

standards. 62 FR 38701. Given that the revision of the PM-10 NAAQS, by itself, constitutes a relaxation, the proposed Fort Hall PM-10 nonattainment area will be subject to the provisions of section 172(e) of the Act. Section 172(e) applies to prevent backsliding in those areas that have not attained the pre-existing PM-10 standard as of the date the PM-10 NAAQS revision became effective. As a result, the pre-existing PM-10 standards will continue to apply in the proposed Fort Hall PM-10 nonattainment area until EPA has completed the rulemaking required under section 172(e). See 62 FR 38701. The rule promulgated under section 172(e) must require controls in the proposed Fort Hall PM-10 nonattainment area that are "not less stringent than the controls applicable to areas designated nonattainment before the relaxation of the 24-hour PM-10 standard."

### III. Administrative Requirements

#### A. Executive Order (E.O.) 12866

Under E.O. 12866 (58 FR 51735 (October 4, 1993)), EPA is required to determine whether regulatory actions are significant and therefore should be subject to Office of Management and Budget (OMB) review, economic analysis, and the requirements of the Executive Order. The Executive Order defines a "significant regulatory action" as one that is likely to result in a rule that may meet at least one of the four criteria identified in section 3(f), including, under paragraph (1), that the rule may "have an annual effect on the economy of \$100 million or more or adversely affect, in a material way, the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities." The Agency has determined that the finding of failure to attain proposed today would result in none of the effects identified in section 3(f). Under section 188(b)(2) of the CAA, findings of failure to attain are based upon air quality considerations and the resulting reclassifications must occur by operation of law in light of certain air quality conditions. They do not, in and of themselves, impose any new requirements on any sectors of the economy. In addition, because the statutory requirements are clearly defined with respect to the differently classified areas, and because those requirements are automatically triggered by classifications that, in turn, are triggered by air quality values, findings of failure to attain and reclassification cannot be said to impose a materially

adverse impact on State, local or tribal governments or communities.

#### B. Regulatory Flexibility

Under the Regulatory Flexibility Act, 5 U.S.C. 601 et seq., EPA must prepare a regulatory flexibility analysis assessing the impact of any proposed or final rule on small entities. 5 U.S.C. 603 and 604. Alternatively, EPA may certify that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and government entities with jurisdiction over populations of less than 50,000.

Findings of failure to attain and reclassification of nonattainment areas under section 188(b)(2) of the CAA do not in and of themselves create any new requirements. See *Mid-Tex Electric Cooperative, Inc. v. FERC*, 773 F.2d 327 (D.C. Cir. 1985) (agency's certification need only consider rule's impact on entities subject to the requirements of the rule). Instead, this rulemaking only proposes to make a factual determination, and does not propose to directly regulate any entities. Therefore, pursuant to 5 U.S.C. 605(b), I certify that today's proposed action does not have a significant impact on a substantial number of small entities within the meaning of those terms for RFA purposes.

#### C. Unfunded Mandates

Title II of the Unfunded Mandates Reform Act (UMRA), establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. Under the UMRA, EPA must assess whether various actions undertaken in association with proposed or final regulations include a Federal mandate that may result in estimated costs of \$100 million or more to the private sector, or to State, local or tribal governments in the aggregate. EPA believes, as discussed above, that the proposed finding of failure to attain and reclassification of the proposed Fort Hall PM-10 nonattainment area are factual determinations based upon air quality considerations and must occur by operation of law. Thus, the finding does not constitute a Federal mandate, as defined in section 101 of the UMRA, because it does not impose an enforceable duty on any entity.

#### D. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045 (62 FR 19885 (April 23, 1997)) applies to any rule that

EPA determines (1) "economically significant" as defined under Executive Order 12866, and (2) the environmental health or safety risk addressed by the rule has a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children; and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This proposed action is not subject to Executive Order 13045 because this is not an economically significant regulatory action as defined by Executive Order 12866.

### IV. Request for Public Comments

EPA is, by this document, proposing a finding that the proposed Fort Hall PM-10 nonattainment area failed to attain the PM-10 standard by December 31, 1996, the applicable attainment date. EPA solicits public comments on all aspects of this proposal. Public comments should be submitted to EPA at the address identified above by July 20, 1998.

#### List of Subjects in 40 CFR Part 81

Environmental protection, Air pollution control, Intergovernmental relations, Particulate matter.

**Authority:** 42 U.S.C. 7401 et seq.

Dated: June 10, 1998.

**Chuck Findley,**

*Acting Regional Administrator, Region 10.*

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## DEPARTMENT OF TRANSPORTATION

### Federal Highway Administration

#### 49 CFR Part 393

[FHWA Docket No. MC-94-1; FHWA-1997-2222]

RIN 2125-AD27

#### Parts and Accessories Necessary for Safe Operation; Lighting Devices, Reflectors, and Electrical Equipment

**AGENCY:** Federal Highway Administration (FHWA), DOT.

**ACTION:** Notice of proposed rulemaking (NPRM); request for comments.

**SUMMARY:** The FHWA is proposing to amend the Federal Motor Carrier Safety Regulations (FMCSRs) to require that motor carriers engaged in interstate commerce install retroreflective tape or reflex reflectors on the sides and rear of trailers that were manufactured prior to

December 1, 1993, have an overall width of 2,032 mm (80 inches) or more, and a gross vehicle weight rating (GVWR) of 4,536 kg (10,001 pounds) or more. The FHWA is proposing that motor carriers be required to install retroreflective tape or reflex reflectors within two years of the effective date of the final rule. Motor carriers would be allowed a certain amount of flexibility in terms of the colors or color combinations during a 10-year period beginning on the effective date of the final rule, but would be required to have all older trailers equipped with conspicuity treatments identical to those mandated for new trailers at the end of the 10-year period. The locations at which the retroreflective material would have to be applied to trailers during the phase-in period would be specified. This rulemaking is intended to help motorists detect trailers at night and under other conditions of reduced visibility, thereby reducing the incidence of passenger vehicles colliding with the sides or rear of trailers.

**DATES:** Comments must be received on or before September 17, 1998.

**ADDRESSES:** Submit written, signed comments to the docket identified at the beginning of this notice, the Docket Clerk, U.S. DOT Dockets, Room PL-401, 400 Seventh Street, SW., Washington, DC 20590-0001. All comments received will be available for examination at the above address from 10 a.m. to 5 p.m., et., Monday through Friday, except Federal holidays. Those desiring notification of receipt of comments must include a self-addressed, stamped envelope or postcard.

**FOR FURTHER INFORMATION CONTACT:** Mr. Larry W. Minor, Office of Motor Carrier Research and Standards, HCS-10, (202) 366-4009; or Mr. Charles E. Madalen, Office of the Chief Counsel, HCC-20, (202) 366-1354, Federal Highway Administration, 400 Seventh Street, SW., Washington, D.C. 20590. Office hours are from 7:45 a.m. to 4:15 p.m., et., Monday through Friday, except Federal holidays.

**SUPPLEMENTARY INFORMATION:**

**Electronic Access**

Internet users can access all comments received by the U.S. DOT Dockets, Room PL-401, by using the universal resource locator (URL): <http://dms.dot.gov>. It is available 24 hours each day, 365 days each year. Please follow the instructions online for more information and help.

An electronic copy of this document may be downloaded using a modem and suitable communications software from

the **Federal Register** Electronic Bulletin Board Service at (202) 512-1661. Internet users may reach the **Federal Register's** home page at <http://www.nara.gov/nara/fedreg> and the Government Printing Office's database at: [http://www.access.gpo.gov/su\\_docs](http://www.access.gpo.gov/su_docs).

**Background**

On December 10, 1992, the National Highway Traffic Safety Administration (NHTSA) amended Federal Motor Vehicle Safety Standard (FMVSS) No. 108 (49 CFR 571.108), to require that trailers with an overall width of 2,032 mm (80 inches) or more and a GVWR greater than 4,536 kg (10,000 pounds), except trailers manufactured exclusively for use as offices or dwellings, be equipped on the sides and rear with a means for increasing their conspicuity (57 FR 58406). Trailer manufacturers are given a choice of installing either red and white retroreflective sheeting or reflex reflectors arranged in a red and white pattern. Manufacturers of retroreflective sheeting or reflex reflectors intended for use in satisfying these requirements must certify compliance of their product with FMVSS No. 108, whether the material is used as original or replacement equipment. The effective date for the final rule was December 1, 1993.

**Summary of the NHTSA Rulemaking**

The NHTSA issued an advance notice of proposed rulemaking (ANPRM) on May 27, 1980, requesting comments on methods to reduce the incidence and severity of collisions between passenger cars and large trailers during conditions of darkness or reduced visibility (45 FR 35405). The use of retroreflective materials was considered a possible solution.

Between 1980 and 1985, the NHTSA conducted a fleet study in which retroreflective material was placed on van-type trailers in a manner designed to increase their conspicuity during conditions of darkness or reduced visibility. The treatment of the trailers consisted of outlining the rear perimeter, and delineating the lower sides with retroreflective tape. The authors of the study concluded that truck-trailer combinations equipped with retroreflective material were involved in 15 percent fewer accidents (in which a trailer was struck in the side or rear by a passenger car at nighttime) than combinations that were not equipped with the material. This research is documented in the following research reports: *Improved Commercial Vehicle Conspicuity and Signaling Systems, Task I—Accident Analysis and Functional Requirements*, March 1981

(DOT HS 806-100); *Improved Commercial Vehicle Conspicuity and Signaling Systems, Task II—Analyses, Experiments and Design Recommendations*, October 1981 (DOT HS 806-098); and, *Improved Commercial Vehicle Conspicuity and Signaling Systems, Task III—Field Test Evaluation of Vehicle Reflectorization Effectiveness*, September 1985 (DOT HS-806-923). A copy of each of the reports is in the docket.

On September 18, 1987, the NHTSA published a notice discussing the results from the fleet study and requesting comments on the research as well as information from motor carriers about their experiences using reflective material to enhance conspicuity (52 FR 35345).

In response to the NHTSA fleet study, Congress included in the Motor Carrier Safety Act of 1990 (Pub. L. 101-500, 104 Stat. 1218), a provision directing the Secretary of Transportation to initiate a rulemaking on the need to adopt methods for making commercial motor vehicles more visible to motorists. The rulemaking was required to begin no later than February 3, 1991, and to be completed no later than November 3, 1992.

Between March 1990 and September 1991 the NHTSA conducted additional research on trailer conspicuity. The purpose of the research program was to define a range of minimally acceptable large truck conspicuity enhancements that could be used as a basis for developing Federal regulations. A number of laboratory and field studies were carried out to assess the value of using a pattern of retroreflective sheeting, the form the pattern should take, the placement of the treatment on the trailer, the effect of retroreflective markings on the detection and identification of stop and turn signals, and the trade-off between the width and retroreflective intensity of the treatment material. In addition, field surveys were conducted to assess the effect of environmental dirt on the performance of the marking systems and the durability of retroreflective materials when used on commercial motor vehicles.

The final report for the research conducted between 1990 and 1991 (*Performance Requirements for Large Truck Conspicuity Enhancements*, March 1992, (DOT HS 807 815)) includes recommendations that the retroreflective tape be at least two inches in width, applied in a red and white pattern (continuous or broken strip) along the bottom of the trailer on the sides, with a continuous strip along the bottom of the rear of the trailer. The

authors also recommend white corner markers at the top of trailers. In addition, the report provides recommendations concerning minimum retroreflectivity levels, taking into account the effects of environmental dirt, aging, and orientation of the marked vehicle. A copy of the final report is in the docket.

On December 4, 1991, the NHTSA published a notice of proposed rulemaking (NPRM) based upon the research conducted between 1990 and 1991 (56 FR 63474). The NHTSA considered its NPRM, which was part of a rulemaking initiated before the enactment of the Motor Carrier Safety Act of 1990, to be responsive to the congressional mandate and its December 10, 1992, final rule as the completion of the rulemaking mandated by Congress.

### **Current FHWA Requirements for Trailer Conspicuity**

The FHWA is responsible for establishing standards for commercial motor vehicles operated in interstate commerce. Commercial motor vehicles subject to the FMCSRs must meet the requirements of 49 CFR parts 393 (Parts and Accessories Necessary for Safe Operation) and 396 (Inspection, Repair, and Maintenance). The requirements for lamps and reflective devices are contained in §§ 393.11 through 393.26.

Section 393.11 of the FMCSRs requires that all lighting devices on commercial motor vehicles placed in operation after March 7, 1989, meet the requirements of FMVSS No. 108 in effect at the time the vehicle was manufactured. Therefore, trailers manufactured on or after December 1, 1993, the effective date of the NHTSA requirement for retroreflective tape or reflex reflectors, must have retroreflective tape or reflex reflectors of the type and in the locations specified in FMVSS No. 108 in order to comply with the FHWA's requirements.

