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DEPARTMENT OF TRANSPORTATION

BEFORE THE SENATE COMMITTEE ON PUBLIC WORKS

SUBCOMMITTEE ON TRANSPORTATION

ON

SAFETY ASPECTS OF TRACTOR-TRAILER HIGHWAY OPERATIONS

March 26, 1974

Mr. Chairman and members of the Subcommittee:

I am Lester P. Lamm, Executive Director of the Federal Highway Administration. With me today are Mr. Charles F. Scheffey, Director of our Office of Research, Dr. Robert A. Kaye and Mr. Kenneth L. Pierson, Director and Deputy Director, respectively, of the Bureau of Motor Carrier Safety. We appreciate this opportunity to appear before you to discuss the safety aspects of medium and heavy commercial vehicles on our Nation's highways.

We have authority under Part II of the Interstate Commerce Act, to regulate the qualifications and hours of service of employees and safety of operation of motor carriers in interstate commerce. This includes for-hire carriers of persons and property, and private carriers of property. The Federal Motor Carrier Safety Regulations made under this statute are of long standing, and furnish a considerable body of background regulation of heavy trucks.

We will cover the safety factors affecting truck operations, both under existing law, and under the proposal for increased weights that the Department of Transportation recently sent to Congress. Where there is little or no difference in safety consequences due to weight increase, we will specifically note that fact.

The safety performance of any motor vehicle, including heavy commercial vehicles, is determined by a number of complex and interrelated factors. None can be viewed separately, and all must be considered together in order to arrive at a reasonable evaluation or prediction of safety performance.

Braking capacity, for example, cannot be taken as an isolated element of safety performance. It relates not only to one-time, straight-line stopping, but is directly enmeshed with vehicle stability, handling, and cargo retention factors.

According to the accident reports filed by intercity carriers with the Federal Highway Administration's Bureau of Motor Carrier Safety, the leading cause of commercial vehicle accidents attributed to mechanical failures involves the brake system. This problem is in our view unrelated to weight. Rather, it is closely related to maintenance. This fact underscores the need for continued surveillance of motor carrier maintenance programs.

The National Highway Traffic Safety Administration has issued Motor Vehicle Safety Standard No. 121, which specifies maximum straight-line stopping distances for various classes of new vehicles to go into effect January 1, 1975. With regard to existing commercial vehicles in use in interstate commerce, the Bureau of Motor Carrier Safety administers regulations, 49 CFR Part 393, subpart C, which are specific about brake capability and the component parts which must be in place and operating on a day-to-day basis. The Bureau's regulations are not bench tests for new vehicles, but requirements that must be met continuously throughout the life of the commercial vehicle. Since 1969, the Bureau of Motor Carrier Safety has conducted additional rulemaking with respect to improved brake capability for truck and buses subject to our jurisdiction.

We anticipate the proposed increased weights should increase stopping distance, brake component wear, and potential for brake fade, all other factors being equal. Stopping distances ordinarily increase in a non-linear manner with increasing vehicle weight, in the absence of wheel lock or stability problems. On those trucks where such problems have been the limiting factor in braking effectiveness, similar problems can be expected at higher weights. In either case, we believe that any anticipated increases in stopping distance are offset

by the decreases in stopping distance which necessarily result from the nationwide 55 m.p.h. speed limit.

Tires present another problem in the area of safety, and one which is sensitive to road condition, speed and load. A tire can carry only so much weight safely at a given inflation pressure, up to its rated maximum. It can carry these weights safely only when properly maintained and inspected for damage.

The National Highway Traffic Safety Administration is involved in rulemaking in the area of tire quality. The Bureau of Motor Carrier Safety has rules governing tire condition, tread depths, and the placement on the vehicle of regrooved tires. Rulemaking concerning maximum loads and minimum inflation pressures on commercial vehicles in interstate use is under consideration.

Generally speaking, tires properly designed and manufactured for existing maximum loads will be within their reserve carrying capacity when bearing the slight additional loads envisioned by the Department's proposal.

