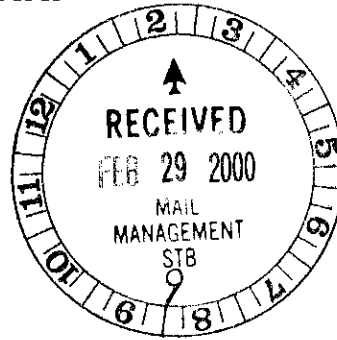


197/67

Environmental (Air Quality) Impact of Intermodal Freight Transfer Between The U.S. and Canada



ENTERED
Office of the Secretary

FEB 29 2000

Part of
Public Record

Prepared for:

TEA 21 Funding under § 1119/1118

For

**Canadian National
-and-
Canadian Pacific**

SBG Project No. 15608.01

March 2000

DESIGN

FOR

REAL

LIFE

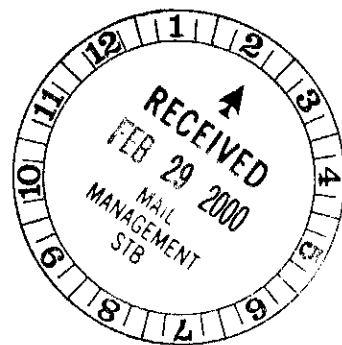


The

Sear-

Brown

Group



**BEFORE THE
SURFACE TRANSPORTATION BOARD**

EX PARTE NO. 582

PUBLIC VIEWS ON MAJOR RAIL CONSOLIDATIONS

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STATEMENT OF WILLIAM C. HOLTHOFF

My name is William C. Holthoff. I am a principle with The Sear-Brown Group, 85 Metro Park, Rochester, New York, 14623.

I have over 25 years of experience in all aspects of the Transportation Engineering profession. For the past 14 years I have been the Manager of the Traffic Engineering and Transportation Planning Division for The Sear-Brown Group, a nationally-recognized transportation and engineering consulting firm. My experience for the 11 years prior joining Sear-Brown includes Deputy Director of the Genesee Transportation Council, the Rochester Area Metropolitan Planning Organization, a Transportation Engineer for Polytechnic Institute Of New York and a Transportation Engineer with the New York State Department of Transportation.

During the last 25 years I have conducted studies for all types of travel modes and have identified their impacts on travel, accessibility, economics, travel safety, and the environment. These studies have been conducted for both private and public sector customers throughout the U.S. and Canada including State and Municipal Departments of Transportation, private and public authorities, industries, universities, land developers, and various modal agencies.

I hold a B.S. Degree in Civil Engineering and a M.S. Degree in Transportation Engineering from the State University of New York at Buffalo. I have published numerous professional papers and reports on various transportation subjects. I am a member and former officer of the Institute of Transportation Engineers. I am also an active participant in many other organizations, including the CAN/AM Border Trade Alliance and the Eastern Border Transportation Coalition.

Over the past 10 years I have directed a series of studies for various customers associated with rail, highway and bridge transportation operations at international border crossings between the U.S. and Canada. These customers include The Buffalo and Fort Erie Port Public Bridge Authority, The Niagara Falls Bridge Commission, The Ogdensburg Bridge and Port Authority, The New York State Department of Transportation, Canadian National, and Canadian Pacific. As part of this work, Sear-Brown reviewed the environmental air quality impacts related to the possible transfer of long distance trucking freight to rail cars (intermodal transportation) for international shipments. A simple analysis was conducted to obtain an order of magnitude estimate of the change in air quality emissions if intermodal transportation is used more extensively.

Available data shows that within U.S./Canadian International Highway Plazas, vehicles idle a staggering 375 years annually waiting for Customs and Immigration processing. We found that for each 10% transfer to intermodal transportation, air pollutant emissions could be reduced by 8,000 tons annually, both within the international plazas and over the National Highway System.

