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UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: May 26, 1972

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 10th day of May 1972.

FORWARDED TO:

Honorable John A. Volpe
Secretary of Transportation
Washington, D. C. 20590

SAFETY RECOMMENDATION I-72-1

On November 5, 1971, the Department of Transportation submitted to Congress a legislative package that contained S. 2842, the Transportation Regulatory Modernization Act of 1971, and S. 2841, the Transportation Assistance Act of 1971. These bills would change many of the competitive relationships, both intramodal and intermodal, within the transportation industry. One of the anticipated long-term results of these changes in national transportation policy would be to divert substantial volumes of traffic from one mode of transport to another.

Several other bills have been introduced in the Congress that would either (1) affect the economic regulation of transportation or (2) provide subsidies or government promotional (investment) programs for different modes. Again, the possibility exists that the long-term result of any of these bills could be the transfer of traffic from one mode to another. (See Attachment A.)

There are substantial differences in the loss rates for the various modes of transportation. Passenger transportation loss-rate data is available from the National Safety Council. A previous Safety Board special study[1/] has shown that the various freight transportation modes

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1/ Fatality Rates for Surface Freight Transportation, 1963 to 1968, adopted August 18, 1971.

also have substantially different fatality rates. Using techniques similar to those discussed in the technical appendix of this earlier report, injury loss rates have been calculated for the surface modes of freight transportation. These calculations are presented in Attachment B.

In some ways these loss rates are a reflection of the interaction between technology and environment for each mode. Thus, pipelines are unmanned systems that operate in relative isolation from the general public. Commercial marine transportation uses large vessels that, with the exception of a limited interface with recreational boating and shoreside activities, do not impinge upon the general public. Railroad freight trains operate upon their own private right-of-way. Only in the highway milieu do we find freight transportation freely intermixed with the general public.

Some have claimed that the existence of these inherent structural and institutional differences somehow invalidate safety comparisons between freight transportation modes. The Safety Board, however, believes that these basic structural differences heighten the need for such comparisons. When they are coupled with the fact that most commodities can be moved conveniently and efficiently by more than one mode of transport, these infrastructure comparisons suggest an important basic principle for transportation policy development:

> Where all other factors are equal so that the possibility for a choice of mode exists, government policy should encourage the movement of freight via the safest mode of transport.

Adherence to this principle during the formulation and implementation of all aspects of national transportation policy would provide the maximum degree of safety for both the general public and for employees in a particular segment of the transportation industry.

Because of the large differences in loss rates for the various surface modes, any change in national transportation policy which has the ultimate effect of transferring traffic from one mode of transport to another mode may have substantial safety implications. The Safety Board has attempted to quantify the potential safety impact of the changes in economic regulatory policy and the competitive transportation infrastructure that have been proposed. We have reviewed some of the analysis and research reports that have been prepared to support the suggested policy changes. Where these documents provide a basis for estimating the amount of traffic that will be

diverted by the proposed changes, the fatality and injury loss rates mentioned above were applied to the estimated traffic diversion. This extension yields an estimate of the potential safety impact of the suggested changes. These calculations are discussed in detail in Attachments C and D.

A chart on page 17 of the Department of Transportation (DOT) Executive Briefing: Transportation Regulatory Modernization and Assistance Legislation, January 1972, shows the projected 1980 division of domestic surface freight ton-miles, both with and without the regulatory changes contained in S. 2842, the Transportation Regulatory Modernization Act of 1971. The projected result of this regulatory change is to shift a substantial amount of freight traffic from highway motor trucks to the railroads. The implications of this shift from a less safe to a more safe mode of transport is a net saving for our society of approximately 550 deaths and 7,300 injuries avoided per year. (See Attachment C.)

Another estimate for the safety impact of rate deregulation can be developed from a recent DOT research report[2/], which found that the railroads could attract approximately one-fourth of the present long-haul truck traffic if freight rates were deregulated. If this traffic diversion estimate is correct, the net safety benefit to our society flowing from this change in economic regulation would be approximately 775 lives saved and 10,200 injuries avoided per year. (See Attachment D.)

