DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Parts 571 and 585

[Docket No. NHTSA 2005-20586]

RIN 2127-AJ23

Federal Motor Vehicle Safety Standards; Tire Pressure Monitoring Systems; Controls and Displays

AGENCY: National Highway Traffic Safety Administration (NHTSA), DOT.

ACTION: Final rule.

SUMMARY: This final rule establishes a new Federal motor vehicle safety standard (FMVSS) requiring installation of a tire pressure monitoring system (TPMS) capable of detecting when one or more of a vehicle's tires is significantly under-inflated. This final rule responds to a mandate in the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act. This final rule requires installation in all new light vehicles of a TPMS capable of detecting when one or more of the vehicle's tires, up to all four tires, is 25 percent or more below the manufacturer's recommended inflation pressure (placard pressure) or a minimum activation pressure specified in the standard, whichever is higher.

DATES: Effective Date: This final rule is effectiveApril 8, 2005, except for Subpart G of 49 CFR Part 585, which is effective September 1, 2005.

Compliance Date: Consistent with the phase-in commencing October 5, 2005, all new light vehicles must be equipped with a TPMS that meets the requirements of the standard by September 1, 2007, with the following exceptions. Vehicle manufacturers need not meet the standard's requirements for the TPMS malfunction indicator and related owner's manual language until September 1, 2007 (*i.e.*, at the end of the phase-in), and vehicles produced by final-stage manufacturers and alterers must be equipped with a compliant TPMS (including a malfunction indicator) by September 1, 2008. However, manufacturers may voluntarily certify vehicles to FMVSS No. 138 and earn carry-forward credits for compliant vehicles, produced in excess of the phase-in requirements, that are manufactured between April 8, 2005, and the conclusion of the phase-in.

Petitions for Reconsideration: If you wish to submit a petition for reconsideration of this rule, your petition must be received by May 23, 2005.

ADDRESSES: Petitions for reconsideration should refer to the docket number above and be submitted to: Administrator, Room 5220, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.

See the **SUPPLEMENTARY INFORMATION** portion of this document (Section VIII; Rulemaking Analyses and Notice) for DOT's Privacy Act Statement regarding documents submitted to the agency's dockets.

FOR FURTHER INFORMATION CONTACT: For non-legal issues, you may call Mr. George Soodoo or Mr. Samuel Daniel, Office of Crash Avoidance Standards (Telephone: 202-366-2720) (Fax: 202-366-4329).

For legal issues, you may call Mr. Eric Stas, Office of the Chief Counsel (Telephone: 202-366-2992) (Fax: 202-366-3820).

You may send mail to these officials at National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.

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I. Executive Summary

This final rule re-establishes FMVSS No. 138, Tire Pressure Monitoring Systems, which requires installation of a tire pressure monitoring system in light vehicles, thereby implementing a mandate in the TREAD Act. In accord with the Act, the objective of this standard is to supplement regular tire maintenance on the part of drivers by providing a warning system to alert them when one or more of a vehicle's tires become significantly under-inflated. Under-inflation of tires increases the likelihood of many different types of crashes, including those involving: (1) skidding and/or loss of control of the vehicle; (2) hydroplaning; (3) increases in stopping distance; (4) flat tires and blowouts, and (5) overloading of the vehicle. We anticipate that 90 percent of drivers will respond to a TPMS low tire pressure warning by re-inflating their tires to the recommended placard pressure. Once all new light vehicles are equipped with compliant TPMSs, we expect that a resulting 119-121 fatalities would be prevented each year.

As background, we note that Standard No. 138 was promulgated previously through a final rule published in the Federal Register on June 5, 2002 (67 FR 38704). It included two compliance options (i.e., a TPMS with a four-tire, 25-percent under-inflation detection capability or a TPMS with a one-tire, 30-percent under-inflation detection capability). However, on August 6, 2003, the U.S. Court of Appeals for the Second Circuit (Second Circuit) issued its opinion in Public Citizen v. Mineta,[1] which held that the TREAD Act requires a TPMS capable of detecting when any combination of tires, up to all four tires, is significantly under-inflated. It vacated FMVSS No. 138 and directed the agency to conduct further rulemaking. This final rule sets requirements for the TPMS standard in a manner consistent with the Second Circuit's opinion. It also responds to numerous public comments submitted in response to the agency's September 16, 2004 notice of proposed rulemaking (NPRM) (69 FR 55896).

A. Requirements of the Final Rule

After careful consideration of all available information, including public comments, the agency has decided to retain in the final rule most of the elements of the proposed rule, with the primary changes involving the detection times for providing the low tire pressure warning and TPMS malfunction warning, modification of the minimum activation pressure values for certain light truck tires, and modifications to the standard's phase-in schedule. Although public comments on the NPRM discussed a wide variety of issues, the majority of comments focused on the topics of the TPMS malfunction indicator and the proposed schedule for lead time and phase-in, the two major aspects of the NPRM not raised at earlier stages of the TPMS rulemaking.

[1] 340 F.3d 39 (2d Cir. 2003).

As reflected in the final rule, FMVSS No. 138 is a performance standard. The agency has sought to establish the standard in a fashion that both meets the need for motor vehicle safety and is also technology-neutral. Particularly in light of the rapid advances in TPMS technology in the past few years, we expect that vehicle manufacturers will have a number of technologies available for compliance purposes. Although the details of the standard, public comments, and the agency's response thereto, are discussed at length in the balance of this document, the following points summarize the key requirements of the standard.

Consistent with the Second Circuit's opinion, FMVSS No. 138 requires new passenger cars, multi-purpose passenger vehicles, trucks, and buses with a gross vehicle weight rating (GVWR) of 4,536 kg (10,000 pounds) or less, except those with dual wheels on an axle, to be equipped with a TPMS to alert the driver when one or more of the vehicle's tires, up to a total of all four tires, is significantly under-inflated. Specifically, the TPMS must warn the driver when the pressure in one or more of the vehicle's tires is 25 percent or more below the vehicle manufacturer's recommended cold inflation pressure, or a minimum level of pressure specified in the standard, whichever pressure is higher. (We note that in response to a petition for rulemaking by the Alliance of Automobile Manufacturers (Alliance) and that organization's subsequent, related comments on the NPRM, we have decided, as an interim measure, to modify our minimum activation pressure (MAP) values for some light truck tires under the standard. Once the agency conducts further safety research, we will either confirm or propose to modify these MAP requirements in response to that petition.)

If any tire drops below the standard's activation threshold, the TPMS is required to provide the low tire pressure warning by illuminating a yellow telltale within 20 minutes of additional travel within a speed range of 50-100 km/hr. This telltale must remain illuminated (and re-illuminate upon subsequent vehicle start-ups) until the under-inflation condition has been corrected. The agency has determined that the specified under-inflation threshold and the detection time will allow the TPMS to provide a timely warning that permits the driver to take corrective action before adverse consequences ensue. Thus, we believe that the low inflation pressure detection requirement of the standard both fulfills the mandate of the TREAD Act and meets the need for motor vehicle safety.