Achieving the same level of reduction in air emissions using a more conventional method such as traffic signal coordination would require the coordination of over 6,500 traffic signals in urbanized areas. To achieve this staggering number would require signal coordination in at least 13 urbanized areas size of Rochester, New York at a minimum cost of \$33 million.

To conclude, increased use of intermodal freight shipments can be a highly cost-effective method for significantly reducing air pollution in both the U.S. and Canada and one of many positive benefits that might be achieved by improved rail service. Therefore, I am urging the STB to judge this merger based on the facts as they relate to "Is it good for service, efficiency, and competition, as well as the environment?"

Attached is a copy of the complete analysis The Sear-Brown Group prepared for CN's and CP's request for \$4.8 million in TEA 21 funding under Sections 1119/1118. It fully describes the technical analysis which supports my conclusions.



THE SEAR-BROWN GROUP
FULL-SERVICE DESIGN PROFESSIONALS

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Ms. Gloria Combe
Director of U.S. Government Affairs
2800 Livernois, Suite 300
P.O. Box 5025
Troy, MI 48007-5025

November 4, 1999

Re: Environmental Impact of Intermodal Freight Transfer
Between the U.S. and Canada 15608.01

Dear Ms. Combe:

As part of CN's and CP's request for continued TEA21 funding under Section 1119/1118, Sear-Brown reviewed the environmental impact (air quality) related to the transfer of long distance truck freight to rail cars for international shipments. A simple analysis was conducted to obtain the order of magnitude on air quality if intermodal is used more extensively. The overall emissions for three major air pollutants, carbon monoxide (CO), hydrocarbons (HC) and Nitrogen Oxides (NOx) were evaluated, both within the international border crossing plazas and over the National Highway System (NHS).

The results show a significant reduction for all three air pollutants, both within the international plazas and nationally. Within U.S./Canadian International Plazas, vehicles are estimated to idle a staggering 375 years annually waiting for Customs and Immigration processing. A reduction in air pollutants within these plazas from 1.7% to nearly 4.9% can be achieved, in addition to removing 8,000 tons of air pollutants from the highway systems for each 10% intermodal transfer.

Achieving the same reduction in air emission the well-documented method of traffic signals coordination was also examined. The results showed coordination of over 6,500 traffic signals in an urbanized area would be needed to obtain the level of CO reductions achieved by each 10% transfer to intermodal shipments. To coordinate 6,500 traffic signals would require signal coordination in at least 13 urbanized areas the size of Rochester, New York at a minimum cost of \$33 million.

To conclude, utilizing intermodal shipments is a highly cost-effective method for significantly reducing air pollution in both the U.S. and Canada. The attached report documents our analysis and findings.

Sincerely,

William C. Holthoff, Manager
Transportation Division

WCH/mah

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Summary

A simple analysis was conducted to obtain the order of magnitude on air quality if a 10% intermodal transfer was achieved in U.S./Canadian International trade. This evaluation was undertaken to supplement the previous analysis prepared by The Sear Brown Group, "Potential Use Of Intermodal Transfers To Provide Additional Passenger Vehicle Capacity Along The U.S./Canada Border" dated January 4, 1999.

The overall emissions for three major air pollutants, carbon monoxide (CO), hydrocarbons (HC) and Nitrogen Oxides (NOx) were evaluated both within the international border crossing plazas and over the highway system.

The results show that for each 10% intermodal transfer of trucks to rail, there is a corresponding change in air pollution emissions of:

- 1,000 tons **annual reduction in HC emissions;**
- 500 tons **annual reduction in NOx emissions;**
- 6,500 tons **annual reduction in CO emissions.**

In addition to these reductions, air quality emissions within the plazas and international border highway crossings such as in the Niagara Frontier and Detroit / Windsor would also be reduced. Only a two-minute wait by the 98.4 million autos and trucks that crossed the U.S./Canadian border in 1995 to begin Customs and Immigrations primary inspection, results in a total of 3.75 centuries of vehicle idling in the international plazas each year. Emission reductions from these idling vehicle would be achieved by reducing the number of trucks waiting to be processing through Customs and Immigrations, as well as freeing Customs and Immigrations staff to process more passenger vehicles. Thus, air emissions from both idling trucks and passenger vehicles waiting to be processed would be reduced. This reduction in time idling would reduce air emission from all U.S./Canadian border crossings by the following for each 10% intermodal transfer of freight to rail:

- **2.3% HC**
- **4.9% NOx**
- **1.7% CO** (approximately 50 tons annually)

To achieve this same order of CO reductions (6,550 tons annually) using traffic signal coordination would require 6,550 traffic signals to be coordinated and maintained at an estimated initial cost of \$33 million dollars. To achieve a comparable reduction using the traffic signal coordination method would require all traffic signals in at least 13 metropolitan areas the size of Rochester, New York (750,000 people) to be coordinated.

This simple analysis demonstrates that long distance international truck freight transfer to railcars for international shipments would improve air quality nationally and at the international crossings. The intermodal transfer of as few as 10% of these shipments would reduce the emission of all three major air pollutants examined.

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**AIR QUALITY BENEFITS OF INTERMODAL TRANSFERS TO RAIL
AT U.S./CANADIAN BORDER CROSSINGS**

1. Introduction

This report was prepared to supplement previously report entitled "Potential Use of Intermodal Transfers to Provide Additional Passenger Vehicle Capacity along the U.S./Canadian Border " 1. The previous report estimated that in 1995, 30% of the goods traded using highway international border crossings travel 500 miles or more. As such, they have the potential to be shipped by rail. To determine what effect such a transfer would have on the environment (air quality); this additional analysis was undertaken.

A simple analysis was conducted to obtain an indication and order of magnitude of possible impacts. The overall emissions for three major air pollutants, Carbon Monoxide (CO), Hydrocarbons (HC) and Nitrogen Oxides (NOx) were evaluated. Possible reductions in air emissions within the plazas of international highway crossings that would result from reducing time vehicles sat idle in plazas waiting to be processed through Customs and Immigration was also evaluated.

The following documents the analysis and the results.

2. Highway System Air Quality Benefits

The estimated air pollutant emitted over the road by all vehicles traveling on highways to those emitted by railroad operations in the U.S., along with emission rates for Heavy Duty Trucks in 1996 was developed using information contain in the "National Transportation Study" U.S. Department of Transportation. (See appendix). The results showed that railroad emissions per car mile, including NOx, are less than trucks per vehicle mile for all heavy-duty diesel trucks when two trucks are carried per each rail car.

Based on the emission rates developed, a 10% intermodal transfer of trucks to rail crossing the U.S./Canadian Border would reduced air pollution emissions for goods shipped an average of 533 miles by:

HC	a reduction of	1,000 tons annually
NOx	a reduction of	500 tons annually
CO	a reduction of	6,500 tons annually

¹ This report was prepared by The Sear-Brown Group for CN & CP to use in their request to NY, MI, MN for FFY 99 USDOT funding under Section 1119 of TEA 21 and is included as Attachment 1 to the Application.

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3. Air Quality Benefits at International Crossings

In addition to the results shown above, each 10% intermodal transfer of trucks to rail at international crossings would provide additional air quality benefits. These additional benefits would occur from the reduction of both trucks and passenger cars idling in the international plazas waiting to be inspected at U.S. or Canadian Customs and Immigrations facilities. To identify the possible magnitude of this improvement, hours waiting to be inspected at crossings in the Niagara Frontier were examined.

There are four international highways and three international railroad crossings serving the Niagara Frontier between Southern Ontario, Canada and the Buffalo and Niagara Falls Region, New York, U.S. In 1995, these four highway crossings carried 17% of all trucks and 18% of all passenger vehicles crossing between the U.S. / Canada (Peace Bridge; Lewiston-Queenston Bridge; Whirlpool Rapids Bridge; and the Rainbow Bridge).