This study also found that if the railroads could substantially improve the reliability of their service, they could obtain an additional 40 percent of the present intercity highway truck traffic. The study suggests institutional changes that would make this improved service possible. If this prediction is correct, an internal institutional change -- new employee work rules in the railroad industry -- could yield a substantial net safety benefit for society as a whole, 1,239 lives saved and 16,331 injuries avoided per year. (See Attachment D.)

New technologies that will divert traffic from existing forms of transportation can also have substantial safety impacts. A recent Bureau of Mines Information Circular discusses the economic feasibility of an

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2/ Competition Between Rail and Truck in Intercity Freight Transportation, Charles River Associates, Incorporated, Cambridge, Massachusetts, December 1969, Contract No. DOT-OS-A9-060, Office of Asst. Secretary for Policy & International Affairs.

iron ore slurry pipeline between the Mesabi Range and the South Chicago steel production area. If the assumptions discussed in Attachment E are correct, the introduction of this new technology would generate, on the average, a net saving of 1.74 lives per year if the diverted traffic came from ships, and 14.46 lives per year if the traffic came from railroads. (See Attachment E.)

These calculations suggest that in some instances it is possible to quantify and predict the safety impact as well as the economic viability of changes in transportation policy or technology. Improved recognition of the safety consequences of alternative courses of action can lead to a more complete consideration of safety issues during the decisionmaking process.

In line with these comments, a further safety impact analysis of some of the provisions of the Transportation Regulatory Modernization Act of 1971 might be beneficial.

This bill suggests changes that would make the abandonment of railroad branch lines easier. To the extent that they would result in the transfer of freight traffic from the railroads to other modes, these proposed changes would have an impact upon transportation safety.

In testimony on behalf of these bills, the Department of Transportation suggested that these new provisions would initially encourage the abandonment of 21,000 miles of lightly used rail line (slightly more than 10 percent of the Nation's total trackage), and that these lines generate less than one-half of one percent of the Nation's car loadings. An estimate of the ton-miles that would be diverted was not provided. However, data presented in the Safety Board's Special Study, Fatality Rates for Surface Freight Transportation, 1963 to 1968, and Attachment B suggest that transferring one percent of the railroads' present ton-mileage to highways would result in approximately 60 additional deaths per year on our highways (to both truckdrivers and others) and about 800 additional injuries each year.

To facilitate the transfer of traffic from abandoned rail lines to other carriers, either highway or water, changes are proposed in this bill that would alter the criteria used by the Interstate Commerce Commission when it issues a certificate of public convenience and necessity. To the extent that these changes in entry control procedures facilitate the shifting of transportation production between modes, they will affect one of the social costs associated with transportation -- lives lost and injuries sustained. Further research might allow quantification of this particular safety impact.

The bill would also change the ground rules for carrier rate bureaus. The Safety Board recognizes that tracing out the safety implications of these institutional changes would be extremely difficult. In spite of these difficulties, the Board believes that an attempt should be made to quantify the potential safety impact of a changed role for rate bureaus.

The Department of Transportation should take the lead in developing a methodology for Safety Impact Statements. These statements would be analogous to Environmental Impact Statements; they would recognize and highlight the safety implications of any proposed transportation change. They could be used within DOT for the evaluation of any suggestions for policy changes that would affect either aggregate transportation demand or the division of demand between the modes (modal split). Safety Impact Statements could become an integral part of transportation research reports, whether dealing with transport economics or new technology.

The Safety Board is aware that proposals have been made for the creation of a "Transportation Trust Fund" that would not be dedicated to any single transport mode. The existence of such an undedicated fund would allow intermodal safety considerations, like those discussed here, to influence government transportation investment decisions.

The Safety Board therefore recommends that:

I-70-1 Department of Transportation policy require Transportation Safety Impact Statements for all DOT actions which may affect the demand for transportation or shift (divert) traffic among modes. This would include legislative proposals, policy statements, program recommendations, grant applications, and research contracts. The requirement for Safety Impact Statements might be made a standard clause in DOT procurement contracts.