Because a small number of aftermarket and replacement tires have construction characteristics that may prevent the continued proper functioning of the TPMS when the original equipment tires are replaced and because of the difficulty in identifying those problematic tires, NHTSA has decided to require the vehicle to be certified with the tires originally installed on the vehicle at the time of initial vehicle sale. (This reflects a change from the June 2002 final rule, which required vehicle manufacturer to certify continued compliance with any optional or replacement tires of the size(s) recommended by the vehicle manufacturer.)

Nevertheless, we expect that a typical vehicle will outlast its original set of tires, and we continue to believe that it is important that drivers continue to receive the benefits of the TPMS after the vehicle's tires are replaced. Therefore, we have decided upon a different approach than that contained in the June 2002 final rule for addressing the issue of maintaining proper TPMS functionality when a vehicle's original tires are replaced.

Specifically, the final rule requires the TPMS to include a malfunction indicator (provided either by a separate telltale or a combined low tire pressure/malfunction indicator telltale) that would alert the driver in situations in which the TPMS is unable to detect low tire pressure.

This malfunction indicator is required to detect incompatible replacement tires, as well as other system faults. Similar to the low tire pressure warning, the system is required to trigger a TPMS malfunction warning telltale within 20 minutes of additional travel within a speed range of 50-100 km/hr after such a malfunction occurs. Consistent with the specific requirements of the standard, this telltale must remain illuminated (and re-illuminate upon subsequent vehicle start-ups) until the TPMS malfunction has been corrected. We believe that the TPMS malfunction indicator will provide useful information to the driver regarding the long-term operability of the TPMS, thereby increasing the overall benefits of the system.

The final rule also specifies required language to be included in the vehicle owner's manual (or in writing to the first purchaser if there is no owner's manual) that describes the purpose of the low tire pressure warning telltale, the consequences of significantly under-inflated tires, the meaning of the low tire pressure telltale when it is illuminated, and corrective action to be taken. The owner's manual must also explain the presence and operation of the TPMS malfunction indicator and the potential problems associated with aftermarket and replacement tires and rims that may prevent continued TPMS functionality. These provisions are designed to ensure that consumers are aware of the importance of regular tire maintenance and of the supporting role played by their vehicle's TPMS.

The final rule provides that compliance testing for FMVSS No. 138 will be conducted on a specific test course, namely the Southern Loop of the Treadwear Course in and around San Angelo, Texas. We believe that this approach offers several advantages. First, testing can be conducted in a timely fashion without the need to design or build a new test track. Further, this course has already been used for several years by NHTSA and the tire industry for uniform tire quality grading (UTQG) purposes. We believe that the specified test course provides an objective test that is representative of a variety of roadways and real world conditions.

B. Lead Time and Phase-In

In order to provide the public with the safety benefits of TPMSs as rapidly as possible, compliance with this final rule is set to commence on October 5, 2005, which marks the start of a two-part phase-in period. Subject to the special provisions discussed below, the phase-in schedule for FMVSS No. 138 is as follows: 20 percent of a vehicle manufacturer's light vehicles are required to comply with the standard during the period from **October 5, 2005,** to August 31, 2006; 70 percent during the period from September 1, 2006 to August 31, 2007, and all light vehicles thereafter.

For the reasons discussed in detail in section IV.B of this notice, we believe that it is practicable for vehicle manufacturers to meet the requirements of the phase-in discussed above, with the following exceptions. We have decided to defer vehicle manufacturers' compliance with the standard's malfunction indicator requirements and associated owner's manual language requirements until September 1, 2007. (There is no

separate phase-in for the malfunction indicator requirements.) After consideration of the many public comments from vehicle manufacturers on this issue, we understand that adding the TPMS malfunction indicator will involve substantial design and production changes and that additional lead time will be required to effect those changes. In addition, our analysis demonstrates that the safety benefits associated with the early introduction of TPMSs, even without malfunction indicators, far outweigh the benefits of delaying the standard until all systems also can meet the malfunction indicator requirements. We note that manufacturers may voluntarily install a TPMS malfunction indicator prior to the mandatory compliance date.

Because our statute generally requires that a standard may not compel compliance less than 180 days after the standard is prescribed,[2] we have decided to postpone the starting compliance date from the NPRM's proposed date of September 1, 2005 to a date that corresponding to 180 days after publication of this final rule. However, we have decided to have the balance of the standard's phase-in coincide with traditional model year production schedules, in order to mitigate production and cost impacts.

We have decided not to delay the start of compliance until Model Year 2007, as several commenters suggested. If the agency were to forego the first year of the phase-in, we would expect to lose 24 lives and to have 1,675 more injuries than would have occurred if TPMSs had been provided in vehicles, as called for in the final rule's phase-in.

Moreover, vehicle manufacturers have been well aware of the key requirements of the final rule (other then the malfunction indicator requirement), at least since the time of the Second Circuit's decision in August 2003 (if not earlier), and the September 2004

[2] 49 U.S.C. 30111(d).

NPRM clearly conveyed the agency's intention to begin a phase-in that would coincide with Model Year (MY) 2006. Further, they did not provide any data to demonstrate that compliance with a Fall 2005 start of the phase-in would be impracticable. In addition, we believe that concerns related to lead time are either rendered moot or significantly mitigated by the final rule's allowance of both carry-forward and carry-backward credits.

As a means of maintaining a mandatory compliance date in Fall 2005, we have decided to ease implementation further by permitting carry-forward and carry-back credits. Vehicle manufacturers can earn carry-forward credits for compliant vehicles, produced in excess of the phase-in requirements, that are manufactured between the effective date of this rule and the conclusion of the phase-in.[3] In order to maximize the time available to earn such credits, we are making this final rule effective upon publication, although vehicle manufacturers have no certification responsibilities until the official start of the phase-in.

With carry-backward credits, manufacturers may defer compliance with a part or all of the certification requirements under the standard for the first period of the phase-in, provided they certify a correspondingly increased number of vehicles during the second period of the phase-in. We believe that permitting carry-backward credits would not impact the overall safety benefits of the final rule because the same number of vehicles would be subject to compliance certification, although the distribution may vary over the model years of the phase-in.

On other topics related to the phase-in, NHTSA has decided to exclude multi-stage manufacturers and alterers from the requirements of the phase-in and to extend by

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[3] We note that carry-forward credits may not be used to defer the mandatory compliance date of September 1, 2007 for all covered vehicles.

one year the time for compliance by those manufacturers (*i.e.*, until September 1, 2008). The final rule also excludes small volume manufacturers (*i.e.*, manufacturers producing less than 5,000 vehicles for sale in the U.S. market in one year) from the phase-in, requiring vehicles produced by such manufacturers to comply with the standard on September 1, 2007.