The increases contemplated, 2,000 pounds for both single and tandem axles, have no real applicability to steering axles using single wheels. They relate instead to dual-wheel load-carrying axles. On a single axle, the 2,000 pound increase is divided among four tires, resulting in increases of 500 pounds per tire. On tandem axles, the same 2,000 pounds is divided

among eight tires, resulting in increases of 250 pounds per tire. Of course, increases approaching maximum rated load reduce the tire's tractive and load carrying reserve capacity. If the axle load limits are fully utilized, either better tires of the same size, or larger tires, may be needed to maintain the reserves for adverse conditions. The incremental increased weights as proposed are based on adherence to 55 m.p.h. maximum now in effect.

Horsepower-to-weight ratios of trucks are obviously altered when vehicle weight is increased without commensurate increases of engine power. However, in the present circumstances, a very sizeable segment of the Nation's truck fleet has been powered to maintain speeds in the area of 70 m.p.h. on the Interstate System. This power is now in excess of that presently needed to maintain a 55 m.p.h. cruise. Given this power reserve, or some gearing changes, these vehicles can safely tolerate the proposed incremental load increases without deterioration of performance. Enactment of a horsepower-to-weight ratio rule had been considered by the Bureau, but rejected because it is unenforceable in the field.

Studies indicate that even the best performing truck engine available hauling 73,000 lbs. could sustain a speed of only 35 m.p.h. on a long 3 percent grade. Increasing the weight by 10 percent would reduce the sustainable speed to

28 m.p.h. Passenger cars can sustain normal speeds of 50 to 55 m.p.h. on such grades. Any speed difference in excess of 10 m.p.h. is already in the critical area for accidents.

The safety effect will depend upon what highway is involved. If it is an older two-lane road, the heavier and slower truck can build a greater upgrade backlog of traffic. On the level, the heavier truck needs more room to build passing speed. On the Interstate System, to which the draft bill applies, the reduction in climbing and acceleration ability due to greater weight would make little or no difference.

Existing coupling systems for articulated vehicles have come under some criticism by various spokesmen who believe that an anti-jackknife standard should be imposed to require the use of various devices upon the market. On the surface, this idea is attractive. The problem is that it proffers only symptomatic treatment, and does not go to the root causes of jackknifing. These causes lie in imbalance in the braking systems, such as where one set of wheels locks before another, and in improper driving habits by drivers. Given the existence of these causes, an anti-jackknife device can force a spin-out in an aligned, rather than jackknifed, configuration. It will not prevent the spin, and in certain cases, might trigger loss of control earlier than otherwise. In any event, the problem is one which is relatively insensitive to the weight of

vehicle and load. We believe MVS-121, the so-called "anti-skid rule" of NHTSA, will do more to decrease jackknifing than "anti-jackknifing" devices now on the market.

A somewhat related matter is that of vehicle stability. Basically, this is a question of center of gravity height. There are a number of specialized semitrailers, such as tanks, which may have their centers of gravity raised substantially by increases in loaded weight. We do not anticipate any increase in center of gravity height in the great majority of semitrailers, which are the vans and flatbeds. We do anticipate that the nationally lowered speed limits will reduce still further the already minor cornering forces involved in Interstate System travel. This should offset completely any added overturn tendency resulting from increase in center of gravity height.

The proposed legislation would allow combination vehicle lengths up to 70 feet overall. This means that the twin 27-foot trailers, called "Western doubles", could be used nationwide on the Interstate System. Our review of the safety experience in those States which now permit these rigs show that they are as safe, if not marginally safer, than the conventional tractor-semitrailer.

This data is derived from the accident records of six of the largest motor carriers in the country, operating "Western doubles" in various States west of the Mississippi. It

confirms our view that the quality of a motor carrier's operation, rather than the weight or configuration of its vehicles, is a more significant determinant of its safety record.

With regard to the phenomenon of offtracking, which is the critical factor in determining if a vehicle can use a given Interstate System ramp, the twin-27 rig can actually turn a slightly tighter circle than a 55 foot tractor-semitrailer of the type now in common use.