In 1990, data was collected on the number of hours vehicles waited, idling, to be processed through U.S. or Canadian Custom and Immigration primary inspections at all four of these crossings²¹. This data showed that during 1990, trucks waited, idling, to be processed for 83,800 hours, equal to 9.5 years. Passenger cars waited, idling, to be processed 1,126,000 hours, equal to 128.5 years. This implies that with similar delays at all U.S. / Canada International Border Crossing in 1990, auto and trucks waited, idling over 750 years, combined.

The magnitude of these delays has decreased slightly since 1995 with the decrease in travel demand (approximately 25%) at the border crossings. Current travel forecasts, however, indicate that they will more return within the next decade unless significant investments are made in border crossing facilities and additional Customs and Immigrations officials are hired to staff these facilities. In fact, if the 98.4 million autos and trucks that cross the U.S./Canadian Border in 1995 waited only 2 minutes to begin Customs and Immigration inspection, the total annual wait time idling in international plazas would be 3.28 million hours, equal to 3.74 centuries.

For each 10% of intermodal trucks transferred to rail in the Niagara Frontier, the number of hours idling in the plaza by trucks would be reduced by a similar percentage. In addition, it would free capacity for processing passenger vehicles. For every truck that is processed by Customs, approximately 2.1 passenger vehicles can be processed. Based on this ratio, there would also be a 1.28% decrease in the number of hours passenger cars would spend idling, waiting to be processed through U.S. or Canadian Customs and Immigrations. Combined, idling time by both trucks and passenger vehicles would be reduced by 2.13%.

Based on these reductions and this magnitude of delay, the following estimates of the reduction in air pollutants can be roughly estimated.

²¹Niagara Frontier U.S.-Canada Bridge Study, Phase 1 Report, August 1999

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3. a) Carbon Monoxide (CO)

Review of CO Idle Emissions for trucks (Heavy Duty Diesel Vehicle or HDDV) and passenger cars (Light Duty Gasoline Vehicle or LDGV), show the following emission factors (gram/hour) for Upstate New York Counties with 20% Cold Starts in 1997:

- Trucks 91.49 grams per hour
- Passenger Cars 429.67 grams per hour³

Applying these rates to the hours vehicles were waiting to be processed at the four Niagara Frontier Crossings shows these idling vehicles would have emitted nearly 542 tons of carbon monoxide into the air annually.

Assuming proportional annual delays at all other highway U.S./Canadian Crossings, we can extrapolate that idling vehicles waiting to be processed through Customs and Immigrations emitted over 3,000 tons of carbon monoxide annually.

Applying these rates, for each 10% intermodal truck transfer to rail results in a 1.68% reduction in carbon monoxide emissions at these crossings, or reduction of nearly 9 tons of CO emissions annually in the Niagara Frontier and 50 tons at all U.S./Canadian border crossings.

3. b) HydroCarbons (HC)

Review of the Average Vehicle Emission Rates by Vehicle Type and Fuel shows that HC emission rates per mile for passenger cars (Light Duty Gasoline Vehicle) is the same as for trucks (Heavy Duty Diesel Vehicle). Assuming these rates do not vary between vehicle types when idling, then a 2.13% decrease in HC emissions would be achieved at these international crossings for each 10% intermodal transfer of trucks to rail.

3. c) Nitrogen Oxide (NOx)

The Average Vehicle Emission Rates by Vehicle Type and Fuel shows that a truck (Heavy Duty Diesel Vehicle) generates more than 8.8 times the NOx emissions than a passenger car (Light Duty Gasoline Vehicle). Again, assuming that this ratio does not significantly vary when these types of vehicles are idling, then a 4.88% decrease in NOx emissions would be achieved at these international crossings for each 10% intermodal transfer of trucks to rail.

Based on this analysis, intermodal transfer of international freight to rail will significantly reduce air pollutant emissions within the international border crossing plazas and their surrounding neighborhoods.