C. Differences Between the Final Rule and the Notice of Proposed Rulemaking

As noted above, NHTSA has decided to adopt most of the provisions contained in the NPRM as part of this final rule. The main differences between the NPRM and the final rule involve the phase-in schedule for the standard, the requirements for low tire pressure and TPMS malfunction detection time, changes to the minimum activation pressure for certain light truck tires, and modifications to the vehicle owner's manual requirements. A number of minor technical modifications also were incorporated in the final rule in response to public comments on the NPRM. All of these changes and their rationale are discussed fully in the balance of this document. However, the following points briefly describe the main differences between the NPRM and this final rule.

- In the final rule, we have decided to increase the time period for the TPMS to detect low tire pressure to 20 minutes. The NPRM had proposed a time period of 10 minutes for the TPMS to detect low tire pressure and illuminate the warning telltale.
- The final rule specifies a time period for the TPMS to detect a system malfunction and to illuminate the TPMS malfunction indicator (20 minutes) and acknowledged that many systems may require vehicle motion to detect a malfunction. The NPRM had been silent on these matters.

- The agency has decided to require the words ("TPMS") for the dedicated TPMS malfunction telltale, rather than the symbol proposed in the NPRM. We have also lengthened the time period for flashing of the combined low tire pressure/malfunction indicator telltale from the proposed one minute to a period of 60-90 seconds.
- The final rule has adopted minimum activation pressures for light truck Load Range "D" and "E" tires of 35 psi (240 kPa), which is different from the values in the NPRM. (However, the agency has stated that it is conducting further research in this area and that it may revisit this issue.)
- The final rule's requirements for the specified statement in the owner's manual regarding the TPMS have changed from the NPRM. Specifically, these changes include clarification that both aftermarket tires and rims may affect the TPMS's continued functionality, tailoring of the language to reflect the two options for the TPMS malfunction indicator, stressing of the driver's ongoing responsibility for regular tire maintenance, and alerting consumers that some replacement tires may call for an inflation pressure different than what is reflected on the vehicle placard.
- In the final rule's test procedures, we have deleted the NPRM's test requirements related to system reset. We have decided that this provision is impracticable, based upon how most resets operate, and unnecessary, because vehicles equipped with a TPMS reset normally include instructions for the proper use of the reset feature as part of the owner's manual.
- The final rule's phase-in schedule has changed from the NPRM's 50-90-100% requirement to a 20-70-100% requirement. In another change from the NPRM, vehicle manufacturers are not required to meet the standard's requirements for the TPMS

malfunction indicator (and associated owner's manual requirements) until the end of the phase-in (*i.e.*, September 1, 2007).

- The final rule permits vehicle manufacturers to elect to use carry-backward credits in meeting the phase-in requirements under the standard. That provision was not present in the NPRM.
- The final rule extends the compliance date for final-stage manufacturers and alterers by one year (*i.e.*, to September 1, 2008). The NPRM had proposed to require compliance for these manufacturers' production by September 1, 2007.

D. Impacts of the Final Rule

Depending upon the technology chosen for compliance, the agency estimates that the total quantified safety benefits from reductions in crashes due to skidding/loss of control, stopping distance, flat tires, and blowouts, will be 119-121 fatalities prevented and 8,373-8,568 injuries prevented or reduced in severity each year, once all light vehicles meet the TPMS requirement.

Additional benefits are expected to accrue from the final rule as a result of improved fuel economy ($19.07-$23.08 per vehicle over its lifetime), longer tread life ($3.42-$4.24 per vehicle), and property damage savings and travel delay savings from avoided crashes ($7.70-$7.79 per vehicle)(assuming a three-percent discount rate).

The agency estimates that the average cost per vehicle to meet the standard's requirements to be $48.44-$69.89, depending upon the technology chosen for compliance. Since approximately 17 million light vehicles are produced for sale in the U.S. each year, the total annual vehicle cost is expected to range from approximately $823-$1,188 million per year.

II. Background

A. The TREAD Act

Congress enacted the TREAD Act[4] on November 1, 2000. Section 13 of that Act[5] required the Secretary of Transportation, within one year of the statute's enactment, to complete a rulemaking "to require a warning system in new motor vehicles to indicate to the operator when a tire is significantly under inflated." Section 13 also required the regulation to take effect within two years of the completion of the rulemaking. Responsibility for this rulemaking was delegated to NHTSA.

B. Rulemaking History Prior to the September 2004 Notice of Proposed Rulemaking

FMVSS No. 138, Tire Pressure Monitoring Systems, has had a protracted regulatory history. The following discussion briefly summarizes the key milestones in the TPMS rulemaking process.

Today's final rule was preceded by an initial NPRM on July 26, 2001 (66 FR 38982). After considering public comments received on that NPRM, NHTSA prepared a final rule, which was submitted to the Office of Management and Budget (OMB) for review. After reviewing the draft final rule, OMB returned it to NHTSA for further consideration, with a letter explaining the reasons for doing so, on February 12, 2002.

On June 5, 2002, NHTSA published a final rule for TPMS (67 FR 38704). Consistent with the OMB return letter, the agency divided the TPMS final rule into two parts, because it decided to defer its decision as to which long-term performance requirements for TPMS would best satisfy the mandate of the TREAD Act. This deferral

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[4] Public Law 106-414, 114 Stat. 1800 (2000).
[5] See 49 U.S.C. 30123 note (2003).

was intended to allow the agency time to consider additional data on the effect and performance of TPMSs currently in use.

The June 5, 2002 final rule provided two compliance options during the interim period (*i.e.*, between November 1, 2003 and October 31, 2006). Under the first compliance option, vehicle manufacturers would have been required to equip their light vehicles (*i.e.*, those with a GVWR of 4,536 kg (10,000 pounds) or less) with TPMSs to warn the driver when the pressure in any single tire or in each tire in any combination of tires, up to a total of four tires, is 25 percent or more below the vehicle manufacturer's recommended cold inflation pressure for the tires, or a minimum level of pressure specified in the standard, whichever pressure is higher. Under the second compliance option, the vehicle's TPMS would have been required to warn the driver when the pressure in any single tire is 30 percent or more below the vehicle manufacturer's recommended cold inflation pressure for the tires, or a minimum level of pressure specified in the standard, whichever pressure is higher.[6]

The two compliance options were outgrowths of the alternative sets of requirements proposed in the initial NPRM. In response to comments indicating that current indirect TPMSs could not meet the NPRM's proposed detection requirements, the agency adopted a one-tire, 30-percent option that would have permitted indirect TPMSs to be used during the phase-in period.[7] NHTSA received 13 petitions for reconsideration of the June 2002 final rule, raising a variety of issues.

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[6] The minimum levels of pressure were the same for both compliance options.

[7] There are two types of TPMSs currently available, direct TPMSs and indirect TPMSs. Direct TPMSs have a pressure sensor in each wheel that transmits pressure information to a receiver. In contrast, indirect TPMSs do not have tire pressure sensors, but instead rely on the wheel speed sensors, typically a component of an anti-lock braking system, to detect and compare differences in the rotational speed of a vehicle's wheels, which correlate to differences in tire pressure.