On April 14, 1997, the FHWA published a notice of proposed rulemaking in which the agency proposed general amendments to part 393 of the Federal Motor Carrier Safety Regulations (FMCSRs), Parts and Accessories Necessary for Safe Operation (62 FR 18170). The proposed amendments covered a wide range of topics, including conspicuity treatments on trailers manufactured on or after December 1, 1993. To make certain that all motor carriers operating trailers subject to the FMCSRs are aware of their responsibility to maintain the conspicuity treatment, the FHWA proposed the addition of detailed language under § 393.11. The FHWA

would cross-reference the specific paragraphs of FMVSS No. 108 related to the applicability of NHTSA's trailer conspicuity standards, the required locations for the conspicuity material, and the certification and marking requirements.

### **FHWA Rulemaking Concerning Retrofitting**

On January 19, 1994, the FHWA published an ANPRM requesting comments on issues related to the application of conspicuity treatments to trailers manufactured prior to the effective date of the NHTSA's final rule on trailer conspicuity (59 FR 2811). The agency requested that commenters respond, at a minimum, to several specific questions listed in the notice:

1. Many motor carriers have been using retroreflective sheeting or reflex reflectors which are not of the colors, retroreflective intensity, width, or configuration of the conspicuity treatment in the NHTSA's final rule. The FHWA seeks information on the type of conspicuity treatments in use and quantitative data on the cost and effectiveness of those treatments in preventing and/or mitigating accidents.

2. What types of technical problems (e.g., tape not adhering to the surface of the trailer) have motor carriers encountered when applying conspicuity materials to in-service trailers? Are any problems unique to certain types of trailers, or to certain types of paints, coatings, or surfaces?

3. What is the approximate cost (parts and labor) to apply conspicuity treatments to trailers? Is special training required for employees performing this task? What cost differences may exist between having this task performed by the motor carrier's own maintenance department or by third parties?

4. How long must a trailer be taken out of service to have the conspicuity material applied to its surfaces?

5. With regard to conspicuity treatments that differ from those in the NHTSA final rule, a retrofitting requirement would result in many motor carriers having to replace their current conspicuity treatments with one that is consistent with the requirements of FMVSS No. 108. The FHWA believes that some form of conspicuity treatment (even certain forms which may be less effective than that covered in the NHTSA's final rule) is better than no conspicuity treatment. What different types of conspicuity treatment are currently being used by motor carriers? What results have been experienced by motor carriers using conspicuity treatments?

6. If this rulemaking proceeds, should the FHWA propose requiring the same red/white color combination, retroreflective intensity, width and configuration as the NHTSA's final rule, or should alternative requirements be considered? If alternatives are considered, do commenters foresee problems in the enforcement of a retrofitting requirement?

7. If this rulemaking proceeds, should the FHWA consider an effective date which is several (2, 3, 4, or 5) years after the date of publication of the final rule?

In addition to responding to the preceding questions, the FHWA encouraged commenters to include a discussion of any other issues that the commenters believed were relevant to the rulemaking.

On August 6, 1996, the FHWA published a notice announcing that the agency had completed its review of the comments received in response to the ANPRM and that it would issue a notice of proposed rulemaking (61 FR 40781).

### **Discussion of Responses to the ANPRM**

The FHWA received 955 comments in response to the ANPRM. The strongest voice of support came from concerned private citizens—a total of 828 responses. The FHWA received 321 responses on behalf of Carl Hall, who was killed in a collision with a tractor-semi-trailer that blocked the road as the truck driver backed the vehicle into a driveway. Another 285 responses were on behalf of Guy Crawford, a 16-year old boy who was killed in an underride accident with a coal truck. In addition, the agency received 223 responses from other concerned citizens, many of whom lost family members or friends in accidents involving commercial motor vehicles.

The FHWA has the greatest sympathy for the losses suffered by these respondents. The goal of this rulemaking is to reduce the number of such accidents, but rules must be based on consideration of evidence and data submitted. Since these commenters did not include answers to the questions listed in the ANPRM or provide information concerning technical or economic aspects of retrofitting trailers with conspicuity treatments, the remainder of this preamble will focus on those issues. The agency, however, has not ignored the advice of those whose tragic personal experiences led them to support a conspicuity rule.

The specific concerns or issues raised by the commenters that discussed technical or economic issues are discussed in the following sections.

### General Discussion of Comments Opposed to the Rulemaking

The FHWA received 40 comments from motor carriers and industry groups that were either opposed to any type of retrofitting requirements, or supportive of the concept of voluntary use of conspicuity treatments but opposed to requiring the red-and-white color scheme specified by the NHTSA. The commenters were: Allied Van Lines, Inc.; the American Movers Conference (AMC); the American Trucking Associations (ATA); Beaver Express Service, Inc.; Becker Hi-Way Frate; Bestway Systems, Inc.; BTI; Churchill Truck Lines, Inc.; the Colorado/Wyoming Petroleum Marketers Association (CWPMA); Contract Freighters, Inc.; Crowley Maritime Corporation; Dart Transit Company; Fleetline, Inc.; Grote Industries, Inc.; the Institute of International Container Lessors; the Interstate Truckload Carriers Conference; John W. Ritter Trucking Inc.; Metalcore, Ltd.; the Missouri Motor Carriers Association; Mobil Oil Corporation (Mobil); the National Private Truck Council (NPTC); the National-American Wholesale Grocers' Association—International Foodservice Distributors Association (NAWGA/IFDA); the Pacific Merchant Shipping Association; the Petroleum Marketers Association of America (PMAA); Reliance Trailer Manufacturing (Reliance); the Rocky Mountain Oil and Gas Association (RMOGA); San Joaquin Sand and Gravel; Schneider National; the Steamship Operators Intermodal Committee (SOIC); Talley Transportation; United Van Lines, Inc.; United Parcel Service (UPS); USA Truck; Wal-Mart Stores, Inc.; Watkins Motor Lines, Inc.; Werner Enterprises; Western Distributing Transportation Corporation; the Wyoming Trucking Association, Inc.; XTRA Corporation (XTRA); and Yellow Freight System Inc.

Generally, the commenters opposed to the retrofitting rulemaking believe that it is important to improve highway safety. However, many of them do not believe that conspicuity treatments are a cost-effective solution to the problem of passenger cars colliding with trailers. In several cases, the commenters argued that there is not enough data to assess the effectiveness of the NHTSA's requirements for trailers manufactured on or after December 1, 1993. For motor carriers that installed conspicuity treatments on their trailers manufactured before December 1, 1993, the opposition to the retrofitting rulemaking is based upon the belief that the FHWA would require them to

remove retroreflective materials that do not conform to the NHTSA standard.

On the subject of data to support the FHWA's rulemaking, the NAWGA/IFDA stated:

Before [the FHWA] issues proposed rules in this docket, NAWGA/IFDA suggests that accident experience data for [the trailers covered by the NHTSA's conspicuity rule]—perhaps for calendar year 1994—be obtained by FHWA. Indeed, such data would be responsive to FHWA's first issue raised in its [ANPRM]—the existence of data on the effectiveness of various marking treatments in preventing and/or mitigating accidents. With this data in hand, FHWA would then be in a better position to proceed to an informed decision as to whether to extend the NHTSA requirements to pre-December, 1993 trailers.

United Parcel Service (UPS) also expressed concern that there is insufficient accident data to support a retrofitting requirement. The UPS stated:

A proposed FHWA rulemaking mandating the retroactive installation of reflective sheeting is at the very least premature, and perhaps entirely unwarranted.

The first assumption is that the current DOT regulations for vehicle visibility are inadequate and need to be improved. In fact, FHWA has presented no data to support such a contention. The rule also assumes knowledge of what constitutes adequate conspicuity. Again, no supporting data is offered.

UPS unsuccessfully opposed NHTSA's conspicuity rule, arguing at the time that the data was insufficient to warrant a rule. In our view, FHWA risks compounding NHTSA's mistake, but in an even more expensive and less sensible way. If FHWA is willing to delay its rulemaking long enough, NHTSA's present regulation (FMVSS No. 108) will provide enough reliable data to make a judgement on the safety impact of the reflective sheeting. It should be noted that in reviewing our own considerable highway safety data, UPS has found no evidence to support the creation of a new mandate that would immediately [affect] such a large number of vehicles.

In addition to the NAWGA/IFDA and UPS, the Interstate Truckload Carriers Conference (ITCC) commented that the benefits of conspicuity treatments have not been proven. The ITCC stated:

As a general observation, retroreflective sheeting or reflex reflectors for trailers manufactured prior to December 1, 1993, should be voluntary, not mandatory, although the Federal Highway Administration ("FHWA") may wish to develop and offer recommended guidelines to assist those carriers wishing to apply retroreflective treatments to their trailer equipment. In spite of the perceived safety benefits of having retroreflective sheeting applied to older trailers, not one of the carriers responding to the ITCC survey, which own and operate more than 34,000

trailers, are able to quantify any correlation between their use of retroreflective materials and a decrease in trailer accidents where conspicuity was a factor. Moreover, operational and cost considerations suggest that any requirement to improve trailer conspicuity would be burdensome. Should the FHWA proceed with this matter and institute a proposed rulemaking, it should propose to accept the conspicuity treatments applied to trailers prior to the effective date of any adopted rule, even though such treatments may not conform to the NHTSA rules prescribing conspicuity treatments for trailers manufactured after December 1, 1993, in type, color, size, placement or configuration, construction, brightness, or other aspect.

The ATA opposes a retrofitting requirement because it believes there is no cost-effective and reasonable method to apply reflective materials to all of the trailers manufactured before December 1, 1993. The ATA also indicated that a large number of trailers are already marked with materials of greater intensity, but different color schemes than those mandated by the NHTSA and that retrofitting to the NHTSA color scheme would cause an unjustified economic hardship on many carriers. The ATA stated:

FHWA did not evaluate this regulatory action because of a lack of necessary cost information. A federal mandate to retrofit reflective materials on trailers built before December 1, 1993, will have a significant cost impact. With 3.8 million trailers on America's highways, the total cost of a federal mandate will exceed \$1 billion. This figure includes costs for conspicuity materials, labor costs for preparing the trailers and applying the materials, and loss of use of trailer productivity while [the trailer is] being prepared/repared and retrofitted.

In addition the ATA indicated that The Maintenance Council of the ATA has published a recommended practice (*Large Vehicle Conspicuity Markings*, RP 722, Issued March 1993, Revised June 1994) concerning the application of reflective tape or materials to unmarked trailers, and that the Society of Automotive Engineers (SAE) was preparing a Surface Vehicle Information Report, *Large Vehicle Conspicuity Markings*, SAE J2117. The ATA believes that there are already market forces (e.g., potential litigation) pressuring motor carriers to retrofit their trailers with conspicuity materials and that a retrofitting rule is not necessary.

Another commenter expressing concerns about the economic impact of a retrofitting requirement was the American Movers Conference (AMC). The AMC stated:

It would be a serious mistake for FHWA to mandate specific conspicuity treatments for existing trailers. Such regulatory action is

impractical and would cause unjustified economic burdens for the moving industry. However, the trailers now in service in our industry are already marked with conspicuity materials that, although different in color and composition from that mandated for new trailers by NHTSA, are highly visible and effectively "conspicuous."

The FHWA does not agree with the NAWGA/IFDA and UPS' assertions that there is insufficient data to support a retrofitting requirement. The FHWA acknowledges that no studies or analyses of the impact of the NHTSA's final rule have been completed to date. However, previous research findings concerning trailer conspicuity strongly suggest that significant improvements in safety could be achieved by requiring all trailers to be equipped with retroreflective materials.

As indicated in the background section of this notice, between 1980 and 1985 the NHTSA conducted a fleet study in which retroreflective material was placed on van-type trailer combinations in a manner designed to increase their conspicuity during conditions of darkness or reduced visibility. The study concluded that truck-trailer combinations equipped with certain conspicuity materials were involved in 15 percent fewer accidents (in which the trailer was struck in the side or rear) than combinations lacking the material.

In addition to the research conducted in the 1980's, the NHTSA conducted a study between March 1990 and September 1991 to define a range of minimally acceptable trailer conspicuity enhancements that could be used as a basis for Federal regulations. The report covering the research performed between 1990 and 1991 is entitled *Performance Requirements for Large Truck Conspicuity Enhancements*, March 1992, (DOT HS 807 815). A copy of this report is included in the docket. The NHTSA's 1992 report states:

Previous research sponsored by NHTSA [a reference to the research documented in *Improved Commercial Vehicle Conspicuity and Signaling Systems*] indicated that the use of retroreflective tape markings systems enhanced the conspicuity of large trucks and, therefore, had the potential to reduce the number and seriousness of car-into-truck crashes. This earlier research specifically examined the effectiveness of enhanced conspicuity on the crash experience of approximately 2,000 van trailers over a period of 23 months and found a significant reduction in conspicuity relevant crashes for the treated vehicles as compared to control vehicles (untreated). The research report also included a discussion of the methodology for the study.

