

UP, BNSF COMBINED COVERED HOPPER CAR FLEET, 1999-2003

<u>Car Type</u>	<u>1999</u>	<u>2003</u>
263,000-Pound GVW Car (100 Tons)	75.3%	63%
286,000-Pound GVW Car (111 Tons)	24.7%	37%

By the Year 2010, UP Expects 286,000-Pound Cars to be 60% of Their Grain Car Fleet. Corresponding Figure for BNSF is 50%.

LARGER CAR SIZE LOWERS RAILROAD COST PER TON-MILE

The 286,000-Pound Car Results in a Reduction in Class I Railroad:

- Car and Locomotive Ownership and Maintenance Costs
- Labor Costs
- Fuel Costs
- Class I Railroad Operating Costs per Ton-Mile of 286,000-Pound Cars are Nearly 9% Less Than 263,000-Pound Cars

THE 286,000-POUND CAR AND SHORTLINE RAILROADS

Increased Use of 286,000-Pound Cars Has Potential to Worsen Four Problem Areas of Many Shortline Railroads

- Light Rail (Rail Weighing 90 Pounds per Yard or Less)
 - Thin Ballast Sections (Less Than a Foot of Ballast Under Ties)
 - Deferred Tie Maintenance
 - Old Bridges
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- Resor et.al (2000) Concluded 90 Pound Rail is Marginal for Speeds of 25 MPH or Less, for 286,000-Pound Cars Even at Very Light Traffic Densities

LARGER RAIL CARS AND ECONOMIC VIABILITY OF SHORTLINE RAILROADS

- Grain is a Major Commodity of Shortlines Serving Agricultural Regions
- Shortlines May Have to Upgrade Tracks and Bridges to Handle The Increased Weight of HAL Cars
- Shortlines Would Have Higher Annual Operating And Maintenance Costs as More HAL Cars Move on Their Lines
- If Shortlines Can't Absorb These Costs, the Percentage of the Grain Car Fleet That Can Move on Shortlines Will Fall
- Grain Shippers Located on Shortlines Will Truck Grain to Terminal Markets or Distant Class I Rail-Served Facilities
- Thus Shortlines Lose Market Share in Their Main Market, Threatening Their Long-Term Viability

IMPACTS OF SHORTLINE ABANDONMENT ON AGRICULTURAL REGIONS

If Track Upgrading Costs of HAL Cars, Coupled With Higher Track Maintenance Costs, Leads to Abandonment of Shortline Railroads, the Negative Impacts on Agricultural Regions Include:

- Higher Transport Costs for Rail Shippers
- Reduction of Market Options for Shippers
- Lost Economic Development Opportunities
- Loss of Local Tax Base to Fund Basic Government Services
- Increased Road Damage Costs
- Increased Energy Use and Pollutant Emissions

RESEARCH OBJECTIVES

1. Document Shift from 263,000-Pound Rail Cars to 286,000-Pound Cars by Class I Railroads
2. For a Sample of Shortline Railroads, Measure the Number of Route Miles and Bridges That Require Upgrading to Handle the 286,000-Pound Car
3. Estimate Which Branchlines are Likely to be Upgraded and Which Will Likely be Abandoned Based on Rate of Return on Investment Analysis
4. Measure the Road Damage Cost if Upgrading to Handle HAL Cars Does Not Occur and Shortlines are Abandoned

KANSAS SHORTLINE RAILROADS

Railroad	Starting Date	Kansas Miles	Total Miles
Cimarron Valley Railroad	1996	186	254
Kansas & Oklahoma Railroad	2001	832	832
Kyle Railroad	1982	482	557
Nebraska, Kansas, & Colorado Railnet	1996	122	434
South Kansas & Oklahoma Railroad	1990	272	404
Total		1,894	2,481