However, after issuance of the June 2002 final rule, Public Citizen, Inc., New York Public Interest Research Group, and the Center for Auto Safety filed a suit challenging certain aspects of the TPMS regulation. The Court of Appeals for the Second Circuit issued its opinion in Public Citizen, Inc. v. Mineta on August 6, 2003, which held that the agency's adoption in the standard of a one-tire, 30-percent compliance option was "contrary to the intent of the TREAD Act and, in light of the relative shortcomings of indirect systems, arbitrary and capricious."[8] The Court found that the TREAD Act unambiguously mandates TPMSs capable of monitoring each tire, up to a total of four tires, effectively precluding the one-tire, 30-percent option, or any similar option that cannot detect under-inflation in any combination of tires up to four tires.

Ultimately, the Court vacated the standard (FMVSS No. 138) in its entirety and directed the agency to issue a new rule consistent with its August 6, 2003 opinion. NHTSA published a final rule in the Federal Register on November 20, 2003, vacating FMVSS No. 138 (68 FR 65404). With the standard vacated, that notice clarified that, at that point in time, vehicle manufacturers had no certification or reporting responsibilities.

In light of the foregoing, NHTSA commenced rulemaking efforts to reestablish FMVSS No. 138 in a manner consistent with the Court's opinion and responsive to the issues raised in earlier petitions for reconsideration, the majority of which remained relevant. To this end, the agency issued a second NPRM on September 16, 2004 (69 FR

We anticipate that new types of TPMS technology may be developed in the future that will be capable of meeting the standard's requirements. For example, such systems might incorporate aspects of both direct and indirect TPMSs (*i.e.*, hybrid systems). In concert with TPMS suppliers, tire manufacturers might be able to incorporate TPMS sensors directly into the tires themselves. In issuing a performance standard, NHTSA is cognizant of and seeks to encourage technological innovation.

[8] 340 F.3d 39, 54 (2d Cir. 2003).

55896) (discussed immediately below) and obtained and considered public comments on that NPRM, actions leading to this latest final rule for TPMS.

For a more complete discussion of this earlier period of the regulatory history of the TPMS rulemaking, readers should consult the June 5, 2002 final rule and the September 16, 2004 NPRM.

III September 2004 Notice of Proposed Rulemaking (NPRM) and Public Comments

A. The NPRM

As noted above, NHTSA published an NPRM on September 16, 2004 that proposed to re-establish FMVSS No. 138, Tire Pressure Monitoring Systems, in a manner consistent with the Court's opinion. Specifically, it proposed to require passenger cars, multipurpose passenger vehicles, trucks, and buses with a GVWR of 4,536 kg (10,000 pounds) or less, except those with dual wheels on an axle, to be equipped with a TPMS to alert the driver when one or more of the vehicle's tires, up to all four of its tires, are significantly under-inflated. The NPRM was drafted so as to be technology-neutral, so as to permit compliance with any available TPMS technology that meets the performance requirements.

The NPRM included the following points, which highlighted the key provisions of the proposed requirements.

- The TPMS would be required to warn the driver when the pressure in one or more of the vehicle's tires, up to a total of four tires, is 25 percent or more below the vehicle manufacturer's recommended cold inflation pressure for the tires, or a minimum level of pressure specified in the standard, whichever pressure is higher.

• Vehicle manufacturers would be required to certify vehicle compliance under the standard with the tires installed on the vehicle at the time of initial vehicle sale.[9]

• The TPMS would be required to include a low pressure telltale (yellow) that must remain illuminated as long as any of the vehicle's tires remains under-inflated and the vehicle's ignition locking system is in the "On" ("Run") position. The telltale would be required to extinguish when all of the vehicle's tires cease to be significantly under-inflated. The TPMS's low tire pressure warning telltale would be required to perform a bulb-check at vehicle start-up.

• The TPMS also would be required to include a malfunction indicator to alert the driver when the system is non-operational and, thus, unable to provide the required low tire pressure warning. The NPRM proposed that TPMS malfunction could be indicated by either:

(1) Installing a separate, dedicated telltale (yellow) that illuminates upon detection of the malfunction and remains continuously illuminated as long as the ignition locking system is in the "On" ("Run") position and the situation causing the malfunction remains uncorrected, or

(2) Designing the low tire pressure telltale so that it flashes for one minute when a malfunction is detected, after which the telltale would remain illuminated as long as the ignition locking system is in the "On" ("Run") position. This flashing and illumination

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[9] The NPRM noted that some vehicle manufacturers authorize their dealers to replace the vehicle's factory-installed tires with other tires, including ones with a different size and/or recommended cold tire inflation pressure. The NPRM stated that the TPMS would have to perform properly with any such tires, because the vehicle could be equipped with those tires at the time of initial sale. Of course, the manufacturer would not have that responsibility if the dealer installed other tires without manufacturer authorization. However, the dealer would violate the Motor Vehicle Safety Act if it installed tires on a new vehicle that prevented the TPMS from functioning properly. *See* 49 U.S.C. 30112(a).

sequence would be repeated upon each subsequent vehicle start-up until the situation causing the malfunction has been corrected.

If the option for a separate telltale is selected, the TPMS malfunction telltale would be required to perform a bulb-check at vehicle start-up.

- The TPMS would not be required to monitor the spare tire (if provided) either when it is stowed or when it is installed on the vehicle.

- For vehicles certified under the standard, vehicle manufacturers would be required to provide in the owner's manual an explanation of the purpose of the low tire pressure warning telltale, the potential consequences of significantly under-inflated tires, the meaning of the telltale when it is illuminated, and what actions drivers should take when the telltale is illuminated. Vehicle manufacturers also would be required to provide a specified statement in the owner's manual regarding: (1) Potential problems related to compatibility between the vehicle's TPMS and various replacement tires, and (2) the presence and operation of the TPMS malfunction indicator.

The NPRM proposed requirements for covered vehicles manufactured on or after September 1, 2005 (*i.e.*, MY 2006), subject to the following phase-in schedule: 50 percent of a vehicle manufacturer's light vehicles would be required to comply with the standard during the first year (September 1, 2005 to August 31, 2006); 90 percent during the second year (September 1, 2006 to August 31, 2007); and all vehicles thereafter.

The NPRM stated that in order to encourage early compliance, the agency was proposing to permit carry-forward credits for vehicles that are certified as complying with the standard and that are manufactured on or after the effective date of the final rule. However, under the proposal, beginning September 1, 2007, all covered vehicles would

be required to comply with the standard, without regard to any earlier carry-forward credits.

We proposed to exclude from the phase-in requirements final stage manufacturers, alterers, and small volume manufacturers (SVMs). The NPRM also proposed phase-in reporting requirements consistent with the proposed phase-in schedule.

B. Summary of Public Comments on the NPRM

NHTSA received comments on the September 16, 2004 NPRM from a variety of interested parties including 10 TPMS manufacturers,[10] 13 automobile manufacturers and their trade associations,[11] seven tire manufacturers and their trade associations,[12] two public interest groups,[13] and six other interested organizations.[14] Comments were also received from 24 individuals. All of these comments may be found in Docket No. NHTSA-2004-19054.