³ Source: CO Emission Factor Tables contained in the NYSDOT Environmental Procedures Manual, Chapter 1.A, October 1997

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4. Air Quality Improvements

To determine the magnitude of the air quality improvement that could be achieved by a 10% intermodal transfer to rail, the effects of reducing motor vehicles CO emissions by other methods were examined. One of the most effective methods available without changing how individuals travel, is coordination of traffic signals. Analysis of traffic signal coordination in the Syracuse, New York urban environment found that at heavily traveled intersections, coordination of traffic signals could reduce CO emissions by approximately one ton per traffic signal controlled intersection annually. Simple coordination of these traffic signals costs approximately \$5,000 or more per signal.

Each 10% intermodal transfer of truck traffic to rail crossing the U.S./Canadian International Border has been estimated in this report to reduce CO emissions by 6,550 tons annually. Based on this, over 6,500 traffic signals would need to be coordinated nationally at a cost of nearly \$33 million to achieve the same reduction in CO emissions that would be expected by a 10% intermodal transfer.

There are approximately 500 traffic signals in the Rochester, New York urban area serving a population of approximately 750,000 people. Thus, traffic signal coordination would have to be implemented and maintained in 13 urban areas the size of Rochester, New York, to obtain the same annual reduction in CO emissions that would be achieved by a 10% intermodal transfer to rail.

5. Conclusions

The analysis has shown that increased use of rail for international trade will decrease the amount of emissions for three major air pollutants (HC, NOx, and CO). It would also provide additional reduction of emissions at the international crossings by reducing idling time in the plazas. The reduced number of trucks using these crossings will also free up Customs and Immigrations to process more passenger cars. This would result in fewer hours for vehicles (both trucks and passenger cars) idling in the plazas waiting to be inspected. The analysis has shown that for each 10% intermodal transfer of trucks to rail a corresponding reduction in air emissions equal to 1.7% for CO, 2.1% HC and 4.8% for NOx can be obtained from reducing the number of idling vehicles within the international plaza. Reductions of this magnitude would be particularly important in metropolitan areas, such as the Niagara Frontier, N.Y. and Detroit Mich. in assisting these areas in meeting National Air Quality Standards for these pollutants. Approximately 70% of all U.S./Canadian truck crossings occur in these two metropolitan areas alone.

The follow table summarizes the air quality improvements for each 10% intermodal transfer, annually.

	Reduction In Air Pollutant Emissions		
	For Each 10% Intermodal Transfer of U.S. / Canada Trade		
	<u>HC</u>	<u>NOx</u>	<u>CO</u>
National Highways	1,000 Tons	500 Tons	6,500 Tons
Intern'l. Highway Crossings	2.3%	4.9%	1.7% or 50 Tons

Appendix

The following table compares total pollutants emitted in short tons (2,000 pounds) and short tons per million miles of vehicle or railroad car travel. The table also includes the vehicle miles of travel in 1996 by rail car, trucks, and total vehicles traveling on the highway system. The information shown in this table was developed based on data contained in the U.S. Department of Transportation, National Transportation Statistics, for 1996.

Comparison of Highway to Railroad Emissions

<u>1996</u>	<u>All Highway Vehicles</u>		<u>Railroads</u>		<u>Combination Trucks</u>	
	<u>Tons</u>	<u>Per Million Miles</u>	<u>Tons</u>	<u>Per Million Miles</u>	<u>Tons</u>	<u>Per Million Miles</u>
HydroCarbons (HC)	5,500,000	2.22	50,000	1.58	319,500	2.69
Nitrogen Oxides (NOx)	7,170,000	2.89	920,000	29.01	1,827,958	15.39
Carbon Monoxide (CO)	52,940,000	21.33	110,000	3.47	1,581,786	13.32
<u>Mileage</u>						
Rail Car	31,715,000,000					
All Trucks	182,756,000,000	7.36%	Trucks			
Combination Trucks	118,756,000,000	4.78%	Combination Trucks (Heavy Duty Vehicles)			
All Highway Vehicles	2,482,202,000,00					