

Almota. Moreover, the time difference associated with travel over county and local roads as opposed to state highways is not reflected in the cost comparison. When speed, opportunity cost of travel time, and extreme operating conditions are considered, the trucking cost per ton-mile may be greater for movements to Almota than to Central Ferry. (2) The enhanced accident risk associated with deliveries to Almota is not reflected in the cost comparison. (3) Localized port congestion effects are not considered.

Potential Variations in Results

Fluctuations in Price Relationships

A comparison of rail and barge rates is really a snapshot in time. Rates are adjusted frequently because of market conditions, equipment availability, cost increases, and competition. The rate and traffic data used in this study reflect a 2002 period which is assumed to be typical of future periods. However, fuel prices have risen since 2002. Both railroads and barges include fuel surcharge provisions in their tariffs. If the fuel price surcharges are applied consistently by both modes, then the estimated change in shipping costs will not be distorted significantly by higher fuel prices. However, price fluctuations for other reasons may change rate relationships in the future.

Barge rates for wheat have risen since the analysis was concluded. For example, the barge rate from Windust to Portland has increased from $6.03 per ton to $6.40 per ton. However, there is no fuel surcharge for October 2003 because the monthly average high sulfur diesel fuel price in Portland during September was below the base price of 90 cents per gallon. In comparison, the 52-car wheat rate from Coulee City to Portland has increased from $1,366 to $1,376 per car since the study was concluded. However, the railroad fuel surcharge for October (which is based on highway diesel fuel prices) is 2.5 percent. When the fuel surcharge is applied to the current base rate, it represents an increase of approximately 40 cents per ton over the 2002 rate level of $1,366 per car. In essence, railroad and barge rates are still in approximate balance even though the base rates have changed and fuel surcharges have varied. However, these rates could be adjusted again at any time.

Potential Impacts of Shuttle Stations

Shippers have expressed concerns that the 110-car shuttle train facility at Ritzville may impact the viability of the Coulee City line.

Currently, the 26-car rate from stations located on the Coulee City line to Portland is $1,376 per car for shipments in 286,000-pound cars. In comparison, the 26-car rate from Ritzville to Portland is $1,023 per car. However, the rate for 110-car shipments from Ritzville to Portland is only $ 914 per car. In effect, the shuttle train rate results in a price differential of 12 cents a bushel for shippers located on the Coulee City line (Table 8).

Table 8. Comparison of Rates for Wheat Movements from Coulee City and Ritzville to the Pacific Coast in 286,000-Pound Rail Cars

	Coulee City	Ritzville
Cars per Shipment	26	110
Rate per Car	$ 1,376	$ 914
Bushels per Car	3,700	3,700
Rate per Bushel	$ 0.37	$ 0.25

In this study, a trucking cost of $1.40 per mile was used for the Rocky Mountain Double. Because of escalations in fuel prices, this cost may have increased to $1.45 per mile.[25] The estimated trucking cost for the 91-mile trip from Coulee City to Ritzville is approximately 22 cents a bushel, including the empty return (Table 9). The additional transfer cost (i.e., the double-handling cost) is roughly five cents per bushel. Thus, it appears that the combined truck-rail cost for shipments via Ritzville is about 52 cents a bushel.[26] From this comparison, it does not appear that farmers have much incentive to bypass the elevators on the Coulee City line in favor of Ritzville.

Table 9. Trucking Cost for Wheat Shipments from Coulee City to Ritzville in Rocky Mountain Doubles

Cost Factor	Value
Truck Cost per Mile*	$1.45
Trip Distance	91
Cost per Round Trip	$264
Bushels per Trip	1,200
Cost per Bushel	$0.22

*Robert Holmes, Whitman County Grain Growers. Updated for fuel price increases

Port and Highway Investments

Investments in the various river ports could alter the relative attractiveness of the ports and distort the projected distribution of post-abandonment traffic. Port investments may be especially influential if they are made by shippers. Such investments create a tying (non-

25 This estimate assumes that the fuel price reflected in the Spring 2002 estimate was $1.20 per gallon. In comparison, the average highway diesel fuel price for August 2003 was $1.49 per gallon. If the average fuel consumption is 6 miles per gallon, then the cost per mile will have increased to approximately $1.45.

26 However, the cost comparison doesn't consider potential origin or destination efficiency payments to shuttle shippers who can load or unload in 15 hours. Moreover, Certificate of Transportation (COT) premiums are not considered in the comparison. Branch-line shippers may have to pay for guaranteed rail car supply. The COT premiums are market-driven and may range from zero to $300 per car. A high COT premium could shift the advantage to Ritzville.

transportation) interest in the traffic volume of the port. The reconstruction or upgrading of port access roads could also alter the relative attractiveness of ports.

Non-Cost Factors

Many non-cost factors such as shipper investments in port terminals and merger and consolidation of shipping companies could affect the distribution of traffic in a post-abandonment environment. Transportation and environmental policies regarding river navigation could affect mode competitiveness, availability, and shipper choices.

APPENDIX

Sources of Traffic Data

The PCC provided the number of carloads interchanged with the BNSF at Cheney and Marshall, and with the UP at Hooper Junction and Wallula. However, the railroad could not provide detailed car-loading data by station. PCC traffic data are recorded by patron. A company such as Central Washington Grain Growers operates many elevators at different locations.

Confidentiality is another issue concerning traffic data. For most purposes, station-specific data are unnecessary. However, they are needed for highway and truck cost analysis. Therefore, the known traffic levels for the PCC subsystems were allocated among stations based on rail waybill data and conversations with shippers. If a station did not show up on the waybill sample during the 1998-2000 period, it may not represented in the analysis.

In general, the railroad and barge rates and transfer costs are unaffected by the traffic allocation among stations. The rail rates are the same for most stations on a given line, as are the barge rates and transfer costs. The trucking costs may vary somewhat with the traffic allocations. However, the allocations used in this study should provide reasonable estimates of the trucking costs from each line.

Comparison of Travel Times and Distances for Grain Deliveries to Almota and Central Ferry

Table 10. Comparison of Travel Times and Distances from Select P&L and BLMR Stations to Alternative River Ports

Station	Almota		Central Ferry	
	Travel Time	Distance	Travel Time	Distance
Endicott	1’ 20”	31.8	54”	25.9
St John	1’ 34”	43.6	1’ 28”	41.0
Thornton	1’ 15”	37.8	1’ 12”	51.0
Palouse	1’ 25”	35.9	1’ 24”	50.6
Willada	1’ 37”	40.1	1’ 20”	34.4
Belmont	1’ 33”	40.8	1’ 26”	53.8
Rosalia	1’ 28”	46.0	1’ 24”	59.2
McCoy	1’ 30”	45.5	1’ 27”	58.7
Spangle	1’ 39”	60.6	1’ 42”	73.8
Fallon	1’ 14”	29.1	1’ 27”	53.2

Source: Yahoo Mapping Services