The commenters raised a variety of issues with the proposed requirements, including ones related to the low tire pressure warning lamp activation, the TPMS

[10] Comments were received from the following TPMS manufacturers: (1) ALPS Automotive, Inc.; (2) Aviation Upgrade Technologies; (3) BERU Corporation; (4) Continental Teves, Inc.; (5) Emtop Ltd.; (6) EnTire Solutions, LLC; (7) ETV Corporation Pty Limited; (8) MLHO, Inc.; (9) NIRA Dynamics AB, and (10) Schrader Electronics Ltd.

[11] Comments were received from the following automobile manufacturers and related trade associations: (1) Alliance of Automobile Manufacturers; (2) American Suzuki Motor Corporation; (3) Association of International Automobile Manufacturers, Inc.; (4) BMW of North America, LLC; (5) DaimlerChrysler Corporation; (6) DaimlerChrysler and Mercedes-Benz U.S.A.; (7) Fuji Heavy Industries USA, Inc. (makers of Subaru vehicles); (8) General Motors North America; (9) Honda Motor Co., Ltd. and American Honda Motor Co., Inc.; (10) Hyundai American Technical Center, Inc./Kia Motors Corporation; (11) Mitsubishi Motors R&D of America, Inc.; (12) Nissan North America, Inc.; (13) Porsche Cars North America, Inc., and (14) Volkswagen/Audi.

[12] Comments were received from the following tire manufacturers and related trade associations: (1) European Tyre and Rim Technical Organisation; (2) Japan Automobile Tyre Manufacturers Association, Inc.; (3) Rubber Manufacturers Association; (4) Sumitomo Rubber Industries; (5) The Tire Rack; (6) Tire and Rim Association, Inc., and (7) Tire Industry Association.

[13] Comments were received from the following public interest groups: (1) Advocates for Highway and Auto Safety, and (2) Public Citizen.

[14] Comments were received from the following other interested manufacturers, trade associations, and groups: (1) American Automobile Association; (2) the European Communities; (3) Fairfax County Public Schools; (4) GE Infrastructure Sensing; (5) National Automobile Dealers Association, and (6) Specialty Equipment Market Association.

malfunction indicator lamp, the TPMS low pressure and MIL telltales, test procedures, minimum activation pressure requirements, the need for a tire reserve load, owner's manual requirements, TPMS operation with replacement tires/spare tires, lead time and phase-in, and other topics. The following discussion summarizes the main issues raised by these public comments and the positions expressed on these topics. A more complete discussion of the public comments is provided under Section IV.C, which provides an explanation of the agency rationale for the requirements of the final rule and addresses related public comments by issue.

Low Tire Pressure Warning Lamp Activation Requirements

Regarding the activation requirements for the low tire pressure warning lamp, commenters raised concerns related to the NPRM's proposed under-inflation detection level, as well as the proposed 10-minute time period for under-inflation detection. Public interest groups and certain other commenters urged NHTSA to adopt a more stringent threshold for under-inflation detection (ranging from 15-20 percent below placard pressure). These commenters argued that existing technologies (*i.e.*, direct TPMSs) can detect and warn the driver at lesser levels of under-inflation, thereby permitting drivers more time to take corrective action and maximizing the benefits provided by the system.

The tire industry also urged NHTSA to adopt a more stringent under-inflation detection threshold, with a trigger point tied to the vehicle placard pressure and the Gross Axle Weight Rating (GAWR). Specifically, the comment of TIA stated that the under-inflation detection warning should be triggered at 1-2 psi below the vehicle's recommended cold tire inflation pressure or at an inflation level where the tires can no longer carry the vehicle weight, whichever is higher. Other commenters suggested that

the under-inflation detection threshold should take into account various vehicle loading conditions.

Vehicle manufacturers did not comment on the under-inflation detection level, which suggests that they do not object to that aspect of the NPRM.

Regarding the NPRM's proposed 10-minute time period for low tire pressure detection, vehicle manufacturers generally recommended extending that time period, arguing that even direct systems would require additional time to detect, confirm, and relay a warning about a significantly under-inflated tire. Comments from vehicle manufacturers also suggested that in order to be technology-neutral and to permit vehicle certification with indirect systems, the under-inflation detection time should be extended in situations where the vehicle has two, three, or four significantly under-inflated tires; those comments argued that there is not a safety need for rapid detection in such cases, where under-inflation is likely to result from diffusion over a considerable period of time.

Public interest groups, the European Communities (EC), and certain other industry commenters argued that the proposed 10-minute detection time period is too long and that it would allow vehicles to continue to travel in a potentially unsafe condition without a warning. These comments suggested that such situations are unnecessary because technology currently exists that would permit a shorter detection time.

TPMS MIL Activation Requirements

Regarding the time period for malfunction detection, vehicle manufacturers stated their concern regarding the absence in the NPRM of an expressed time period for the TPMS to detect a malfunction and to illuminate the TPMS MIL. Commenters stated that

immediate detection, as implied by the NPRM, is not technically possible and that in most cases, the vehicle must be driven in order to detect a malfunction. Several commenters stated that TPMSs cannot detect malfunctions any faster than the system can detect low tire pressure (because the same subsystems are involved) and that the same durational parameters should be set for both functions (with suggestions ranging from 20-30 minutes).

A number of manufacturers commented that the proposed TPMS malfunction requirements are overly broad and are in need of modification. Specific commenters asserted that TPMSs would have difficulties detecting or reporting various types of malfunctions.

One commenter raised the issue of MIL disablement (or suppression) in situations where the TPMS sending units have been removed as a result of the replacement of the original equipment tires and rims with aftermarket components that are not compatible with the direct-sensing TPMS. (The NPRM made no provision for MIL disablement.)

Telltale Requirements

A number of commenters discussed the issue of how the TPMS MIL would operate, particularly when it is combined with the low tire pressure warning telltale. Some commenters, primarily representing vehicle manufacturers, argued that the MIL requirements are design-restrictive and may impose unnecessary costs. Those commenters requested flexibility in providing the malfunction warning through a variety of means (*e.g.*, text messaging and audible warnings), provided that the warning is explained in the vehicle owner's manual.

Several commenters expressed concern about how the malfunction warning would be provided to the driver in a combined telltale. Some commenters argued that flashing should be used to indicate low tire pressure; some argued that flashing should be used to indicate malfunction; some argued that the flashing sequence should be longer, and still others argued that any sort of flashing may be confusing to drivers.

Public interest groups generally favored requiring a separate telltale to indicate TPMS malfunction, in order to provide a clear message to drivers. However, manufacturers commented that separate telltales are unnecessary, add cost, and consume valuable space on the instrument panel that could be used to provide other safety messages.

Commenters overwhelmingly recommended that NHTSA reconsider its proposed symbol to indicate a TPMS malfunction, which was considered to be confusing, and a variety of alternatives were suggested. Some commenters expressed support for only permitting a low tire pressure telltale that indicates which tire is under-inflated, because such symbol is both more recognizable and offers enhanced information to the driver.