METHODOLOGY

- A Shortline Railroad Will Invest in Upgrading a Rail Line if the Rate of Return to Upgrading Exceeds the Rate of Return the Shortline Could Receive From Other Investments
- The Internal Rate of Return For a Shortline Investment in Track Upgrading Can be Calculated by Solving for ρ in This Equation

$$C_u = \sum_{i=0}^N R_i / (1 + \rho)^i$$

Where

C_u -Upgrading Cost

N-Number of Years Over Which the Upgrade is Expected to Generate Benefits

R_i -Incremental Profits in Year i Resulting From the Upgrade

ρ -Internal Rate of Return

DATA

- Length of Haul was Obtained From *Profiles of U.S. Railroads* published by the Association of American Railroads
- Total Carloads were Provided by Representatives of the Five Kansas Shortlines
- Carloads per Mile Were Obtained by Dividing Total Carloads by Mainline Miles of Track
- Upgrade Miles are the Miles the Kansas Shortline Personnel Said Need to be Upgraded to Handle 286,000-Pound Cars. For the Five Shortlines as a Group, 70% of Their Mainline Route Miles Need Heavier Weight Rail and 86% of Their Bridges Have to be Upgraded to Handle HAL Cars.
- The Upgrade Cost per Mile of \$207,770 was Obtained by Averaging Estimates in Published Studies as well as Those Provided by Kansas Shortline Personnel.
- Tons per Car of 111 is the Maximum Carrying Capacity of a 286,000-Pound Car

PROCEDURE

- The Internal Rate of Return for an Upgrading Investment to Handle HAL Cars depends on (a) Incremental Annual Profits from Upgrading the Line, and (b) the Upgrading Cost
- $\text{Incremental Revenues} = \text{Revenue per Car} \times \text{Carloads per Mile} \times \text{Mainline Miles}$
- Incremental Revenues (and Costs) are Calculated for the Actual Cars per Mile of Each Kansas Shortline as well as Assumed Traffic Densities of 50, 75, 100, 150, and 200 Cars per Mile
- Incremental Annual Costs are Measured With a Shortline Costing Model (Martens 1999) That Simulates Operating Costs of Shortlines After the Upgrading Investment to Handle HAL Cars
- $\text{Incremental Profits} = \text{Incremental Revenues} - \text{Incremental Equipment, Transportation, and Maintenance Costs.}$

CALCULATION OF RATES OF RETURN

- For a Given Shortline, All the Rate of Return to Upgrading Calculations are Based on the Characteristics of That Railroad
- The Four Most Important Shortline Characteristics for Rate of Return Calculations Are:
 - Average Length of Haul
 - Carloads per Mile
 - Miles of Mainline Track to be Upgraded
 - Total Miles of Mainline Track
- The Upgrade Cost per Mile of \$207,770 and Tons per Car of 111 for HAL Cars Are the Same for All Rate of Return Calculations
- The Rates of Return Are Hypothetical Rates of Assuming a Railroad With the Same Characteristics as Each of the Five Kansas Shortlines

EMPIRICAL RESULTS

- The Rate of Return to Upgrading is Negative for All the Hypothetical Kansas Shortlines When Their Actual Average Traffic Density and Other Characteristics Are Assumed
- This Result Occurs for All Assumed Time Horizons (8 to 25 Years)
- If Traffic Density is Increased to 100 Cars per Mile for All Five Shortlines, Two of the Five Railroads Have Positive Rates of Return Even for the 8 Year Time Horizon. If the Time Horizon is 15 Years, Three of the Five Shortlines Obtain Rates of Return Ranging from 8.3% to 21.1%.

IMPACT OF UPGRADING DECISIONS ON ROAD DAMAGE COSTS

- Babcock et.al (2003) Found That if Four of the Five Kansas Shortlines Were Abandoned, Annual Kansas Road Damage Cost Would Increase by \$58 Million
- The Actual Increase in Annual Road Damage Cost Would be Significantly Higher Since the Estimate Does Not Include One of the Five Shortlines. The Estimate Also Excludes the Road Damage Cost From Abandonment of 600 Track Miles in States Bordering Kansas.

CONCLUSIONS

- None of the Five Kansas Shortlines Can Earn an Adequate Rate of Return on Upgrading Track and Bridge Investment With Their Current Traffic Densities and Other Characteristics
- The Estimated Cost to Upgrade Track and Bridges of the Five Kansas Shortlines is \$309 Million, Which They Probably Can't Finance Alone
- Government Financial Assistance to Shortlines is an Efficient Use of Resources Since Shortline Rail Service Generates External Benefits Including:
 - (a) Avoided Road Damage Costs
 - (b) Highway Safety Benefits
 - (c) Lower Energy Production and Consumption Emissions
- Class I Railroads Receive Traffic From Shortlines. If They Are Abandoned, the Class I Would Lose Traffic and Profit. Thus Class I Railroads May Consider Increasing the Amount Paid per Car to Shortlines if it Benefits Both Railroads.