The authors summarized the research methodology as follows:

Both laboratory and field investigations were conducted to address the issues of interest. For example, two laboratory studies were carried out to establish reasonable upper limits for glare from retroreflective surfaces. Field measurements of glare from retroreflective panels positioned at various distances were then taken from different vehicles to relate the laboratory measurements to actual driving conditions.

Minimum reflectivity values were determined from field studies that related material reflectivity values to detection distance. Full scale presentations of various treatment configurations were employed on an actual trailer. The distance at which subjects could detect the trailer were measured on each trial. Final recommendations were based on values corrected for subject expectancy.

The recommendations for pattern and configuration of retroreflective enhancements were based on several field and laboratory studies. The first laboratory investigation involved a paired comparison of various combinations of red and white retroreflective materials viewed at two distances. Two field studies were also carried out in which subjects, who were instructed to look for "potential hazards," detected and identified various retroreflective treatments in a normal driving situation. Finally, using computer presentations of stimuli, two additional laboratory studies were conducted to evaluate the relative importance of different configurations of retroreflective treatments in estimating relative vehicle speed and changes in vehicle spacing.

The tradeoff between treatment width and reflectivity value was assessed in a field study in which subjects drove toward different retroreflective displays and indicated when they could detect them. Measures were taken of detection distance.

Finally, surveys of trucks in use were conducted to assess the effects of environmental dirt and grime as well as degradation due to aging. To measure the effects of dirt, 17 trailers were fitted with retroreflective patches on the sides and rears. The reflective values of these were measured at regular intervals for a period of one year. The effects of aging were assessed by measuring the reflectivity value of retroreflective material that had been in place on trailers for various periods of time. The oldest material measured had been in place for more than 20 years.

The FHWA considers the NHTSA's research results to be reliable indicators of the potential safety benefits of the use of retroreflective materials in preventing passenger cars from crashing into the sides or rear of trailers. None of the commenters identified flaws in the research methodology for the work performed between 1980 and 1985, or the work performed between 1990 and 1991. Furthermore, none of the commenters presented technical data that would call into question the conclusions and recommendations presented in the NHTSA research reports.

Although several motor carriers indicated that they have not experienced any benefits (in terms of preventing passenger cars from crashing into their trailers) from using retroreflective tape, the FHWA believes that negative conclusions are not valid unless based upon detailed information. The information that needs to be evaluated includes: the total number of trailers operated by the fleets in question; the types of trailers operated; the total number of trailers that have conspicuity treatments; daytime and nighttime exposure data (miles traveled with a distinction between urban and rural roads) for the trailers that were treated with conspicuity materials and the trailers that were not treated with conspicuity materials; reflectivity levels for the conspicuity materials used; and, color combinations and patterns for the conspicuity treatments. The before-and-after accident experience of each of the fleets should also be examined carefully. None of the commenters indicated that this type of information was collected and analyzed, or that such information would be made available for review by the FHWA. Therefore, the FHWA does not believe that the commenters have provided enough technical information to warrant terminating the rulemaking.

In response to the commenters who argue that the problem of passenger cars crashing into trailers is not severe enough to warrant a retrofitting requirement, the FHWA believes that the number of these collisions indicates that motorists have a major problem recognizing trailers at night and under other conditions of reduced visibility. The FHWA has reviewed recent accident data and determined that the number of accidents, fatalities and injuries are strong indicators of the need for continuing this rulemaking. The NHTSA's Fatality Analysis Reporting System (FARS) data for 1994 indicates that nighttime collisions in which the passenger vehicle struck the side of a trailer at an angle (as opposed to sideswiping the trailer) accounted for 119 incidents resulting in a total of 140 fatalities. There were 173 nighttime incidents involving a passenger vehicle rear-ending a trailer. The result was 198 fatalities.

The FARS data for 1995 indicates that nighttime collisions in which the passenger vehicle struck the side of a trailer at an angle accounted for 115 incidents resulting in a total of 136 fatalities. There were 200 nighttime incidents involving a passenger vehicle rear-ending a trailer. The result was 224 fatalities. When consideration is given to the NHTSA's estimate (based upon

the research cited earlier in this notice) of the effectiveness of trailer conspicuity treatments at preventing certain types of accidents, and the NHTSA data on the number of accidents, fatalities, injuries, and property damage associated with these accidents, it is reasonable to conclude that significant safety benefits could be achieved if a retrofitting requirement was established.

With regard to the ATA's reference to The Maintenance Council's (TMC) recommended practice, *Large Vehicle Conspicuity Markings*, RP 722, the FHWA does not believe the TMC publication has any relevance to this rulemaking since motor carriers are not required to comply with the recommended practice. This is especially the case given that many trailers have not been retrofitted with any form of conspicuity treatment. The FHWA's observations of trailers currently in use suggest that a large number of motor carriers are either unaware of the ATA's recommended practice, or have chosen to ignore the recommendation. The large number of untreated trailers also suggests that the market forces that the ATA alluded to have not been effective in prompting carriers to voluntarily retrofit their vehicles. Therefore, the FHWA believes that it is necessary to continue this rulemaking and to request public comments on the specific regulatory language that is being proposed in this notice.

The FHWA contacted the SAE to inquire about the status of its efforts to publish a surface vehicle information report concerning conspicuity markings. The SAE advised the FHWA that the project was discontinued.

On the subject of the potential economic impact that this rulemaking would have on the motor carrier industry, the FHWA has prepared a preliminary regulatory evaluation (PRE) to accompany this rulemaking notice. A copy of the PRE is included in the docket. The FHWA estimates that the total cost of this rulemaking would be \$339 million. This estimate is based upon the assumption that approximately 1,373,000 trailers would be covered by the rule (if a 2-year phase-in period chosen). The FHWA estimates that the benefits of the rulemaking would be approximately \$741 million. A detailed discussion of how the FHWA prepared its estimates is provided later in this notice for commenters that are not able to review the PRE.

In response to commenters concerned about whether their fleets would be required to replace conspicuity treatments that are of a different pattern or color scheme than the NHTSA

requirements, it is not the intention of the FHWA that motor carriers remove conspicuity treatments applied to trailers prior to the issuance of this proposal solely because they employ different color schemes than that required by the NHTSA. To accommodate this concern, the FHWA is proposing to allow carriers flexibility in terms of the colors used to satisfy the requirements for a period of 10 years from the effective date of the final rule. This time period was chosen because trailers that were voluntarily equipped with conspicuity treatments will have exceeded their useful service lives and be retired from service. It is, therefore, reasonable to require that at the end of the 10-year period, all motor carriers to use conspicuity treatments that conform to the NHTSA standard (i.e., the use of a red-and-white pattern, and retroreflective sheeting that is certified as meeting the minimum reflectivity levels specified in the NHTSA rule). Although the FHWA would allow the use of alternative colors during a 10-year period, the agency would adopt regulatory language that encourages motor carriers to retrofit their trailers with a conspicuity system that meets all of the requirements applicable to trailers manufactured on or after December 1, 1993, including the use of retroreflective sheeting or reflex reflectors in a red and white pattern. Motor carriers which do not retrofit their trailers to the NHTSA standard (for example by using an alternative color pattern) during the 10-year period, would be required to comply with FHWA's rules concerning the locations and colors. The FHWA would require that the locations at which the conspicuity treatments are installed be consistent with the NHTSA standards under FMVSS No. 108. This preliminary decision is supported by information contained in *Improved Commercial Vehicle Conspicuity and Signaling Systems, Task II, Analyses, Experiments and Design Recommendations*.

The research included studies to determine the relative conspicuity of certain patterns of retroreflective material in a field setting under nighttime and daytime viewing conditions. The color combinations included red and white, blue and white, green and white, and fluorescent red-orange and white. Pairs of conspicuity patterns were installed side-by-side on a truck and viewed at two distances. Subjects were asked to judge which of each pair was the most attention demanding, appeared closer, and showed the most detail. All possible pairs of the 12 test patterns were

presented to the subjects. The research showed that the high-reflectivity red and white pattern (using a 3 to 2 ratio of red to white) was the only configuration that received high rankings during both daytime and nighttime conditions. The next best patterns, in terms of the test subjects' reactions, were high-reflectivity blue and white, and green and white (using 3 to 2 ratio of the darker color to the white).

It is very important to note that the researchers acknowledged that an "emphasis was placed on deriving an improved and practical pattern, rather than some optimum pattern." While the findings indicate the red and white pattern was the most effective in terms of hazard recognition, it does not imply that other color schemes or patterns had no value or effect. Therefore, allowing alternative colors for a 10-year period will minimize the economic impact of this rule on motor carriers that have voluntarily retrofitted their trailers with alternate color schemes, while ensuring to the greatest extent practicable, safety benefits during the transition period.

The FHWA fully supports the NHTSA's selection of a standardized red and white pattern for use by trailer manufacturers. However, it is obvious that similar treatments in other colors already applied by safety conscious motor carriers also improve conspicuity and provide potential safety benefits. The FHWA believes it would be inappropriate to immediately prohibit the use of other colors of conspicuity material on trailers manufactured prior to December 1, 1993, because it would have the effect of requiring motor carriers to remove reasonable conspicuity treatments of other colors from older trailers. Such a regulation would penalize motor carriers who had taken steps to retrofit their vehicles prior to the establishment of Federal standards.

The principal reason for NHTSA's requirement of a red and white pattern was to make the reflective image on the side of a trailer recognizable to motorists. Since the side conspicuity treatment consists of a single line of material, a distinct color pattern, less ambiguous than solid white or yellow, was established so that motorists would learn to associate it with trailers. A red and white pattern was chosen for standardization because it was already commonly associated with danger. This color combination is widely recognized and associated with highway hazard warning signs such as stop signs and railroad grade crossing gates. NHTSA also considered outlining the sides of trailers with reflective material to make

them recognizable, but rejected that approach because it was more costly and impractical for trailer configurations other than van-type trailers.

The FHWA does not believe that this proposal will inhibit NHTSA's goal of having the public learn to associate a long red and white line of retroreflective sheeting (or reflex reflectors) with the side of a trailer. On the contrary, the agency expects the majority of conspicuity retrofits to be red and white despite an equitable policy toward existing treatments of other colors during a 10-year transition period. The NHTSA has received numerous inquiries from fleets about voluntary retrofitting since 1993 and none of those fleets expressed an interest in color combinations other than red and white. At the end of the 10-year period, all trailers, irrespective of the date of manufacture, would be required to be equipped with red-and-white retroreflective material which meets the NHTSA's requirements, including certification marking. During the transition period the FHWA's regulations will continue to require red and white treatments be maintained on trailers manufactured on or after December 1, 1993. Therefore there is no financial or aesthetic incentive for motor carriers to retrofit their older trailers in ways that avoid a common fleet appearance with their newest equipment and with future acquisitions.

In addition to the reasons cited in the preceding paragraphs, the FHWA has opted to allow flexibility for trailers that have not been retrofitted with any type of conspicuity treatment because it would be difficult, if not impossible, to enforce a requirement for the use of red and white material. The agency would have to distinguish between older trailers covered by the proposed "grandfathering" clause, and older trailers that were retrofitted on or after the effective date of the final rule. The FHWA is not aware of a practical and effective means of obtaining proof of the date that the reflective material is actually installed on the trailers.

The FHWA requests comments on its preliminary decision to allow, during a 10-year transition period, motor carriers flexibility in the colors or color combinations of retroreflective materials that would be used to satisfy the proposed requirements.

#### *General Discussion of Comments in Support of the Rulemaking*

As mentioned previously in this notice, the FHWA received 828 comments from concerned citizens (including individual truck drivers) in

support of the rulemaking. In addition to the concerned private citizens the FHWA received 87 comments from companies, organizations, law firms (most of which represented individuals who were killed or injured in accidents involving a commercial motor vehicle), State governments, and municipal governments (including fire and police departments). Commenters included: 3M; Advocates for Highway and Auto Safety (the Advocates); Alterman Transport Lines, Inc.; the American Society of CLU and ChFC; the Denton County Democratic Party; the Eye Care Center; the Insurance Institute for Highway Safety (IIHS); the National Sheriffs' Association; Roberson Corporation; R.R. Crawford Engineering; D.A.S. Roofing Company; Joseph E. Badger Accident Reconstruction Services; the Wellness Center; the Seniors Civil Liberties Association, Inc.; the Maryland State Highway Administration; Merck and Co., Inc.; the Montana chapter of the American Automobile Association; Miller and Bethman, Inc.; Minnesota State Representative Sidney Pauly; Minnesota State Patrol; New Jersey State Senator John J. Matheussen; New York City Department of Transportation, Bureau of Traffic; City of Tampa, Department of Public Works; Strategic Metro Area Reduction Team, Inc.; Transamerica Leasing, Inc.; U.S. Representative James C. Greenwood; U.S. Representative Paul McHale; former U.S. Representative Marjorie Margolies-Mezvinsky; University of South Florida, Department of Community and Family Health; Montana Office of Public Instruction; Kay E. Konz, Nebraska Volunteer Coordinator for Citizens for Reliable and Safe Highways; Operation Front Line; and the Owner-Operator Independent Drivers Association (OOIDA).