Regarding telltale color, some manufacturers recommended permitting the low tire pressure telltale to change color (*e.g.*, from yellow to red) to indicate when under-inflation has progressed to a dangerously low level, as determined by the vehicle manufacturer. Commenters also raised the issue of the color of the TPMS MIL, with some recommending yellow and others recommending red.

In their comments, manufacturers also raised issues related to extinguishment of the TPMS telltales. For example, concerns were raised regarding the possibility of a TPMS reset button extinguishing the telltale before the underlying problem (*i.e.*, low tire

pressure or system malfunction) has been corrected. Others suggested that the final rule should specify that tires must be re-inflated to a level at least 10 percent above the warning threshold before the TPMS low pressure telltale would extinguish.

Another topic raised by commenters related to the TPMS combined telltale involved requests for the final rule to set an illumination priority for the low tire pressure and TPMS malfunction warnings. Commenters did not agree as to which warning should take precedence.

Tire-Related Issues

Another major area of comment involved tire issues. Regarding the issue of the NPRM's proposed approach for TPMS operation with replacement and spare tires, public interest groups generally objected to the agency's tentative decision to require compliance certification with the tires originally installed on the vehicle, but to require a malfunction indicator to indicate to the driver when replacement tires have been installed on the vehicle which prevent the continued proper functioning of the TPMS. Those commenters suggested that the TPMS should either be required to function with all replacement tires and original equipment (OE) full-sized spare tires (so as to provide continuing operational benefits to consumers) or that there should be ongoing efforts to make the public aware of those tires which have been found to prevent proper TPMS functioning.

Comments from the tire industry also supported a requirement for the TPMS to operate with replacement tires, particularly in light of those tires' prevalence in the marketplace. Those commenters further argued that vehicle manufacturers should be required to provide affordable access to TPMS service information to all tire dealers and

service providers. Other commenters expressed concern regarding the impact the proposed rule would have on small businesses.

The tire industry recommended that the final rule should include a tire pressure reserve requirement in order to ensure that the vehicle can safely carry the vehicle maximum load, even if the tires are under-inflated by 25 percent below placard pressure. Otherwise, commenters argued that the vehicle's tires may fall below the level designated in the tire industry's load/pressure tables but still not trigger a low pressure warning from the TPMS. These commenters were especially concerned that this situation could lead to increased instances of tire failure, particularly if drivers come to rely on the TPMS as a substitute for regular tire maintenance. Moreover, the Tire and Rim Association (TRA) stated its intention to modify its 2005 Year Book to provide additional instruction for manufacturers of TPMS-equipped vehicles.

The Alliance commented that the NPRM's proposed Table 1, which specifies minimum activation pressures for different tires, should be modified for Load Range "C," "D," and "E" light truck (LT) tires. According to the Alliance, the MAPs currently contained in Table 1 do not allow such tires to be used across the safe operating ranges of inflation pressures for which loads are specified in the TRA Yearbooks. The Alliance argued that unless corrective action is taken, vehicle manufacturers could face costly vehicle redesigns or be forced to substitute less capable tires in certain vehicle applications.

Owner's Manual Requirements

Several commenters suggested modifications to the NPRM's proposed language related to TPMSs for the vehicle owner's manual. One comment involved allowing

vehicle manufacturers discretion to tailor the owner's manual statement to the system installed on the vehicle, provided that certain basic topics were addressed. Other comments included clarifying the discussion of permissible telltale formats, of proper pressures for replacement wheel/tire combinations, and of ongoing driver responsibility for maintaining proper tire inflation pressure.

Test Procedures

Commenters raised a number of issues related to the NPRM's proposed test conditions and procedures. The issue of calibration time was raised, with at least one manufacturer commenter suggesting that no calibration period is necessary, and other manufacturer commenters arguing that the NPRM's proposed 20-minute calibration time should be extended to 30 minutes or one hour.

Comments from the tire industry recommended that the test conditions and performance parameters in the final rule should be expanded to capture a fuller range of real world driving conditions. Specifically, these comments recommended expanding the proposed ambient temperature range to include colder and warmer temperatures, testing under slippery road conditions, and expanding the vehicle speed range to include both slower and faster speeds.

Commenters also offered suggestions pertaining to the test procedures for TPMS MIL activation, which would implement their recommendations regarding the types of malfunctions the system should be required to detect and how quickly they should be detected.

Manufacturers also commented on the proposed cool-down period of up to one hour, as contained in S6(e) of the proposed test procedures. The Alliance recommended

reducing the cool-down period to five minutes or less, arguing that in certain cases, tires deflated during testing when cold may warm up to a point above the warning threshold before the TPMS has time to detect a significantly under-inflated tire. Other commenters made similar arguments and recommended adding additional pressure checks to the test procedures to ensure that the pressure level has been set accurately during testing.

Other commenters urged NHTSA to modify the test procedures to recognize that testing may need to be conducted with a pressure other than placard pressure in order to properly match the load on the tires. These comments suggested that the owner's manual should be consulted in order to select the proper pressure under certain situations.

Several commenters also raised issues regarding use of a system reset feature during testing, including use in situations where the driver switches between summer and winter tires.

Lead Time and Phase-In

In general, most of the vehicle manufacturers that commented on the NPRM requested additional lead time and a modified phase-in schedule, arguing that more time is necessary to incorporate TPMS technologies into their new vehicle production processes. Most vehicle manufacturer commenters recommended a two-year phase-in, with an initial compliance date beginning on September 1, 2006. Furthermore, vehicle manufacturers universally commented that it would not be possible to incorporate the TPMS MIL until September 1, 2007.

In contrast, public interest groups expressed support for the NPRM's compliance schedule, as proposed.

Other Issues

Commenters also raised a variety of other issues in response to the NPRM. These included small business impacts, environmental impacts, maintenance issues, markings on vehicles equipped with direct TPMSs, definitions, educational efforts, alternative systems, over-inflation detection, temperature and altitude compensation, system longevity, and harmonization. Comments on each of these issues will be described and addressed in section IV.C of this notice.

IV. The Final Rule and Response to Public Comments

A. Summary of the Requirements

After careful consideration of public comments on the NPRM, this final rule re-establishes FMVSS No. 138, Tire Pressure Monitoring Systems, in a manner consistent with the Second Circuit's opinion. Specifically, it requires passenger cars, multi-purpose passenger vehicles, trucks, and buses with a GVWR of 4,536 kg (10,000 pounds) or less, except those with dual wheels on an axle, to be equipped with a TPMS to alert the driver when one or more of the vehicle's tires, up to all four of its tires, is significantly under-inflated. Subject to the phase-in schedule and the exceptions below, compliance with the requirements of the final rule commences for covered vehicles manufactured on or after **October 5, 2005** (*i.e.*, MY 2006). The standard is intended to be technology-neutral, so as to permit compliance with any available TPMS technology that meets the standard's performance requirements.

The following points highlight the key provisions of the final rule.