The Safety Board also reiterates the recommendation that it made in the Special Study, Fatality Rates for Surface Freight Transportation, 1963 to 1968:

"The Department of Transportation develop and publish, on a regular basis, comparable data on the losses and loss rates associated with all modes of freight transportation. This data should include losses in all forms: death, injury, property damage, and delays due to accidents."

This recommendation will be released to the public on the issue date shown above. No public dissemination of the contents of this document should be made prior to that date.

Reed, Chairman; Laurel, Thayer and Burgess, Members, concurred in the above recommendation. McAdams, Member, filed the attached concurrence and dissent.

By: John H. Reed
Chairman

Attachments (6)

McADAMS, Member, Concurring and Dissenting:

I have no objection to recommending to the Department, if indeed it is not now being done, that if a policy is adopted which results in a significant diversion of traffic from one mode to another, it consider the safety implications. I do, however, object to requiring the Department to conduct a safety impact study based upon historical accident statistics as a part of the decisional process. The decision to divert traffic is one that is properly based upon economic, competitive, technological, and social factors, and not upon the past accident rate of a particular mode. If the public interest requires such a diversion then it becomes the responsibility of the government to take such action as is required to transport the increased traffic in the safest possible manner.

Francis H. McAdams
Member

Attachment A

Pending Transportation Legislation
April 1972
(Selected Bills)

S. 1729 Fast Freight Systems Act of 1971

S. 1730 National Freight Car Corporation Act of 1971

S. 1731 Railroad Equipment Obligation Insurance Act of 1971

S. 2362 Surface Transportation Act of 1971

S. 2841 Transportation Assistance Act of 1971

S. 2842 Transportation Regulatory Modernization Act of 1971

INJURY LOSS RATES FOR SURFACE FREIGHT TRANSPORTATION

	1964	1965	1966	1967	1968	FIVE-YEAR TOTALS AND RATES	REFERENCES
Railroad							
Ton-Miles (in billions)	666.2	708.7	750.8	731.2	756.8	3,613.7	1
Total injured, all accidents	18,345	17,441	17,389	16,642	16,793		2
Less: Injured in accidents involving passenger trains only	3,500	2,838	2,850	2,447	2,641		3
Net: Injured in freight or maintenance service	14,845	14,603	14,539	14,195	14,152	72,343	4
Injuries per billion ton-miles	22.3	20.6	19.4	19.4	18.7	20.0	
Highway (Federally regulated carriers only)							
Ton-Miles (in billions)	126.4	140.3	143.1	139.9	155.4	705.1	1
All persons injured in truck accidents	19,297	18,737	16,923	18,606	18,894	92,157	5
Injuries per billion ton-miles	152.7	133.5	118.3	133.0	121.6	130.7	
Marine							
Total ton-miles (in billions)	542.5	545.3	565.0	570.1	581.0	2,803.9	6
Total injuries	1,540	1,502	1,468	1,627	1,797	7,934	7
Injuries per billion ton-miles	2.83	2.75	2.59	2.85	3.09	2.82	

References

1. Transport Economics, Bureau of Economics, Interstate Commerce Commission. Data sources:

Year	Issue
1963	Dec. 1965, p. 2
1964	Sept. 1967, p. 10
1965	Jan. 1968, p. 8
1966	Nov. - Dec. 1969, p. 12
1967	Nov. - Dec. 1969, p. 11

2. Accident Bulletin, Summary and Analysis of Accidents on Railroads in the United States, Federal Railroad Administration, Washington, D.C., Table 16, p. 5

3. Same source, Table 108, p. 20.

4. This figure is a conservative base for the calculation of a loss rate, for it includes those injured in non-train accidents and in an accident involving a passenger train and another type of train. This figure also includes injuries from highway grade-crossing accidents that involve a freight train or yard movement.

5. Accidents of Large Motor Carriers of Property, Bureau of Motor Carrier Safety, Washington, D. C., Table 1. Includes injuries from railroad/highway grade-crossing accidents which involve a Federally regulated motor truck.