The OOIDA indicated that it supported the NHTSA's rulemaking to require conspicuity treatments on newly manufactured trailers because it agreed with NHTSA's findings that better conspicuity would significantly reduce the likelihood of side and rear collisions. The OOIDA stated:

It has been the experience of the Association that owner-operators equip their vehicles in such a way that better use is made of reflective devices and additional lighting. OOIDA believes that it would be in the best interests of motor carriers to do all that is necessary to enhance the visual conspicuity of their vehicles, regardless of the age of the tractor or trailer in question. Not only will the safety of the driving public be increased, but insurance costs would likely be reduced. For example, OOIDA works closely with one insurance company that already requires reflective devices on flatbed trailers. However, such requirements should not be

left to the uncertainties of voluntary compliance.

The Insurance Institute for Highway Safety (IIHS) indicated that requiring retrofitting of the red and white retroreflective materials is needed to achieve the full safety benefits of the NHTSA requirements in terms of reductions in deaths, injuries, and property damage. The IIHS believes that only a portion of the fleet of trailers will be replaced during a given year and that the retrofitting should be required for all trailers in operation.

The Advocates also supports a requirement to retrofit vehicles with conspicuity treatments that conform to the NHTSA standard. The AHAS stated:

Given the fact that the current regulation is in effect, Advocates wants to stress early in these comments that, notwithstanding our concern that the NHTSA did not choose an optimal reflectorization design for truck trailers, we think it is crucial that any retrofit of existing heavy truck trailers with reflective materials should adhere strictly to the marking regime established by NHTSA in its amended Final Rule. The importance of [an] unambiguous conspicuity message for other drivers cannot be overestimated and, therefore, any proposal for reflectorization of the sides and rears of trucks by the FHWA should conform in all particulars to the regulation for new trailers. Competition from reflectorized logos and accessory reflectorization of trailers already threatens to overwhelm the sparse conspicuity signature of the NHTSA FMVSS. Any prospective Federal Motor Carrier Safety Regulation (FMCSR) must assist in reducing the wide variety of competing conspicuity cues already present in the existing truck fleet. Without such uniformity, the FHWA may saddle the motor carrier industry with an additional financial burden that does not reap substantial benefits in reducing both crashes and crash severity.

In addition, the AHAS argues that the FHWA should require retrofitting of conspicuity materials on single-unit trucks and apply the conspicuity requirements to vehicles operated in the United States by Canada- and Mexico-based motor carriers.

Several law firms submitted comments in support of a retrofitting requirement. One of the firms was Elliot, Reihner, Siedzikowski, North and Egan which represents the estates of Marion Steward and Carl Hall, both of whom were killed in accidents involving collisions into the side of a trailer. David Narkiewicz, responding on behalf of the law firm, stated:

There is no question in my mind but that both of the above individuals would still be alive if appropriate retroreflective tape and additional lighting had been installed on both of the tractor trailers which were positioned at 45 degree angles across both lanes of the highway in both accidents.

On the subject of the red and white pattern for conspicuity treatments, Mr. Narkiewicz stated:

[M]any of the conspicuity experts which I have utilized have told me that the broken pattern of red and white now mandated on new trailers is not as good as solid white, so I would ask that reflective tape be required but leave the colorant pattern up to the owners of the vehicles. There should be minimum standards as to size and location but do not overregulate so that improvements in the future would not be possible because of rigid guidelines that need to be continually amended.

Only one motor carrier submitted a comment in support of a requirement to retrofit vehicles in a red and white pattern. Alterman Transport Lines, Inc. (Alterman), with a fleet of 1,400 trailers, indicated that it had already started retrofitting its older trailers. Alterman stated:

We think it provides perfect visibility. We have checked conditions a number of times especially during the night in rainy and foggy conditions, indeed it does support that which the program was designed [to accomplish].

The FHWA agrees that older trailers should be retrofitted with red-and-white conspicuity treatments. However, the FHWA believes that motor carriers should not be penalized for voluntarily retrofitting their trailers with conspicuity treatments of alternate colors. The FHWA is proposing to allow these carriers 10 years to continue to use the non-conforming colors. The end of the 10-year period would coincide with the expected end of the useful service life of the vehicles in question.

The NHTSA in its final regulatory evaluation estimated that the average trailer has a useful service life of approximately 14 years. Commenters to both the NHTSA's NPRM and the FHWA's ANPRM generally agreed with this estimate. Tank trailers are both more expensive and more durable than other types of trailers and are believed to have a useful life of approximately 20 years. The NHTSA requirements cover trailers manufactured on or after December 1, 1993, which means that the 14-year useful service life on most trailers manufactured shortly before this date would be reached around the year 2007. The useful service life of most tank trailers would be reached around the year 2013. Therefore, the 10-year period will help to ensure that motor carriers operating trailers equipped with non-conforming conspicuity treatments will not be penalized by the retrofitting rulemaking. However, if these carriers choose to continue operating these trailers at the end of the 10-year period, the vehicles would have to be retrofitted with a conspicuity treatment that

conforms to the NHTSA standard. For carriers operating tank trailers equipped with non-conforming conspicuity treatments, the old treatments would have to be replaced with a conforming conspicuity treatment within 10 years of the effective date of the final rule.

As discussed in the preceding section of this notice, the NHTSA's research suggests that there are potential safety benefits from the use of other color combinations. While the FHWA fully supports the NHTSA's decision to require the red and white pattern on newly manufactured trailers, attempting to immediately extend that requirement to trailers that are already equipped with a different conspicuity scheme would not result in a cost effective improvement in safety. The FHWA is not aware of data that would enable the agency to conclude that the level of effectiveness of the alternative color schemes on older trailers is unacceptable for use during the proposed 10-year transition period.

The FHWA does not intend to propose, at this time, conspicuity treatments on single-unit trucks. This rulemaking is not intended to serve as a forum for resolving complaints about the NHTSA's conspicuity rulemaking. The NHTSA provided all interested parties with the opportunity to comment on the amendments to FMVSS No. 108 during its rulemaking on trailer conspicuity.

The Advocates have not provided data to prove that a retrofitting requirement for single-unit trucks would be a cost-effective solution to the problem of passenger vehicles colliding with single-unit trucks. The NHTSA's accident data (Fatality Analysis Reporting System (FARS) and General Estimates System (GES)) indicate that combination vehicles are over represented in collisions involving passenger vehicles striking the sides or rear of commercial motor vehicles. This means that the number of accidents in which a passenger vehicle strikes a combination vehicle (a single-unit truck pulling a trailer(s), or a truck-tractor pulling a trailer(s)) exceeds the amount that one would expect if one looked at the percentage of the registered commercial vehicle fleet that is listed in the combination-vehicle category.

In 1995 there were an estimated 16,674 nighttime accidents in which one commercial motor vehicle and one passenger vehicle were involved. All of these accidents resulted in a fatality, injury, or one of the vehicles incurring damage severe enough to require that the vehicle be towed from the accident scene. In 4,734 of these accidents, a passenger vehicle rear-ended a trailer

(2,313 cases) or struck the side of the trailer (2,421 cases). By comparison, in 2,027 of the 16,674 nighttime accidents a passenger vehicle rear-ended a single-unit truck or truck-tractor (1,112 cases) or struck the side of the single-unit vehicle (915 cases).

Looking at the 1995 FARS data, there were 914 fatal nighttime accidents involving one commercial motor vehicle and one passenger vehicle. In 315 of these accidents, a passenger vehicle rear-ended a trailer (200 cases) or struck the side of the trailer (115 cases). By comparison, in 67 of these nighttime accidents a passenger vehicle rear-ended a single-unit truck or truck tractor (50 cases), or struck the side of the single-unit vehicle (17 cases).

The 1995 nighttime accident statistics indicate that the frequency with which passenger vehicles strike the rear of trailers is double the frequency with which passenger vehicles strike the rear of single-unit vehicles. The frequency with which passenger vehicles strike the side of a combination vehicle is approximately 2.6 times the frequency with which passenger vehicles strike the side of a single-unit vehicle. The FARS data for 1995 show that frequency of fatal nighttime accidents involving a passenger vehicle striking the side of a combination vehicle is almost seven times the rate at which passenger vehicles strike the side of a single-unit commercial motor vehicle. The frequency of fatal nighttime accidents involving a passenger vehicle rear-ending a combination vehicle is four times the rate at which passenger vehicles strike the rear of a single-unit commercial motor vehicle.

The difference between the nighttime accident involvement for combination vehicles and single-unit vehicles is especially important because the number of registered single-unit trucks (4,219,920) is 2.63 times the number of combination trucks (1,607,183).<sup>1</sup> Therefore, combination vehicles represent approximately 27 percent of the fleet, but 70 percent (4,734 out of 6,761 cases) of nighttime accidents in which a passenger car struck the side or rear of a commercial motor vehicle. Looking at the fatal nighttime accidents, combination vehicles were involved in 82 percent (315 out of 382 cases) of the incidents in which a passenger vehicle struck the side or rear of a commercial motor vehicle. Based upon this data, the FHWA has decided to limit this rulemaking to semi-trailers and trailers.

<sup>1</sup> *Summary of Medium and Heavy Truck Crashes in 1990*, National Highway Traffic Safety Administration, February 1993 (DOT HS 807 953).



The FHWA agrees with the Advocates' recommendation that the retrofiting requirements apply to Canada- and Mexico-based vehicles. The agency's proposal applies to trailers operated by foreign-based motor carriers. This issue is discussed in greater detail later in this notice.

With regard to commenters who believe that specific accidents would not have occurred, or the severity of the accidents would have been decreased, if the trailers involved had been equipped with conspicuity treatments, the FHWA notes that the commenters offered more conclusions than evidence. While it is possible to estimate, based upon an analysis of accident data and a structured research program, the percentage of certain types of accidents that could be prevented if conspicuity requirements are established for all trailers, it is generally difficult to identify a specific accident and state with certainty that the use of retroreflective tape would have prevented the accident.

#### *Motor Carrier Experiences Applying and Maintaining Conspicuity Treatments*

The FHWA received comments from motor carriers, industry groups, and manufacturers of retroreflective sheeting in response to the question concerning motor carrier experiences retrofitting their trailers with conspicuity materials. Both supporters and opponents of the retrofitting rulemaking provided detailed information.

Contract Freighters, Inc. (Contract Freighters) indicated that when attempting to retrofit its trailers in 1986 and 1987, several hours of labor were required to prepare the surface of the trailers for proper adhesion of the conspicuity treatment. Contract Freighters also indicated that most trailers have a line of rivets that sometimes hamper the application of reflective tape. The company stated:

The other problems with large fleets is the ability to move all the equipment to one location where the treatment can be applied in a cost effective manner. During 1986 and 1987 we were unable to get all 1,500 trailers retrofitted simply due to the logistics problems of getting them to our shop.

The application is very time consuming and while a trailer may pass through our facility for inspecting and routine maintenance, there were consistently occasions that time simply did not permit putting the trailer out of service for conspicuity treatment.

The Interstate Truckload Carriers Conference (ITCC) indicated that the primary difficulty that its members experienced in retrofitting trailers was the preparation of the surface. The ITCC stated:

Some carriers report an inordinate amount of time consumed with surface preparation so that adhesive-backed conspicuity treatments will properly adhere to the trailer surface. Some older trailers have gouges, scratches, and surface metal deterioration that result in poor application. Other older trailers have poor paint finishes that similarly prevent proper adhesion. On these older trailers, carriers report the need to sand, prepare, and repaint trailers before adhesive-backed conspicuity treatments can be applied. Ironically, some newer trailers manufactured before December 1, 1993, are treated with a paint finish, designed to reject moisture and dirt, that makes it difficult for adhesive tape to adhere to the trailer surface.

On the subject of maintaining the conspicuity treatments that had been retrofitted on the older trailers, the ITCC stated:

Maintenance of adhesive tape poses a problem for carriers. Many carriers simply do not apply adhesive tape—or any other reflective markers—on the trailer underride bar because of the abuse that area of the trailer experiences, at loading docks and when used as a step for trailer entry, and because of the almost immediate corresponding reduction in retroreflective benefit. Carriers operating flatbed trailers report a harsh environment for retroreflective applications generally, as a result of chains and bindings that are often used with such equipment and which scrape against reflective treatments. On some applications, dirt was found to be obscuring the edge of the reflective material, so the material is now being edge-coated to prevent this problem.

The NAWGA/IFDA indicated that its members generally have not experienced problems applying reflective materials to their trailers. However, members of NAWGA/IFDA did encounter adhesion problems on some of the older trailers because of rust and the condition of the trailer surfaces. The NAWGA/IFDA stated:

For those members that have experienced problems, the biggest is not so much a "technical" problem as a matter of preparing the surface of the trailer before installation of the material. Cleaning the surface before application of the material can be a labor-intensive and costly process. In addition, certain types of conspicuity materials cannot be properly installed over or around rivets and welds.