What can be said of the twin-27 trailers in this regard cannot be said of twin-40 trailers. They cannot negotiate a great number of Interstate ramps without leaving the pavement or taking out guard rails. The alternatives are to break them into single units on the Interstate System highway itself, or to construct many new marshalling areas along the System at strategic points. The first alternative, from the safety standpoint, is unacceptable and the second, marshalling yards, would be expensive and could not be constructed in any reasonable time to give relief for the present energy crisis.

Splash and spray, and other aerodynamic effects of large commercial vehicles, have been mentioned as annoyances, and perhaps safety problems, to some private motorists.

Such effects are highly sensitive to speed variations, and to the shape and configurations of the vehicles involved. They are almost totally insensitive to the weights of the vehicles, either as an absolute or a relative matter.

Certainly, if the trucking industry takes full advantage of the higher weights and longer lengths under our proposal, there will be some changes in configuration. These in turn may change the aerodynamic patterns.

For example, it appears that the common tractor-semitrailer generates two bow waves in the air, one each from the nose of the tractor and trailer, and three splash or spray fronts, one from each set of wheels. However, a twin-27 rig will have three bow waves and four splash fronts. No amount of added weight will change this. The national speed reduction to 55 m.p.h. has materially reduced the aerodynamic and splash effects from all vehicles.

The traffic mix situation between cars and trucks should be alleviated by our proposal. Fewer truck trips would be required to carry the same amount of cargo, while car trips would remain controlled by existing factors such as availability of fuel. We have no evidence that the growing percentage of smaller and more agile cars in the vehicle population will have any greater difficulty avoiding conflict with trucks than would very large cars. Likewise,

it appears in almost all cases to make no difference whatsoever whether a car collides with a 70,000 pound or 90,000 truck. A car of any size invariably is at a disadvantage in a conflict with a tractor-trailer rig of any size, since at all highway speeds the "G" forces at work result in a potential fatality situation.

In certain car-truck conflict situations, rear-end underride protection is of significant help to the car occupants. The Bureau of Motor Carrier Safety has had such a requirement in its regulations to be observed by carriers in interstate commerce for over 20 years. Likewise, the Bureau has enforced to the best of its ability equally long standing and highly detailed rules governing maintenance of intercity trucks and buses (including brakes and underride protection), and qualifications of interstate commercial drivers. In the area of driver qualification particularly, we have made great progress in upgrading the requirements that drivers must meet to be employed as interstate drivers.

While these Federal regulations apply only to motor carriers in interstate commerce, whether on or off the Interstate System, 31 States have adopted them in whole or in part for use on all their highways. This continuing and expanding State-Federal regulatory effort is evidenced in all fifty States by formal cooperative enforcement

agreements. Some 80 State agencies have entered into arrangements to cooperate with our field staff on accident notifications, casework, and information exchanges.

We do not foresee great difficulties from the use of slightly longer or heavier vehicles on most older highways off the Interstate System. In the most extreme practical case of length, where 55 feet was the previous limit, the length of the vehicle to be passed is increased by 15 feet, or about one car length. This will increase slightly the passing time exposure, and the distance travelled in the passing lane. As noted previously, greater weight affects a truck's acceleration, and consequently its performance in passing. Drivers of heavier trucks on off-System roads, where there is generally less room for evasive maneuvering instead of braking, would need to allow greater vehicle spacing.

To the extent that States were to permit greater off-System lengths and weights, not required by the draft bill, all drivers would need to make compensations in technique. In this regard, it must be emphasized that off-System highway use regulation remains a State prerogative. The States which find a safety problem with weight, length, or any other dimension have plenary power to restrict or prohibit any or all off-System use they see fit. In the past, they have not hesitated to use this authority.

In summary, we believe that the incremental increase in length and weight proposed by the Department does not constitute a measurable degradation in safety of operations of commercial vehicles.

It appears that these changes, if accompanied by compensation in technique by the affected drivers, vigorous State and local enforcement, and close monitoring of their nationwide effects by the Bureau of Motor Carrier Safety in cooperation with the States, need not portend an increase in hazards to the driving public.

We also believe that most, if not all, of the safety concerns previously expressed about such economically desirable increases are being met and overcome by the effects of the reduced national speed limit.

Mr. Chairman, we would be pleased to answer any questions you and the Committee may have.