- The TPMS is required to detect and to provide a warning to the driver within 20 minutes of when the pressure of one or more of the vehicle's tires, up to a total of four tires, is 25 percent or more below the vehicle manufacturer's recommended cold inflation pressure for the tires, or a minimum level of pressure specified in the standard, whichever pressure is higher. These minimum activation pressures are included in Table 1 of FMVSS No. 138.[15]
- Vehicle manufacturers must certify vehicle compliance under the standard with the tires installed on the vehicle at the time of initial vehicle sale.[16]
- The TPMS must include a low tire pressure warning telltale[17] (yellow) that must remain illuminated as long as any of the vehicle's tires remain significantly under-inflated and the vehicle's ignition locking system is in the "On" ("Run") position.[18] The TPMS's low tire pressure warning telltale must perform a bulb-check at vehicle start-up.

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[15] We note that the Alliance of Automobile Manufacturers submitted a Petition for Rulemaking on April 29, 2003 that asks NHTSA to make certain changes to the MAPs in Table 1 (see Docket No. NHTSA-2000-8572-265). For a more complete discussion of the MAP issue raised by the Alliance, see section IV.C.4.d of this document. NHTSA is in the process of evaluating the issues raised in the Alliance petition. However, we have decided to modify the values in Table 1 pertaining to Load Range "D" and "E" tires, pending completion of our analysis.

[16] We note that some vehicle manufacturers authorize their dealers to replace the vehicle's factory-installed tires with other tires, including ones with a different size and/or recommended cold tire inflation pressure. The TPMS must perform properly with any such tires, because the vehicle could be equipped with those tires at the time of initial sale. Of course, the manufacturer would not have that responsibility if the dealer installed other tires without manufacturer authorization.

[17] As part of this final rule, we are adding two versions of the TPMS low tire pressure telltale and a TPMS malfunction telltale to Table 2 of FMVSS No. 101, Controls and Displays. The regulatory text in this final rule incorporates the TPMS telltales in Table 2, as that table currently exists in the Code of Federal Regulations. However, we note that NHTSA published an NPRM in the Federal Register on September 23, 2003 that proposes to update and to expand FMVSS No. 101 (68 FR 55217). Publication of the present version of Table 2 here is not intended to suggest a change in approach to the ongoing FMVSS No. 101 rulemaking. We anticipate incorporating the TPMS telltales in a revised Table 2, once a final decision is reached on updating Standard No. 101.

[18] We note that if a vehicle manufacturer elects to install a low tire pressure telltale that indicates which tire is under-inflated, the telltale must correctly identify the under-inflated tire. See S4.3.2.

- The TPMS must also include a TPMS malfunction indicator to alert the driver when the system is non-operational, and thus unable to provide the required low tire pressure warning.[19] The TPMS malfunction indicator must detect a malfunction within 20 minutes of occurrence and provide a warning to the driver. This final rule provides two options by which vehicle manufacturers may indicate a TPMS malfunction:

  (1) Installation of a separate, dedicated telltale (yellow) that illuminates upon detection of the malfunction and remains continuously illuminated as long as the ignition locking system is in the "On" ("Run") position and the situation causing the malfunction remains uncorrected, or

  (2) Designing the low tire pressure telltale so that it flashes for a period of at least 60 seconds and no longer than 90 seconds when a malfunction is detected, after which the telltale must remain continuously illuminated as long as the ignition locking system is in the "On" ("Run") position. This flashing and illumination sequence must be repeated upon each subsequent vehicle start-up until the situation causing the malfunction has been corrected.

  If the option for a separate telltale is selected, the TPMS malfunction telltale must perform a bulb-check at vehicle start-up.

- The TPMS is not required to monitor the spare tire (if provided), either when it is stowed or when it is installed on the vehicle.

- For vehicles certified under the standard, vehicle manufacturers must provide in the owner's manual a specified statement explaining the purpose of the low tire

[19] We note that the TPMS telltale(s) may be incorporated as part of a reconfigurable display, provided all requirements of the standard are met.

pressure warning telltale, the potential consequences of significantly under-inflated tires, the meaning of the telltale when it is illuminated, and what actions drivers should take when the telltale is illuminated. Vehicle manufacturers also must provide a specified statement in the owner's manual regarding: (1) potential problems related to compatibility between the vehicle's TPMS and various replacement or alternate tires and wheels, and (2) the presence and operation of the TPMS malfunction indicator. For vehicles that do not come with an owner's manual, the required information must be provided in writing to the first purchaser at the time of initial vehicle sale.

B. Lead Time and Phase-In

As discussed in the NPRM, the Second Circuit's decision vacating FMVSS No. 138 necessitated a change in the standard's phase-in schedule in order to ensure the practicability of the standard's implementation, particularly for those manufacturers that had intended to certify to the June 5, 2002 final rule's one-tire, 30-percent option. Responses to the agency's September 9, 2003 Special Orders to 14 vehicle manufacturer and 13 TPMS suppliers demonstrated that in anticipation of the start of the phase-in under the June 2002 final rule, most vehicle manufacturers were moving aggressively toward installation of TPMSs capable of meeting the four-tire, 25-percent detection requirement, although some were not. The information provided by TPMS suppliers indicated sufficient capacity to supply TPMSs with a four-tire, 25-percent detection capability in quantities that would easily meet the phase-in requirements. Accordingly, in the NPRM, the agency proposed that 50 percent of a vehicle manufacturer's light vehicles would be required to comply with the standard during the first year (September

1, 2005 to August 31, 2006); 90 percent during the second year (September 1, 2006 to August 31, 2007); and all vehicles thereafter.

In public comments on the NPRM, vehicle manufacturers argued that they would not be able to meet the standard's requirements given the proposed lead time and phase-in schedule. Most of their concerns involved the TPMS malfunction indicator, a newly proposed requirements which manufacturers uniformly agreed would necessitate significant engineering and vehicle design efforts and corresponding production changes. Vehicle manufacturers stated that they could meet the TPMS MIL requirements (and associated owner's manual requirements) by September 1, 2007. More generally, vehicle manufacturers commented that, setting aside the issue of the MIL requirements, the phase-in schedule nevertheless may be too aggressive.

We acknowledge that the TPMS MIL represents a new requirement impacting TPMS design and functionality and that vehicle manufacturers may require additional time to incorporate the MIL into their production processes. However, we do not believe that implementation of the entire standard should be delayed until technical changes related to the TPMS MIL can be fully resolved, because that would deny the public the safety benefits of TPMSs in the meantime. Accordingly, we believe that it is preferable to move rapidly to implement the standard, but to delay the compliance date only for the TPMS MIL requirements and associated requirements in the owner's manual.

In light of the above and subject to the vehicle manufacturer option for carry-backward credits discussed below, NHTSA has decided to adopt the following phase-in schedule: 20 percent of a vehicle manufacturer's light vehicles are required to comply with the standard during the period from **October 5, 2005,**

to August 31, 2006; 70 percent

during the period from September 1, 2006 to August 31, 2007, and all light vehicles thereafter. However, vehicle manufacturers are not required to comply with the requirements related to the TPMS malfunction indicator (including associated owner's manual requirements) until September 1, 2007; however, at that point, all covered vehicles must meet all relevant requirements of the standard (*i.e.*, no additional phase-in for MIL requirements). The final rule includes phase-in reporting requirements consistent with the phase-in schedule discussed above.