Grote Industries, Inc., a manufacturer of lighting devices, mirrors, wiring systems, emergency warning equipment, and switches stated:

As a manufacturer of painted, plated, and decorated parts, many of which require adhesive labels, the importance of good surface preparation is well [known] to us. There is a wide range of surfaces found on both new and in-service trailers (e.g., steel, aluminum, wood, fiberboard, various types and grades of paint, etc.) and they will or have been exposed to a wide range of contaminants and environmental effects (e.g.,

salt, water, oil, gas, dirt, dust, wind abrasion, diesel fuel, etc.). The net effect is a huge variety of possible barriers to good adherence of conspicuity tape. It is clear that many if [not] all in-service trailers will have surfaces that are chipped, oxidized, rusted, dirty, oily, dented, scratched, and contaminated in numerous ways and combinations of ways. The only way to provide even a chance for adherence of conspicuity tape would be to restore the trailer's finish to its original condition; a process that will be both costly and time consuming.

XTRA also expressed concerns about getting conspicuity materials to adhere to the surface of older trailers. XTRA stated:

Any retrofitting requires the application of materials to trailers in varying conditions and produces less than optimal results. Trailer surfaces must be cleaned to achieve satisfactory adhesion. Conspicuity treatments cannot be applied satisfactorily in cold and adverse weather conditions. Because of the lack of indoor facilities, this limits the time of year in which conspicuity treatments could be applied in many areas of the country. Retrofitting of trailers may have to be repeated to maintain the conspicuity to the standard because of durability problems in applying materials to existing trailers.

The SOIC indicated that it is not aware of any intermodal chassis fleets which utilize conspicuity treatments other than required lights and reflectors. The SOIC stated:

Many, if not most, intermodal chassis in service today have been coated with wax-based coatings. Tape materials will not adhere to these coatings and it would be necessary to apply the retroreflective tape to metal plates which must then be riveted or welded to the chassis structure.

In addition, because intermodal chassis have very narrow profiles at the front and rear, it will be necessary for most chassis fleet operators to purchase new identification markings and reapply them in new locations in order to comply with the rules being contemplated hereunder. A third technical problem, not encountered in the manufacture of new equipment, is that adhesive films cannot generally be applied under very low temperature or high humidity conditions, thus affecting the ease of application of many field locations.

Schneider explained that in the case of polyurethane paints and other high gloss enamel surfaces, all road grime must be removed from the surface prior to applying the conspicuity treatment. Schneider indicated that normally an ordinary solvent is sufficient to properly clean the surface. It was emphasized that surface temperature is critical. The surface of the trailer must be greater than 4.4°C (40°F) for proper adhesion of the conspicuity treatment.

Schneider also indicated that it had experienced difficulty applying retroreflective sheeting to rear underride devices. Schneider stated:

The application of reflective sheeting to the rear underride protection of semi-trailers is best done when the underride protection is brand new. When applying to an old surface that has the normal wear and tear type abrasions and nicks in the painted surface that has resulted in a certain amount of surface rust, the surface must be buffed clean, painted, allowed to dry and then have the reflective sheeting applied in a retrofit operation. This is one of the more costly aspects of applying reflective sheeting to the rear of the trailer during retrofit and it is also an area of high maintenance because of the abrasion and scuffing of the reflective sheeting caused by locking devices which attach to the bumper at the dock areas during loading and unloading of the semi-trailer.

By contrast, the OOIDA indicated that none of its members had submitted complaints concerning technical problems applying conspicuity treatments to trailers.

The 3M Corporation stated that "Proper surface preparation protocols, tests for surface evaluation and application techniques have been developed which, when followed and used with properly manufactured adhesive systems, ensure optimal conditions for the formation of adhesive bonds." The 3M Corporation also stated:

There are some surface coatings, such as "non-hardening" paint, which are formulated to have very low surface energy. An alternate (non-adhesive) system is required to affix conspicuity treatments to these substrates.

The FHWA recognizes the difficulties that motor carriers have had retrofitting conspicuity treatments to older trailers. The agency has considered the technical problems associated with installing conspicuity treatments as part of the process for preparing the preliminary regulatory evaluation (PRE) to accompany this notice. The agency has also considered the scheduling problems cited by the commenters and used this information as one of the factors for deciding to propose a two-year phase-in period for installing retroreflective materials on trailers that are not equipped with any form of conspicuity treatment, and a 10-year transition period to replace non-conforming treatments with retroreflective material that conforms to the NHTSA requirement.

The agency believes that, in most cases, retrofitting an older trailer would not require major repairs of the trailer. Generally, thorough cleaning and proper preparation of the surfaces on which the retroreflective materials would be applied should be adequate to ensure that the tape sticks to the trailer for the remainder of the trailer's service life. The FHWA encourages commenters to this NPRM to provide additional information, including color

photographs, concerning surface conditions of in-service trailers that require extensive repairs prior to applying conspicuity materials.

In response to comments concerning the difficulty of retrofitting conspicuity treatments to the rear underride guard, the FHWA is not proposing that carriers be required to apply retroreflective material at that location. The FHWA believes that requiring conspicuity treatments on the rear underride guard would, in many cases, also require the complete refurbishment of the underride device and significantly increase the economic burden of a retrofitting rule. Extensive work on the underride device would increase the amount of time the trailer would be out of revenue service, and the labor, supplies and materials needed to complete the retrofitting process. While there are potential safety benefits to having conspicuity treatments on the rear underride, the agency does not have enough information to ensure that safety benefits that would be gained by requiring the retrofitting of conspicuity treatments on the underride guard exceed the costs for installing and maintaining the reflective material in that location. The FHWA requests comments from all interested parties on this issue.

#### *Color Combinations Currently Used by Motor Carriers*

The FHWA received numerous comments from industry groups, motor carriers, and manufacturers of retroreflective sheeting in response to the request for information about current conspicuity schemes. Both supporters and opponents of the retrofitting rulemaking provided detailed descriptions of the types of reflective tape/material in use on trailers manufactured before December 1, 1993.

Gra-Gar, Inc. (Gra-Gar), which operates approximately 8,000 trailers manufactured before December 1, 1993, indicated that all of its older trailers are marked with a "light blue diamond grade reflective tape" which is compatible with the color scheme on its trailers. Gra-Gar believes that this color scheme is adequate and provides high visibility during nighttime hours.

Mobil Oil Corporation (Mobil), with a domestic fleet of more than 200 trailers (primarily MC-306 specification cargo tanks), is concerned that the FHWA's rulemaking does not acknowledge additional trailer visibility enhancement associated with the use of retroreflective corporate logos. Mobil stated:

Mobil's conspicuity enhancements to trailer sides include application of two 2-inch-wide strips of white retroreflective tape:

one delineating the trailer overturn rail and one delineating the trailer lower-side rails; two retroreflective corporate logos: one 27-inch diameter "Pegasus" medallion and one 23-inch high by 77-inch "Mobil" trademark on each side of cargo tank equipment. Mobil's conspicuity enhancements to the trailer rear include application of one 19-inch high by 66-inch length retroreflective "Mobil" trademark and an eight-inch high by 108-inch length retroreflective bumper strip. Retroreflective DOT placards have also been applied to both sides and the front and rear heads of cargo tank equipment.

The 3M Corporation stated:

In addition to the NHTSA standard Red & White sheeting, we have supplied prismatic material for conspicuity in Blue & White, Red, Orange, White and other colors. These colors were chosen for their compatibility with existing graphics or corporate identity systems, as well as for their conspicuity.

The 3M Corporation indicated that its own vehicles have been marked with conspicuity materials since 1979. Red and white markings are used on the rear of the trailer and white markings are used on the sides.

The American Movers Conference stated:

The use of reflective treatment for trailers is not new in the moving industry. Movers have been installing reflective markings on trailers for a number of years. As an example, North American Van Lines began installing reflective logos and "barricades" on the rear doors of their trailers in 1969, and since 1988 have been using "jumbo" reflective logos and sheeting on the sides of trailers. In addition, some of their more recently acquired trailers are also equipped with [1½ inch] reflective silver striping along the side rails. Mayflower, Allied and United have likewise been using reflective enhancements to highlight their corporate logos on the sides and rear of trailers.

Schneider National (Schneider) indicated that it has approximately 21,000 trailers that have reflective sheeting applied in a pattern established by the company to meet its internal requirements established in 1987. Schneider uses orange reflective sheeting (2-inch by 12-inch segments) in an alternating pattern to outline the perimeter of the rear of its van-type trailers. Both of the vertical supports of the rear underride device as well as the horizontal member have white reflective sheeting applied (one 12-inch segment for the vertical components, and one 36-inch segment for the horizontal component). The sides of the trailers are outlined in a pattern of 36-inch long, 2-inch wide orange reflective sheeting.

The ATA indicated that a number of motor carrier fleets are already using reflective materials that meet or exceed the NHTSA requirements for reflectance and that the prevailing 33621 opinion among

these fleets is that the color red should be used only on the rear of all trailers. The ATA stated:

Current fleet applications of reflective materials follow the NHTSA rule in the scheme of application, with a few basic deviations. Most fleets use a broken line on the side of trailers. The rears of the trailers have, for the most part, a broken outline and/or a barricade pattern. The deviations from the NHTSA rule are the use of other colors than red, e.g., blue, orange or green and leaving tape off underride devices and the top of headerboards.

In response to the comments, the FHWA is proposing to allow, during a 10-year transition period, motor carriers to use color combinations other than red and white to satisfy the proposed retrofitting requirements. At the end of this transition period, however, motor carriers would be required to use conspicuity treatments that conform to the NHTSA requirements for trailers manufactured on or after December 1, 1993. As indicated earlier in this notice, the FHWA believes that there are safety benefits associated with the use of other color combinations. There is insufficient data to require motor carriers to immediately remove conspicuity treatments that have been applied to trailers manufactured before December 1, 1993. The effectiveness of these alternate approaches, in terms of getting the attention of motorists, may be close enough to the NHTSA standard that a requirement to replace existing treatments prior to the end of the useful service life of the trailers would not be cost effective. Therefore, the agency is proposing to allow, during a 10-year transition period, alternate colors or color combinations, with the stipulation that red retroreflective sheeting or reflex reflectors cannot be used along the sides of the trailer unless it is part of a red and white pattern.

With regard to commenters requesting that the FHWA consider allowing the use of reflective logos as a substitute for the more conventional forms of conspicuity treatments, the FHWA is not aware of any research data or other information that would support such a decision. Therefore, the FHWA is not proposing to allow the use of logos in lieu of retroreflective material in the locations specified in FMVSS No. 108. However, logos may be used in addition to the retroreflective material.

*Costs To Install Conspicuity Treatments*

The FHWA received numerous comments from private citizens, motor carriers, industry groups and manufacturers concerning the costs of installing conspicuity treatments.

Generally, the private citizens estimated that retrofitting a trailer costs less than \$200. Most of the commenters stated that Landstar System retrofitted its trailers at a cost of \$125 to \$135 per trailer for a total cost of approximately \$1 million. However, none of the commenters provided documentation of these estimates, and Landstar System did not submit comments.

As far as comments from the industry, Ryder Commercial Leasing & Services (Ryder) indicated that when a trailer is "almost new" it typically costs \$250 (material, labor and adequate attention/skill in cleaning) for a 48-foot trailer, if the NHTSA requirement for reflective material on the rear underride is excluded.

Contract Freighters, Inc. stated that "A recent quote from a current vendor to supply reflective material came to approximately \$50.00 per trailer. This estimate included material for the sides and rear of the trailer." The labor involved would include approximately "one-hour per trailer at an average labor rate of \$30.00 per hour."

Bestway Systems, Inc. estimates that the cost of conspicuity markings would be approximately \$90 per trailer for the tape plus a minimum of 2 hours labor at \$35 per hour for a total of \$160.

The Interstate Truckload Carriers Conference (ITCC) commented that its members reported costs ranging from \$65 for 1,248 square inches of reflective material to \$150 for 2,424 square inches of material. The ITCC also stated:

There is a variance of up to 30 percent in the cost of materials for those carriers using a similar number of square-inch treatments. Thus, one carrier with 2,500 square inches of conspicuity treatments reports a cost of \$100.00 per trailer for materials, which generally consist of the retroreflective treatment, tape, screws, and other required materials. Other carriers experience a much greater materials cost, such as \$580.00 for 3,456 square inches of treatment.

Labor costs vary as well, and reflect the amount of time needed to adequately prepare the trailer surface for adhesive application, to trim the material, and the like. Some carriers have not directly figured the labor cost of applying conspicuity treatments, as it is performed within the general duties of shop personnel. Other carriers report labor costs per trailer of as much as \$300.00, again depending upon the amount of treatments per trailer. Only a few carriers reported seeking bids from outside vendors for conspicuity application, and reported quotes of about \$185.00 per trailer for labor costs only.

