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Before the
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

June 21, 1999
WASHINGTON, DC

Comments of
AMERICAN TRUCKING ASSOCIATIONS, INC.
On
TRUCK SPLASH AND SPRAY
REDUCTION FOR A REPORT TO CONGRESS

NHTSA Docket No. 99-5 101; Notice 01
Fed. Reg. [Vol. 64, No. 88/May 7, 1999, Pgs. 24709-24711]

ATA
AMERICAN
TRUCKING
ASSOCIATIONS

FOREWORD

The American Trucking Associations (ATA), with offices located at 2200 Mill Road, Alexandria, Virginia 22314-4677, is the national trade association for the trucking industry. ATA represents every type and class of motor carrier in the country through its:

- Affiliated trucking associations and their more than 30,000 motor carrier members, located in every state,
- Fourteen affiliated conferences, and
- Other national trucking organizations.

ATA's highest priority is highway safety. Our support for and development of safety initiatives over the years reflects this commitment.

The ATA Engineering Department is responsible for reviewing trucking equipment related legislative and regulatory actions proposed by any jurisdiction within the United States and promoting technical policies consistent with the trucking industry's safety priorities. The Department solicits industry views and develops and submits comments reflecting trucking industry policy.

These comments mirror the broad consensus of the thousands of trucking professionals employed by our motor carrier members. The ATA Technical Advisory Group (TAG) – which consists of 30 truck equipment experts – fully supports the comments below and played a central role in formulating them. TAG is a subgroup of ATA's Safety and Engineering Committee, which sets ATA policy on equipment matters.

ATA files these comments in response to the Notice for Docket No. NHTSA-99-5101; Notice 1, in Federal Register Volume 64, No.88, pages 24709-24711 May 7, 1999, Department of Transportation, National Highway Traffic Safety Administration (NHTSA) requesting comments on Truck Splash and Spray Reduction for a Report to Congress.

Issue Manager:

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ATA
AMERICAN TRUCKING ASSOCIATIONS

INTRODUCTION

NHTSA seeks answers to nine questions in this call for comments. Most of these queries seek specific information from manufacturers. ATA addresses those three questions for which we have particular knowledge. We also offer a few recommendations regarding the issue of splash/spray and its mitigation.

DISCUSSION

A. Backaround & References

At the instigation of Congress there has been much research on the subject of reducing vehicle-generated splash and spray. Two laws dealing with this issue are "The Surface Transportation Assistance Act of 1982" and the "Highway Safety Act of 1987." The 1987 Act provided that:

> "DOT must establish final minimum standards for splash and spray suppression devices not later then April 2, 1988, unless DOT has determined that there is no available technology that can significantly reduce splash and spray from truck tractors, semitrailers, and trailers and can significantly improve visibility of drivers. Any determinations of significant reductions in splash and spray and significant visibility improvements must be based on testing on highways, at test facilities, and in laboratories to take into account possible wind and rain conditions."

The work done as a result of this requirement is the foundation of knowledge about splash and spray generation. We have used two studies tracing back to the basic research done by DOT in preparing these comments.

The first of these, or **reference 1**, is:

> Koppa, et.al., Heavy Truck Splash and Spray Testing Phase I I , Final report to the Motor Vehicle Manufacturers of the United States, Aug. 1985.

This work was an expansion of DOT's efforts and it looked at how vehicles and certain generic devices actually behaved on the highway.

The second report, or **reference 2**, is a relatively recent paper presented to the Society of Automotive Engineers. It is:

> Hans Goetz and Ronald Schoch, "Reducing Splash and Spray of Trucks and Passenger Cars", SAE Paper 950631, Feb. 1995.

This paper reviews European experience with attempts at mitigation including tests of devices mandated by EEC directive 91-226.

It is worthy of note that through all of the DOT related rulemaking and research that has gone on over roughly the past 20 years two basic findings have always held true:

- While some devices do reduce the density of the spray cloud, one can still not see through it, making the reductions futile.
- Crosswinds blow splash and spray across the edge of instead of into all devices thereby negating their effectiveness.

B. Response To Question 1

1. Please provide information and data on any technological improvements made since 1993 in the design and/or testing of splash and spray devices for use on heavy trucks.

Since NHTSA's 1993 Report to Congress on Splash and Spray one thing has changed and led to improvements -- there have been significant advancements in streamlining made to vehicles above 8,500 lbs. GVWR. These **enhancements improve general visibility for driving during inclement weather because they reduce the aerodynamic disturbances that turn the water falling from vehicles into spray clouds.**

C. Response To Question 4

4. Please provide information on any aftermarket devices introduced since 1993 that are intended to reduce the amount of splash and spray generated by heavy-duty vehicles.