6. Special Study, Fatality Rates for Surface Freight Transportation, 1963 to 1968, National Transportation Safety Board, August, 1971. Report No. NTSB-STS-71-4, p. 12

7. Proceedings of the Merchant Marine Council, U. S. Coast Guard, Washington, D. C., Fiscal Year Basis. Includes freight vessels, cargo barges, tankships, tank barges, and tugs. Includes both injury due to a vessel casualty and injury not involving a vessel casualty.

Attachment C

POTENTIAL SAFETY IMPACT OF DOT LEGISLATIVE PROGRAM, NOVEMBER 1971.

Projected 1980 Freight Traffic	Billion Ton - Miles	Fatalities per Year	Injuries per Year
Without Regulatory Changes			
Rail	967	2,417	19,340
Water	802	249	2,262
Motor	537	5,853	70,186
Total	2,306	8,519	91,784
With Regulatory Changes			
Rail	1,033	2,583	20,660
Water	802	249	2,262
Motor	471	5,134	61,560
Total	2,306	7,966	84,482
Difference		553	7,302

Sources:

Projected 1980 freight traffic is from Executive Briefing, Transportation Regulatory Modernization and Assistance Legislation, U. S. Dept. of Transportation, January 1972, p. 17.

Fatality rates are from NTSB Special Study, Fatality Rates for Surface Freight Transportation, 1963 to 1968. National Transportation Safety Board, Washington, D. C., Report No. NTSB-STS-71-4, p. 10.

Injury rates are from Attachment B above.

Attachment D

THE POTENTIAL SAFETY IMPACT OF RAILROAD INSTITUTIONAL CHANGES

	Change Inducing Traffic Diversion		
	Rate Deregulation	Improved RR Service	Totals
Percentage of intercity highway traffic diverted from highway to railroad by change	25%	40%	65%
Billion ton-miles diverted (per year)	92.2	147.5	239.7
Safety Impacts (per year)			
Reduced Highway fatalities	1005	1608	2613
Increased Railroad fatalities	230	369	599
Net saving to society (deaths postponed)	775	1239	2014
Reduced Highway injuries	12,050	19,281	31,331
Increased Railroad injuries	1,844	2,950	4,794
Net saving to society (injuries avoided)	10,206	16,331	26,537

Sources: Percentage of intercity highway traffic that could be diverted from highways to railroads by institutional changes is from Competition Between Rail and Truck in Intercity Freight Transportation, by Charles River Associates Incorporated, Cambridge, Mass., [illegible] 1969. p 49. (DOT Contract No. DOT-OS-A9-060.)

Total intercity truck ton-miles (both Federally regulated and unregulated) and fatality rates are from NTSB Special Study Fatality Rates for Surface Freight Transportation, 1963 to 1968, Report No. NTSB-STS-71-4, p 10

Injury rates are from Attachment B above.

THE RELATIVE SAFETY OF IRON ORE TRANSPORTATION: SLURRY PIPELINE, MARINE, OR ALL-RAIL

The Bureau of Mines, U. S. Department of the Interior, recently published a research report on the feasibility and estimated cost of using a slurry pipeline to transport iron ore from the Mesabi Range in northern Minnesota to the South Chicago steel producing district. (Information Circular 8512). The assumptions for this study include a 515-mile pipeline with a throughput of 10 million long tons of taconite concentrate fines per year. This is equivalent to 5.8 billion ton-miles per annum. Extending this production figure by the transportation loss rates developed in the NTSB Special Study, Fatality Rates for Surface Freight Transportation, 1963 to 1968, and Attachement B above yields the following estimates for the relative safety of the various modes of transportation:

Method of Transportation	Accident Fatalities Per Year	Accident Injuries Per Year
Pipeline	.06	Not available
Marine	1.80	16.4
Rail	14.50	116.0

There are some assumptions and caveats implicit in these extensions:

1. For the marine movement, the higher loss rate for the rail movement from mine to loading dock is ignored.

2. The loss rate for liquid petroleum pipelines has been used for slurry pipelines that would be operating with nonvolatile water as the movement media.