The ATA believes that the labor costs for retrofitting tape cannot be accurately determined due to extreme variations in serviceable trailer conditions. However, the ATA estimates that the total cost per

trailer could reach \$1,400. The ATA derived its estimate as follows:

ATA ESTIMATE FOR RETROFITTING A TRAILER WITH CONSPICUITY MATERIAL

MATERIALS:	
Tape .....	\$75-100
Chemicals .....	25-150
Repair parts (rubrails) .....	200
LABOR:	
Cleaning/grease .....	175-200
Cleaning/oxide .....	300
Vehicle repairs (replace rubrails).	500
Total Cost .....	1,400

The National Private Truck Council stated that some of its members reported an approximate cost of \$250 for parts and labor with a high-end of \$740 per trailer.

The Steamship Operators Intermodal Committee (SOIC) stated:

The costs to apply conspicuity treatment to existing intermodal chassis vary widely, depending on the fleet operator's labor arrangements and the location at which the work is accomplished. Material expenses range from a low of \$40.00 per chassis to a high of \$75.00. Labor costs range from \$25.00 per hour at some non-union locations to \$48.00 at some unionized facilities. Two to four man-hours would be required to apply the material.

Thus, the direct costs for applying retroreflective materials to a container chassis can vary from a low of \$90.00 to a high of \$267.00. It is SOIC's view that the mean is probably in the \$210.00 range. This does not include transportation to and from repair shops nor out-of-service time.

The Pacific Merchant Shipping Association estimates that the cost for a conspicuity retrofit would be approximately \$470 per chassis. This includes the cost of a new "stepguard," labor, plates and tape. The estimate does not include the cost of down time for the chassis or for drayage to and from the retrofit site.

The AMC indicated that its members reported costs from \$250 to \$500 for reflective tape with labor costs between \$150 on a relatively new trailer and \$300 for a trailer that required surface preparation.

The PMAA surveyed its members and determined that the cost of installing reflective material is estimated to be approximately \$500 per vehicle. The association believes that when vehicle down time and administrative expenses are considered, the total cost per trailer would rise to more than \$1,000.

Schneider National indicated that the cost of retrofitting an individual trailer is approximately \$180 for materials and labor. Schneider National also indicated that there is a cost associated with

pulling a trailer out of the fleet for the retrofitting process. The cost for pulling the trailer out of revenue service is \$75 per day. The company believes a trailer can be retrofitted with only one day of lost productivity.

Yellow Freight Systems, Inc. (Yellow) estimates the cost of retrofitting the trailers in its fleet to be between \$168.11 and \$183.94 depending on the type of trailer.

In addition to motor carriers and leasing companies, the FHWA received one comment from a trailer manufacturer, Reliance Trailer Manufacturing (Reliance). Reliance reported that its costs to install conspicuity treatments on new trailers is between \$125 and \$175. Reliance also stated:

On a used trailer, the cost to install the reflective tape would be significantly higher. This additional cost is due to the preparation required [for the] contact surface of the trailer prior to application of retroreflective sheeting. The additional time required to sand, prime, and paint throughout the installation process could range from \$200–\$1,000 per trailer. (In addition to the regular conspicuity cost.)

The FHWA estimates that the total costs of retrofitting a 45–53 foot van-type trailer would be approximately \$316. This estimate includes the cost for the retroreflective tape (\$97), labor (\$75), and the loss in revenues while the trailer is being retrofitted (\$144). Details about how the agency developed its estimates for the costs of retrofitting are presented later in this notice as well as in the FHWA's preliminary regulatory evaluation (PRE). The FHWA notes that it is reasonable to expect that some motor carriers may be able to retrofit their trailers for less than the FHWA's estimates while others may end up spending more. However, the FHWA believes it is very unlikely that motor carriers would have to spend \$1,400, as the ATA estimates.

Based upon the information presented by the commenters, the FHWA does not believe that the amount of cleaning and repairs required to comply with the proposed requirements would reach the levels estimated by the ATA (i.e., approximately \$700 for rubrail repair/replacement, and approximately \$400 for cleaning grease and oxidation off the surfaces of the trailer). The ATA's estimate, when compared to the estimates of other commenters, appears to be a worst case scenario for a vehicle that has not been cleaned on a regular basis, or the physical appearance of which has not been maintained. The agency believes this worst case scenario would only be applicable to a small fraction of the flatbed and heavy hauler

trailers that would be subject to this rulemaking. The FHWA believes that most motor carriers have adequately maintained their vehicles and that \$1,100 in repairs would not be necessary to comply with the proposed requirements.

The FHWA requests additional comments from motor carriers that believe their costs for retrofitting a trailer would greatly exceed the agency's estimates. Commenters are encouraged to provide detailed information on how their estimates were prepared, especially if the estimates are based upon first-hand experience retrofitting vehicles in their fleet.

#### **Summary of the FHWA's Rationale for Issuing the NPRM**

The FHWA recognizes the technical and economic concerns of commenters opposed to a retrofitting requirement. However, based upon the information currently available, the agency believes that retrofitting of trailers with conspicuity treatments will provide significant safety benefits. Retrofitting appears to be cost-effective and technically feasible.

The FHWA has completed a preliminary regulatory evaluation (PRE) for this rulemaking. A copy of the PRE is included in the docket. Three key issues were considered in determining whether to issue a notice of proposed rulemaking.

The first issue is the cost of installing retroreflective material on older vehicles. The surfaces of many of the older trailers will require preparation (e.g., removal of oxidation, pre-treating, etc.) to ensure that the retroreflective tape adheres. In many cases the trailer will have to be removed from revenue service to complete the retrofit. Therefore, the FHWA is proposing a two-year phase-in period to allow motor carriers to complete the retrofitting at routine maintenance intervals. The FHWA estimates that the total cost (conspicuity material, labor, and the loss in revenues) for retrofitting a 45–53 foot trailer would be approximately \$316, with the cost for shorter trailers being less.

The second issue is the voluntary use of retroreflective material on older trailers by certain fleets. A large number of fleets have been using conspicuity treatments on their trailers since the mid-1980's. However, many of the color schemes as well as the levels of reflectivity of the tape used on the older trailers differ from the NHTSA requirements for trailers manufactured on or after December 1, 1993. If these motor carriers are required to replace the retroreflective materials that they

voluntarily installed to improve safety, it would have the effect of penalizing motor carriers that demonstrated an extra level of safety consciousness. This would have the unintended effect of discouraging motor carriers from exploring innovative approaches to improving safety. With this in mind, the FHWA is proposing to allow these motor carriers 10 years to remove alternative conspicuity treatments applied to trailers manufactured before December 1, 1993.

The third issue concerns the projected safety benefits of trailer conspicuity material that meets the NHTSA requirement. The NHTSA estimates that retroreflective tape could lead to a 25 percent reduction in rear end collisions and a 15 percent reduction in side impact collisions. From data available at the time of the NHTSA's final rule implementing conspicuity enhancements, tractor-trailer combinations were involved annually in about 11,000 accidents in which they were struck in the side or rear at night. Within this group of accidents, about 8,700 injuries and about 540 fatalities occurred. The NHTSA indicated that the conspicuity requirements, when fully implemented, are expected to prevent, annually, 2,113 of these accidents. The NHTSA estimated 1,315 fewer injuries and about 80 fewer fatalities would occur.

In 1995 there were an estimated 16,674 nighttime accidents in which one commercial motor vehicle and one passenger vehicle were involved. All of these accidents resulted in a fatality, injury, or one of the vehicles incurring damage severe enough to require that the vehicle be towed from the accident scene. In 4,734 of these accidents, a passenger vehicle rear-ended or struck the side of a combination vehicle—a truck or truck-tractor, towing one or more trailers. It is estimated that more than 4,200 injuries occurred in these nighttime accidents.

Looking specifically at fatal accidents, the NHTSA's Fatality Analysis Reporting System (FARS) data for 1995 indicate there were 2,587 fatal accidents involving one commercial motor vehicle and one passenger vehicle. In 1,819 of these fatal accidents, the commercial motor vehicle was a combination vehicle. Of the 1,819 fatal accidents between a passenger vehicle and a combination vehicle, 200 cases were nighttime accidents in which the passenger vehicle rear-ended the trailer. The result was 224 fatalities (compared to 54 fatalities for 50 nighttime accidents in which a passenger vehicle rear-ended a single-unit commercial motor vehicle). Nighttime accidents in

which the passenger vehicle struck the side of a trailer at an angle accounted for 115 incidents resulting in a total of 136 fatalities.

#### **FHWA Estimates of the Costs and Benefits**

The FHWA has completed a preliminary regulatory evaluation comparing the projected safety benefits of a retrofitting requirement to the potential economic impact on the motor carrier industry. The following discussion summarizes the FHWA's analysis. A copy of the complete PRE is available for review in the docket.

Based upon an analysis and comparison of the estimated costs and benefits of two-, three-, and five-year phase-in period options for a retrofitting requirement, the FHWA is proposing a two-year phase-in period for trailers that are not currently equipped with retroreflective sheeting. The FHWA estimates that the total costs for motor carriers to comply with the proposed requirements within a two-year period would be \$339 million, with the safety benefits (fatalities and injuries prevented) and economic benefits (property damage prevented) totaling \$741 million. The FHWA estimates that this rulemaking would apply to approximately 1.4 million trailers if a 2-year phase-in period were allowed (fewer trailers would be subject to the rulemaking if the 3- or 5-year phase-in periods were chosen). It is estimated that the rulemaking would, over a ten year period, prevent 258 fatalities and 4,224 injuries associated with passenger cars colliding with trailers. In addition, this rule would prevent approximately 5,300 property damage only (PDO) accidents. The FHWA believes the projected safety benefits (in terms of accidents prevented and lives saved) outweigh the economic burden on the motor carrier industry. The following section provides a detailed discussion of how the FHWA prepared its estimates of the costs and benefits.

The costs are considered one-time costs in that the conspicuity treatments will not need to be replaced during the remaining years of the useful service lives of the trailers that would be subject to the retrofitting requirement. The estimates for the benefits are the total expected benefits over the remaining years of the useful service lives of the trailers that would be retrofitted.

Generally, there are three types of costs associated with retrofitting: the tape or reflex reflectors; the labor required to apply it; and, the opportunity cost of withdrawing the trailer from revenue-producing service. The following describes how the FHWA

arrived at its estimates for the different types of costs and benefits.

#### *Costs for Retroreflective Sheeting*

The NHTSA's preliminary regulatory evaluation used a tape cost of \$.675 per linear foot for 50 mm (2-inch) wide tape. Based upon comments to the NHTSA rulemaking and further analysis, the NHTSA adjusted this figure to \$1.29 in its final regulatory evaluation.

The amount of tape required to retrofit a trailer varies with its size. For example, a 28-foot trailer would need 47 feet of tape: 14 feet of material per side (because the rule would require that at least 50 percent of the length of the trailer must be covered); an 8-foot strip along the bottom of the rear; 2 pairs of one foot strips for the outline of the upper rear, and approximately seven feet of material for the underride guard. (The FHWA notes that the estimated cost for retrofitting a rear underride guard that does not require complete refurbishment was included in the PRE although the FHWA is not proposing that carriers be required to install conspicuity materials on the underride guard.) By contrast a 48-foot trailer would require the use of an additional 10 feet of material for each side of the trailer or a total of 67 feet of tape.

The NHTSA estimated that the total cost for the tape would be \$60.84 for 28-foot trailers, \$77.67 for 40-42 foot trailers, and \$86.73 for 45-53 foot trailers. The FHWA adjusted these figures to account for inflation between 1992, when the NHTSA's final regulatory evaluation was completed, and 1995. This adjustment, based upon the producer price index for industrial commodities (See Table b63 from the *Economic Report of the President*, 1996, ISBN 0-16-048501-0), increased the costs to \$65.04 for 28-foot trailers, \$83.03 for 40-42 foot trailers, and \$92.71 for 45-53 foot trailers.

The FHWA made an additional adjustment to take into consideration the comments to the ANPRM. The additional adjustment increased the cost by approximately \$4.50 per trailer. The total estimated tape cost is \$69.54 for 28-foot trailers, \$87.53 for 40-42 foot trailers, and \$97.21 for 45-53 foot trailers.

#### *Cost for Labor To Apply the Retroreflective Sheeting to the Trailers*

The FHWA used an average wage of \$25 per hour, including fringe benefits, for calculating labor costs. The NHTSA estimated that it takes 30 minutes to install tape on a trailer. While this is a reasonable estimate for factory installed tape, the FHWA recognizes that it would take longer to retrofit a trailer.

This assumption is supported by the docket comments. Trailers will generally have to be prepared and cleaned for the conspicuity treatment. Trailers which have holes and other damage may require more extensive repairs.

The comments to the docket, as well as observations by FHWA staff during a 1994 site visit to a Roadway terminal (documentation of the visit is included in the docket file), indicate that the amount of time required to retrofit a trailer will vary significantly with trailer type and condition. For example, trailers with outer posts may require more extensive work than trailers with smooth exterior surfaces.