Devices that can be characterized as "variations on a theme" keep appearing in the marketplace. However, there are no revolutionary or "out of the box" techniques or equipment among them. Most of the devices are simply different ways to channel spray toward the center of the vehicle.

Except for treatments such as "whiskers" (brush like devices mounted in an eyebrow fashion over the wheel well or fender cutout) none of the techniques or devices addresses the front tires. In a 1985 report (reference 1.), the Texas Transportation Institute commented that the leading surface of a heavy truck's front tires produces a considerable amount of splash which turns to spray as turbulence (from the vehicle's slipstream) hits it. This initial splash was not controlled by any treatments evaluated by TTI and will not be addressed by any of the new concepts we have seen.

In order to receive the water thrown down and back as a vehicle moves forward devices are designed to intercept material coming perpendicular to them. Decades of research have indicated that no strategies work in crosswinds. Such winds blow with variable angularity. They cause the water to go sideways past and across the edge of all devices, negating their effectiveness,

Vision through spray clouds is enhanced as the truck's streamlining improves because aerodynamic vehicles have less turbulent airflow about them. The reduction in turbulence retards the generation of spray, however, it does not make the water disappear.

The volume of water picked up from the road surface by the tires largely determines the amount of splash and spray. There are currently no devices that can manage this, so the major problem remains unaddressed. Until such a device is fashioned -- if it can be created at all -- the foremost source of the water turned into spray by airflow, road splash, will not be controlled enough to improve visibility.

D. Response To Question 8

8. Please provide any information along with supporting data on bow effective EEC Directive 91-226 has been at reducing splash and spray....

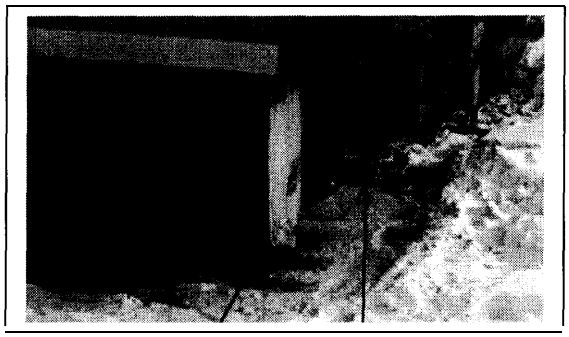
Our information on the effectiveness of EEC Directive 91-226 comes from reference 2. It states:

> "The EEC mudguards were significantly worse than the present standard state.. . . The measurement revealed a deterioration by 7-10% at 60km/h and 33-42% at 80km/h. Practical trials did not demonstrate any, and measurements scarcely any, reduction in spray mist resulting from the so called "absorber mats" as splash flaps of the same shape and size with a smoother inner surface produced practically identical results as obtained with absorber mats."
>
> It also states: "Wheel covers meeting the minimum requirements of the EEC directive have a poorer effect than the current production state. Absorber mats hardly have any water spray reducing effect in practical application."

Note that these tests were at low speeds (approximately 36 and 48 mph). As is well known, the spray phenomenon is speed dependent. Again, per reference 2, spray is more than doubled when speed increases from 60 to 80 km/h. Therefore one could expect the results reported above would be no better, and perhaps worse, in tests performed at higher speeds.

The channeled mudguards discussed in reference 2 and absorption mat technology both share a significant shortcoming. Any moisture the mud/splash guard retains freezes in cold weather. A buildup of ice, as shown in the attached figure, is generated. This is a photograph of ice buildup on a textured flap. The

ice actually has a groove cut in it because it contacts the tire. In a similar fashion figure 15 of reference 2 shows mud buildup, which also turns solid in freezing weather. Fleets that experimented with textured flaps in cold climates found that the ice buildup was heavy enough to tear the flap off the vehicle, creating road debris.



Porous pavements sustain less surface water; thus reducing the volume picked up by tire. Simply slowing down to around 45 mph reduces the amount of splash and spray because tires pick up less water and less turbulent airflow is generated.

CONCLUSION AND RECOMMENDATIONS

Little has changed since the NHTSA's 1993 report to Congress on splash and spray. There is still one basic truth of physics that mitigates all attempts to eliminate this problem. Matter can neither be created nor destroyed but merely changed in form. Therefore, rainwater can not be eliminated and a motor vehicle (truck or car) will transform a puddle it strikes or water washing down its sides into splash and then spray. Continued aerodynamic refinement, slowing down in wet weather and reducing the amount of standing water on the highway will diminish spray generation.

The paper cited in reference 2. suggests a mudguard for both trucks and passenger cars. This suggestion acknowledges that passenger cars, and by implication sport utility vehicles, share in the generation of splash/spray. Since these motor vehicles constitute the majority of highway vehicles and they do generate much splash/spray, they ought to share in the mitigation effort. Neglecting them ignores an important part of the challenge of improving visibility for driving during implement weather.