Taking into account these considerations, the FHWA estimates that the retrofitting process for the average 28-foot trailer would take 2 hours to complete. The agency estimates that the time required to retrofit 40-42 foot and 45-53 foot trailers would be 2.5 and 3 hours, respectively. The FHWA's preliminary estimates of labor costs are \$50, \$62.50, and \$75 for the 28-, 40-42, and 45-53 foot trailers, respectively.

#### *Opportunity Costs*

Estimating the value of revenue that cannot be generated while the trailer is being retrofitted is difficult because of the variety of trailer types, the variety of motor carrier operations and the rates that are charged, and the overall manner in which some trailers are used—being left idle at the motor carrier's terminals for periods of time that may be as short as a few hours to several days.

The FHWA believes that it is more likely than not that a large percentage of trailers would have to undergo routine repair and/or maintenance at some point during the two-year phase-in period. Retrofitting trailers at the same time that repairs or maintenance are performed would result in negligible opportunity cost since the trailers would not be generating revenue in any case. Even the trailers that do not require routine repairs may be idle at some point during the phase-in period and could be retrofitted at minimal opportunity cost. However, the less time motor carriers have to comply with the retrofitting requirement, the less likely it is that they could take advantage of the routine repair or maintenance cycles or periods when the vehicle would be idle. This means that the opportunity cost increases as the phase-in period decreases.

The FHWA does not have the detailed information required to develop a comprehensive model of opportunity costs. Therefore, the agency constructed a simple model which relates the costs

to the logarithm of the phase-in period. With a five-year period, the estimated opportunity cost per trailer would be \$62, while the cost for a three-year phase-in period would be \$91. The opportunity costs for two-year phase-in period would be \$144.

*Number of Trailers*

The FHWA estimates that there are 2.1 million trailers and semi-trailers in operation as of January 1994. This estimate is based largely upon the U.S. Bureau of the Census trailer production data.

The NHTSA in its final regulatory evaluation estimated that the average trailer has a usable service life of approximately 14 years. Commenters to both the NHTSA's NPRM and the FHWA's ANPRM generally agreed with this estimate. Tank trailers are both more expensive and more durable than other types of trailers and are believed to have a useful life of approximately 20 years.

The FHWA used data from the Truck Trailer Manufacturers Association (TTMA) and the U.S. Bureau of the Census concerning the number of trailers sold in the United States. This data was compiled by trailer type and year for the previous 25 years. The TTMA data was available through 1993. The NHTSA estimated that 170,000 new trailers would be sold annually. The FHWA used the NHTSA estimate for 1994 and 1995.

Given the trailer sales data and the average trailer useful service life estimates, the FHWA determined that the number of trailers in use at the end of 1995 was approximately 2.12 million. However, not all of these trailers would be affected by this regulation since some of the vehicles would reach the end of their service life before the end of the two-year phase-in period for compliance with the final rule. In addition, some of these trailers already have conspicuity markings (although the markings may not be in conformance with the NHTSA specifications) which would enable motor carriers to continue operating these vehicles during the proposed 10-year transition period for replacing non-conforming conspicuity treatments. The 10-year transition period coincides with the end of the useful service life of most of the older trailers currently in use, with the exception of tank trailers. The FHWA believes that the number of trailers that will have to be retrofitted

under the two-year option would be 1,373,000. The number of trailers that would be retrofitted if the three-year option was chosen would be 1,202,000 while the number that would be covered under the five-year option would be 834,000.

With regard to the number of trailers that would have to have non-conforming conspicuity treatments replaced at the end of the 10-year transition period, the FHWA estimates most of these vehicles will be tank trailers since the useful service life of this type of trailer is approximately 20 years. Tank/dry bulk trailers are approximately 2 percent of the fleet population and tank/liquids or gas trailers represent 7.4 percent of the population of trailers (1992 *Truck Inventory and Use Survey*, U.S. Census Bureau). Applying these estimates to the 1995 data, there are approximately 199,280 tank trailers (all types). It is believed that only a fraction of these trailers have been voluntarily retrofitted with non-conforming conspicuity treatments. If 20 percent of these trailers would be covered by a requirement to replace non-conforming treatments, the agency estimates less than 40,000 tank trailers would have to have non-conforming conspicuity treatments replaced before they reach the end of their useful service life.

*Total Costs for Retrofitting Trailers*

Based upon the information currently available concerning the costs for retroreflective sheeting, labor, and opportunity costs, and the estimates of the number of trailers for which motor carriers would be required to take some type of actions to comply with the proposed requirements, the FHWA believes the total costs for retrofitting under the 2-year option would be \$339 million. The costs for the 3-year option would be \$238 million while the costs for the 5-year option would be \$138 million. It should be noted that opportunity cost makes up 45 percent of the total cost for the 2-year option, and decreases to only 27 percent of the costs for the 5-year phase in period. These estimates are for a 10-year period discounted at a 7-percent rate.

*Benefits of a Retrofitting Requirement*

The estimated benefits of this rulemaking are a reduction in the number of fatalities, injuries, and property damage only (PDO) accidents

caused by nighttime accidents in which a passenger car collides with the rear or side of a trailer. The FHWA estimates that over a 10-year period, a total of 258 fatalities and 4,224 injuries would be prevented because of this rule. The following table shows the number of accidents and injuries prevented. The net present value of this level of accident reduction is \$741 million.

The reduction in fatalities comprises the largest component of benefits, at over 65 percent of the total. The second largest component is maximum adjusted injury scale (MAIS) 3 accidents, which constitute 10.5 percent of the total benefits.<sup>2</sup>

DISTRIBUTION OF DOLLAR AMOUNTS OF BENEFITS

Severity	Number	Percent total benefits
PDO .....	5,379	5.2
MAIS 1 .....	3,282	3
MAIS 2 .....	615	6.6
MAIS 3 .....	265	10.5
MAIS 4 .....	40	4.1
MAIS 5 .....	22	4.6
Fatality .....	258	66

Benefits are spread unevenly over the 10-year analysis period. Benefits are expected to peak two years after the effective date of the final rule, after which there is a slow decline. Two years after the effective date of the final rule, all trailers covered by the retrofitting requirement would have conspicuity treatments. As the population of pre-1993 trailers decreases, the benefits of the retrofitting rule would decline. This pattern holds for both discounted and non-discounted dollars as well as for accidents. By the year 2000, all trailers would be required to be equipped with conspicuity treatments, and nighttime accidents would fall by 15 percent (for retrofitted trailers still in use).

<sup>2</sup>The Abbreviated Injury Scale (AIS) was developed by the American Medical Association and the American Association for Automotive Medicine to measure the threat to life of an accident. The MAIS refers to the maximum (most severe) injury sustained in a crash. The scale ranges from 0 for no injury to 6 for a fatality. A more detailed discussion of MAIS, including examples of the types of injuries that are included in each of the levels, is included in the FHWA's preliminary regulatory evaluation (PRE) for this rulemaking. A copy of the PRE is contained in FHWA Docket No. MC-94-1.

## SUMMARY OF COSTS AND BENEFITS OF CONSPICUITY RETROFIT OPTIONS

Options for retrofitting phase-in period	2 years	3 years	5 years
Estimated number of trailers that would have to be retrofitted .....	1,373,000	1,202,000	834,000
Estimated benefits (\$millions) .....	741	634	425
Estimated costs (\$millions) .....	339	238	138
Estimated Net Benefit (\$millions) .....	402	396	288
Benefit-to-cost ratio .....	2.2	2.7	3.1
Fatalities prevented (during a 10-year period) .....	258	226	160
Injuries prevented (during a 10-year period) .....	4,224	3,701	2,615

The benefit of this regulation results from an expected 15 percent reduction in nighttime side and rear crashes into trailers, and an expected 19 percent reduction in the severity of certain property damage only accidents. These estimates come from the NHTSA, which performed extensive fleet evaluations in the 1980's. According to the NHTSA, these kinds of accidents result in an average of 536 fatalities annually, and almost 8,800 injuries, most of which are minor. This proposal would prevent between 258 fatalities over a 10-year period.

The monetary value of these benefits range from over \$741 million for the 2-year phase in to \$425 for the 5 year phase in. Under all of the phase-in options the ratio of the benefits to costs exceeds two, with the ratio increasing as the phase-in period is extended. More importantly, all three scenarios yield net benefits (benefits minus costs) in excess of \$280 million, with net benefits increasing as the phase-in period is shortened.

Two issues which could affect these results are the number of trailers already equipped with conspicuity marking, and the safety impact of existing markings which are not in compliance with the NHTSA specifications. The FHWA estimates, based on non-random observation and anecdotal information, that approximately 20 percent of trailers manufactured prior to December 1, 1993, have some form of conspicuity treatment. Although the FHWA does not have data concerning the effectiveness of the alternate conspicuity treatments that are currently in use on trailers manufactured prior to December 1, 1993, the agency believes, based upon the NHTSA's research, that many of the alternate retroreflective sheeting treatments improve conspicuity and provide potential safety benefits. Some form of conspicuity treatment is better than no conspicuity treatment, with the most effective form of conspicuity treatment being a system that conforms to the NHTSA standard. The FHWA requests comments from motor carriers using conspicuity treatments that differ from that required by the NHTSA.

Specifically, the FHWA requests information concerning a reduction in the number of accidents in which passenger cars collide with the sides of rear of trailers.

#### Discussion of the Proposed Regulatory Language

The FHWA proposes to amend the FMCSRs by adding a new § 393.13, Retroreflective sheeting and reflex reflectors, requirements for semi-trailers and trailers manufactured before December 1, 1993. This section would be added to subpart B of part 393, Lighting Devices, Reflectors, and Electrical Equipment. Paragraph (a) would provide the applicability for § 393.13. The proposed requirements would not apply to trailers that are manufactured exclusively for use as offices or dwellings because these types of trailers are rarely transported at night. In addition, the NHTSA conspicuity requirements do not apply to this type of trailer. The FHWA is proposing to exclude pole trailers (as defined in § 390.5) from the conspicuity requirements because these trailers generally do not have side and rear surfaces to which conspicuity treatments could be applied in a cost-effective manner. The agency notes that § 393.11 does require lamps and reflectors on pole trailers and requests comments on whether retrofitting of conspicuity materials should be required on all pole trailers, including those that are currently manufactured without any type of conspicuity treatment.

In addition, the FHWA is proposing to exclude trailers that are being towed in a driveway-towaway operation (as defined in § 390.5). This would not be a blanket exception for certain types of trailers, but an exception that would cover certain movements of trailers. Examples of the types of transportation that would be covered include movements between a dealership or other entity selling or leasing the trailer and a purchaser or lessee, to a maintenance/repair facility for the repair of disabling damage (as defined in § 390.5).

Paragraph (b) would encourage motor carriers to retrofit their trailers with a conspicuity system that meets all of the requirements applicable to trailers manufactured on or after December 1, 1993, but allow the use of alternate color or color combination of retroreflective sheeting or reflex reflectors during a 10-year transition period. At the end of the 10-year period, all trailers would be required to have conspicuity treatments identical to the NHTSA requirements. Although the FHWA is proposing to allow motor carriers a certain amount of flexibility with regard to the colors of retroreflective tape or reflex reflectors, the locations for the conspicuity treatments would be required to conform to those specified in the NHTSA regulations.

Paragraph (c) would cover the locations for retroreflective sheeting, excluding the use of the reflective material on the rear underride device. Paragraph (d) would specify the locations for the arrays of reflex reflectors, excluding the use of reflectors on the rear underride device. The FHWA recognizes the concerns that motor carriers have about conspicuity treatments on the rear impact guards or rear underride devices. Consequently, the agency has tentatively determined that motor carriers should not be required to apply conspicuity material to the rear underride device. However, the FHWA specifically requests comments from motor carriers as to whether the underride device should be excluded as a required location for reflective material.

With regard to the effective date for the retrofitting requirements, the FHWA is proposing that motor carriers be allowed 2 years from the effective date of the final rule, to retrofit trailers operated in interstate commerce. Motor carriers would be allowed 10 years from the effective date of the final rule to replace non-conforming conspicuity treatments with ones that meet the NHTSA requirements for newly manufactured trailers.

### *Applicability to Canadian and Mexican Vehicles*

The FHWA is not proposing an exemption for trailers operated in the United States by Canada- and Mexico-based motor carriers. Although the Federal governments of Canada and Mexico have not indicated whether they intend to require retrofitting of the trailers operating in their countries, the FHWA believes that it is appropriate to require retrofitting of conspicuity treatments on foreign-based trailers manufactured prior to the December 1, 1993, if those vehicles are operated within the United States. This preliminary decision is consistent with the applicability of the requirements of parts 393 and 396 of the FMCSRs and ensures that all commercial motor vehicles operating in interstate or foreign commerce within the United States are required to meet the same safety standards. The FHWA specifically requests comments from Canada- and Mexico-based motor carriers.

### **Rulemaking Analysis and Notices**

All comments received before the close of business on the comment closing date indicated above will be considered and will be available for examination in the docket room at the above address. Comments received after the comment closing date will be filed in the docket and will be considered to the extent practicable, but the FHWA may adopt a final rule at any time after the close of the comment period. In addition to late comments, the FHWA will also continue to file in the docket relevant information that becomes available after the comment closing date, and interested persons should continue to examine the docket for new material.

### **Executive Order 12866 (Regulatory Planning and Review) and DOT Regulatory Policies and Procedures**

The FHWA has determined that this action is a significant regulatory action within the meaning of Executive Order 12866 and significant within the meaning of Department of Transportation regulatory policies and procedures. The FHWA has prepared a preliminary evaluation of the economic impact the proposed regulatory changes would have on the motor carrier industry. A copy of the preliminary regulatory evaluation is included in the docket file.

The FHWA estimates that the total costs for motor carriers to comply with the proposed requirements within a 2-year period would be \$339 million, with

the safety and economic benefits totaling \$741 million. The FHWA estimates that this rulemaking would apply to approximately 1.4 million trailers. It is estimated that the rulemaking would, over a ten year period, prevent 258 fatalities and 4,224 injuries associated with passenger cars colliding with trailers. In addition, this rule would prevent approximately 5,300 property damage only (PDO) accidents.

The costs are considered one-time costs in that the conspicuity treatments will not need to be replaced during the remaining years of the useful service lives of the trailers that would be subject to the retrofitting requirement. The estimates for the benefits are the total expected benefits over the remaining years of useful service lives of the trailers that would be retrofitted. A copy of the FHWA's preliminary regulatory evaluation has been placed in the docket.

Based upon the information received in response to this NPRM, the FHWA will carefully consider the costs and benefits associated with establishing a conspicuity retrofitting requirement. The FHWA requests comments, information, and data concerning the economic impact of establishing retrofitting requirements.

### **Regulatory Flexibility Act**

The FHWA has evaluated the effects of the proposed regulatory changes on small entities. A copy of the Regulatory Flexibility Analysis is provided in the docket file. Generally, the costs per trailer for retrofitting should be comparable, but not necessarily identical, for both large motor carriers and small motor carriers. For example, large carriers will be able to obtain discounts when ordering conspicuity materials in bulk. The costs for the retroreflective tape needed to comply with the proposed requirement is \$69.54 for 28 foot trailers, \$87.53 for 40-42 foot trailers, and \$97.21 for 45-53 foot trailers. The FHWA's preliminary estimates of labor costs are \$50, \$62.50, and \$75 for the 28-, 40-42, and 45-53 foot trailers, respectively. The FHWA believes the opportunity cost would be approximately \$144 per trailer. Therefore, the costs per trailer for small entities would be \$263 for 28-foot trailers, \$293 for 40-42 foot trailers, \$316 for 45-53 foot trailers. The costs would only apply to small entities that have trailers that were manufactured before December 1, 1993, and have not already been retrofitted with a conspicuity system that would satisfy the proposed requirements. Furthermore, the costs would only be applicable if the small entities intend to

continue to operate these older trailers after the proposed 2-year phase-in period.

As of September 1996, the FHWA estimates that there were approximately 382,128 interstate motor carriers. Of these carriers, 136,360 own, term-lease or trip-lease 6 or fewer trailers (68,405 have 1 trailer, 45,770 have 2-3 trailers, and 22,185 have 4-6 trailers). The number of motor carriers that own, term-lease or trip-lease more than 6 trailers but fewer than 21 is 21,793 (6,658 carriers have 7-8 trailers, 6,197 have 9-11 trailers, 3,887 carriers have 12-14 trailers, 2,779 carriers have 15-17 trailers, and 2,272 carriers have 18-20 trailers). If only those motor carriers that own, term-lease, or trip-lease 20 or fewer trailers are considered small entities, this rulemaking could have an economic impact on up to 158,153 small entities.

The economic impact on each of the motor carriers would vary depending on the number of trailers that the carrier would be responsible for retrofitting by the end of the 2-year phase-in period, and the size of those trailers. If, for example, the carrier only operates one 45-53 foot trailer, the total economic impact would be \$316. If the carrier operates 20 such trailers that have to be retrofitted, the total economic impact would be \$ 6,320.

The Small Business Administration (SBA), which oversees agencies' compliance with the Regulatory Flexibility Act, has published guidelines to classify small business. The SBA has indicated that for entities engaged in motor freight transportation and warehousing, small businesses are those with \$18.5 million or fewer dollars in annual receipts. Therefore, if the motor carrier described in the preceding example is a private motor carrier with its principal business being something other than transportation, and operates 20, 45-53 foot trailers and has annual receipts of \$18.5 million, the total economic impact would be less than one-tenth of one percent of the private motor carrier's annual receipts (\$6,320/\$18.5 million). If this carrier operated 100 trailers and had annual receipts of \$18.5 million, the economic impact would be approximately two-tenths of one percent of the carrier's annual receipts (\$31,600/\$18.5 million).

Based on its preliminary regulatory flexibility analysis summarized above, the FHWA believes that this proposed rule, if adopted, would affect a substantial number of small entities, but would not have a significant impact on these entities. Based upon the information received in response to the NPRM, the FHWA, in compliance with



the Regulatory Flexibility Act (Pub. L. 96-354; 5 U.S.C. 601-612), will further consider the economic impacts of these potential changes on small entities. The FHWA requests comments, information, and data on these impacts.

#### **Executive Order 12612 (Federalism Assessment)**

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 12612, and it has been determined that this rulemaking does not have sufficient Federalism implications to warrant the preparation of a Federalism assessment. Nothing in this document directly preempts any State law or regulation.

#### **Executive Order 12372 (Intergovernmental Review)**

Catalog of Federal Domestic Assistance Program Number 20.217, Motor Carrier Safety. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities do not apply to this program.

#### **Paperwork Reduction Act**

This action does not contain a collection of information requirement for the purposes of the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 *et seq.*

#### **National Environmental Policy Act**

The agency has analyzed this rulemaking for the purpose of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and has determined that this action would not have any effect on the quality of the environment.

#### **Unfunded Mandates Reform Act**

This rule does not impose any unfunded mandates on State, local, or tribal governments as defined by the Unfunded Mandates Reform Act of 1995 (2 U.S.C. 1532-1538). However, this rule would likely result in a Federal mandate requiring expenditure by the private sector of \$100 million or more in any one year. Therefore, the FHWA has prepared a separate written statement incorporating various assessments, estimates, and descriptions that are delineated in the Act. A copy of the FHWA's Regulatory Accountability and Reform Analyses is included in the docket.

#### **Regulation Identification Number**

A regulation identification number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes

the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross reference this action with the Unified Agenda.

#### **List of Subjects in 49 CFR Part 393**

Highway safety, Motor carriers, Motor vehicle safety.

Issued on: June 8, 1998.

**Kenneth R. Wykle,**  
*Federal Highway Administrator.*

In consideration of the foregoing, the FHWA proposes to amend title 49, Code of Federal Regulations, chapter III, as follows:

#### **PART 393—[AMENDED]**

1. The authority citation for part 393 continues to read as follows:

**Authority:** Section 1041(b) of Pub. L. 102-240, 105 Stat. 1914, 1993 (1991); 49 U.S.C. 31136 and 31502; 49 CFR 1.48.

2. Section 393.13 is added to read as follows:

#### **§ 393.13. Retroreflective sheeting and reflex reflectors, requirements for semi-trailers and trailers manufactured before December 1, 1993.**

(a) *Applicability.* All trailers and semi-trailers manufactured prior to December 1, 1993, which have an overall width of 2,032 mm (80 inches) or more and a gross vehicle weight rating of 4,536 kg (10,001 pounds) or more, except trailers that are manufactured exclusively for use as offices or dwellings and pole trailers (as defined in § 390.5) and trailers transported in a driveway-towaway operation, must be equipped with retroreflective sheeting or an array of reflex reflectors that meet the requirements of this section. Motor carriers have until [two years from the effective date of the final rule] to comply with the requirements of this section.

(b) *Retroreflective sheeting and reflex reflectors.* Motor carriers are encouraged to retrofit their trailers with a conspicuity system that meets all of the requirements applicable to trailers manufactured on or after December 1, 1993, including the use of retroreflective sheeting or reflex reflectors in a red and white pattern (see Federal Motor Vehicle Safety Standard No. 108 (49 CFR 571.108), S5.7, *Conspicuity systems*). Motor carriers which do not retrofit their trailers to meet the requirements of FMVSS No. 108, for example by using an alternative color pattern, must comply with the remainder of this paragraph and with paragraph (c) or (d) of this section.

Retroreflective sheeting or reflex reflectors in colors or color combinations other than red and white may be used on the sides or lower rear area of the semi-trailer or trailer until [ten years from the effective date of the final rule]. The alternate color or color combination must be uniform along the sides and lower rear area of the trailer. The retroreflective sheeting or reflex reflectors on the upper rear area of the trailer must be white and conform to the requirements of FMVSS No. 108 (S5.7). Red retroreflective sheeting or reflex reflectors shall not be used along the sides of the trailer unless it is used as part of a red and white pattern. Retroreflective sheeting shall have a width of at least 50 mm (2 inches).

(c) *Locations for retroreflective sheeting.*—(1) *Sides.* Retroreflective sheeting shall be applied to each side of the trailer or semi-trailer. Each strip of retroreflective sheeting shall be positioned as horizontally as practicable, beginning and ending as close to the front and rear as practicable. The strip need not be continuous but the sum of the length of all of the segments shall be at least half of the length of the trailer and the spaces between the segments of the strip shall be distributed as evenly as practicable. The centerline for each array of reflex reflectors shall be between 375 mm (15 inches) and 1,525 mm (60 inches) above the road surface when measured with the trailer empty or unladen, or as close as practicable to this area. If necessary to clear rivet heads or other similar obstructions, 50 mm (2 inches) wide retroreflective sheeting may be separated into two 25 mm (1 inch) wide strips of the same length and color, separated by a space of not more than 25 mm (1 inch).

(2) *Lower rear area.* The rear of each trailer and semi-trailer must be equipped with retroreflective sheeting. Each strip of retroreflective sheeting shall be positioned as horizontally as practicable, extending across the full width of the trailer, beginning and ending as close to the extreme edges as practicable. The centerline for each of the strips of retroreflective sheeting shall be between 375 mm (15 inches) and 1,525 mm (60 inches) above the road surface when measured with the trailer empty or unladen, or as close as practicable to this area.

(3) *Upper rear area.* Two pairs of white strips of retroreflective sheeting, each pair consisting of strips 300 mm (12 inches) long, must be positioned horizontally and vertically on the right and left upper corners of the rear of the body of each trailer and semi-trailer, as close as practicable to the top of the

trailer and as far apart as practicable. If the perimeter of the body, as viewed from the rear, is not square or rectangular, the strips may be applied along the perimeter, as close as practicable to the uppermost and outermost areas of the rear of the body on the left and right sides.

(d) *Locations for reflex reflectors.*—(1) *Sides.* Reflex reflectors shall be applied to each side of the trailer or semi-trailer. Each array of reflex reflectors shall be positioned as horizontally as practicable, beginning and ending as close to the front and rear as practicable. The array need not be continuous but the sum of the length of all of the array segments shall be at least half of the length of the trailer and the spaces between the segments of the strip shall be distributed as evenly as practicable. The centerline for each array of reflex reflectors shall be between 375 mm (15 inches) and 1,525 mm (60 inches) above the road surface when measured with

the trailer empty or unladen, or as close as practicable to this area. The center of each reflector shall not be more than 100 mm (4 inches) from the center of each adjacent reflector in the segment of the array. If reflex reflectors are arranged in an alternating color pattern, the length of reflectors of the first color shall be as close as practicable to the length of the reflectors of the second color.

(2) *Lower rear area.* The rear of each trailer and semi-trailer must be equipped with reflex reflectors. Each array of reflex reflectors shall be positioned as horizontally as practicable, extending across the full width of the trailer, beginning and ending as close to the extreme edges as practicable. The centerline for each array of reflex reflectors shall be between 375 mm (15 inches) and 1,525 mm (60 inches) above the road surface when measured with the trailer empty or unladen, or as close as practicable to

this area. The center of each reflector shall not be more than 100 mm (4 inches) from the center of each adjacent reflector in the segment of the array.

(3) *Upper rear area.* Two pairs of white reflex reflector arrays, each pair at least 300 mm (12 inches) long, must be positioned horizontally and vertically on the right and left upper corners of the rear of the body of each trailer and semi-trailer, as close as practicable to the top of the trailer and as far apart as practicable. If the perimeter of the body, as viewed from the rear, is not square or rectangular, the arrays may be applied along the perimeter, as close as practicable to the uppermost and outermost areas of the rear of the body on the left and right sides. The center of each reflector shall not be more than 100 mm (4 inches) from the center of each adjacent reflector in the segment of the array.

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