Small volume manufacturers (*i.e.*, those manufacturers producing fewer than 5,000 vehicles for sale in the U.S. per year during the phase-in period) are not subject to the phase-in requirements, but their vehicles must meet the requirements of the standard beginning September 1, 2007.

Consistent with the policy set forth in NHTSA's February 14, 2005 final rule on certification requirements for vehicles built in two or more stages and altered vehicles (70 FR 7414), final-stage manufacturers and alterers must certify compliance for covered vehicles manufactured on or after September 1, 2008. However, final-stage manufacturers and alterers may voluntarily certify compliance with the standard prior to this date.

NHTSA has decided to permit vehicle manufacturers to earn carry-forward credits for compliant vehicles, produced in excess of the phase-in requirements, that are manufactured between the effective date of this rule and the conclusion of the phase-in. These carry-forward credits could be used during the phase-in, but they could not be used to delay compliance certification for vehicles produced after the conclusion of the phase-

in. Except for vehicles produced by final-stage manufacturers and alterers (who receive an additional year for compliance), all covered vehicles must comply with FMVSS No. 138 on September 1, 2007, without use of any carry-forward credits.

Furthermore, we have determined that there is good cause to make this final rule effective upon publication so that vehicle manufacturers would have a standard in effect to which they may certify vehicles for purposes of early, voluntary compliance and to maximize the time for earning carry-forward credits. We explicitly note that vehicle manufacturers have no mandatory compliance responsibilities under the standard until the start of the phase-in.

To further ease implementation, we have decided to also provide carry-backward credits, whereby vehicle manufacturers may defer compliance with a part or all of the certification requirements for the first period of the phase-in, provided that they certify a correspondingly larger percentage of vehicles under the standard during the second period of the phase-in. We believe that permitting carry-backward credits would not impact the overall safety benefits of the final rule, because the same number of vehicles would be subject to compliance certification, although the distribution may vary over the model years of the phase-in. Corresponding changes have been added to the regulatory text of both FMVSS No. 138, as well as the TPMS phase-in requirements contained in 49 CFR Part 585.

C. Response to Public Comments by Issue

As noted previously, public comments on the September 2004 NPRM for TPMS raised a variety of issues with the NPRM's proposed requirements. Each of these topics

will be discussed in turn, in order to explain how these comments impacted the agency's determinations in terms of setting requirements for this final rule.

1. Low Tire Pressure Warning Lamp Activation Requirement

(a) Under-inflation Detection Level

The NPRM proposed to require the TPMS to illuminate a low tire pressure warning telltale not more than 10 minutes after the inflation pressure in one or more of the vehicle's tires, up to a total of four tires, is equal to or less than the pressure 25 percent below the vehicle manufacturer's recommended cold inflation pressure or the pressure specified in the 3rd column of Table 1 of this standard for the corresponding tire type, whichever is higher (see S4.2(a)).

A number of commenters raised concerns about the 25-percent under-inflation detection level proposed in the NPRM. Although their reasoning differed, these commenters all argued that a more stringent detection level should be required under the final rule.

Public Citizen stated that a 20-percent threshold should be adopted. Public Citizen argued that NHTSA's technology-neutral standard, as proposed, was crafted to accommodate indirect TPMSs (which Public Citizen considers to be an "inferior technology") when there is other adequate technology readily available (*i.e.*, direct TPMSs). (Advocates for Highway and Auto Safety (Advocates) provided a similar comment.) According to Public Citizen, NHTSA should not reduce safety requirements in order to accommodate inferior technology, particularly when other affordable and more effective technology exists.

Public Citizen stated that the aspect of the agency's rationale that a higher threshold could discourage technological innovation is unsubstantiated. The comments of Public Citizen similarly characterized as unsubstantiated NHTSA's concerns about nuisance warnings that could result from a detection level that is set too close to placard pressure and requested substantive driver behavioral research to confirm that this would be a problem. (Similarly, Advocates argued that NHTSA acted arbitrarily in selecting a 25-percent under-inflation threshold (as opposed to the 20-percent level proposed in the 2001 NPRM) and that the record does not justify NHTSA's claim that a 20-percent under-inflation detection level would result in nuisance warnings.)

Public Citizen rounded out its comments in this area by characterizing the NPRM's 25-percent under-inflation detection level as a cost-saving measure. It argued that safety should outweigh cost considerations and that NHTSA's other rulemaking activities provided support for adopting a 20-percent under-inflation detection level (*e.g.*, the 2001 TPMS NPRM and the agency's rollover research). The Advocates argued that NHTSA has not compared the actual benefits of the two thresholds and suggested that NHTSA's New Car Assessment Program (NCAP) data would support the theory that different pressure levels correlate with different levels of risk.

Fairfax County Public Schools expressed support for a system that either provides a built-in tire pressure gauge or provides an earlier warning, such as a 20-percent under-inflation detection level. It stated that it is not always easy to find a functioning air compressor when traveling, so it is better to provide an earlier indication before the vehicle is past the point of safe operation.

Mr. James Anderson, an individual, commented that the under-inflation detection level should be set at some point between 15 percent and 18 percent below placard pressure, the point at which the commenter argued that the tire sidewall begins to over-flex. According to Mr. Anderson, as the tire over-flexes, heat begins to build up, but the tire is no longer able to dissipate the heat. Mr. Anderson stated that at some point above 200º F, the tire compounds begin a reversion process, which may lead to delamination and, ultimately, separation of tire components. He argued that a warning level 25-percent below placard pressure would not permit sufficient time for driver recognition and timely action to correct the under-inflation situation before tire damage may occur.

The Tire Industry Association (TIA) argued that the proposed TPMS under-inflation detection level is too lenient, suggesting that the trigger point instead should be tied to the vehicle's placard pressure and GAWR. Specifically, TIA stated that the under-inflation detection warning should be triggered at 1-2 psi below the vehicle's recommended cold tire inflation pressure or at an inflation level where the tires can no longer carry the vehicle weight, whichever is higher. (TIA's argument here is related to the issue of Tire Reserve Load, a topic discussed later in this document.) TIA argued that the standard should require the TPMS to provide a warning before there is a serious problem, thereby taking into account that drivers may not immediately take corrective action when the warning telltale illuminates.

ETV Corporation (ETV) stated that the TPMS should be required to take into account different load conditions in determining the need to activate the low tire pressure warning.

The National Automobile Dealers Association (NADA) stated that although the final rule must factor in technological and cost constraints, it should specify the smallest under-inflation threshold that can be reliably monitored.

EnTire Solutions, LLC (EnTire) commented that the direct TPMSs it produces are capable of providing low pressure warnings at a more stringent threshold than the NPRM's proposed 25-percent under-inflation detection level. EnTire also stated that its system and those of other TPMS manufacturers have multiple thresholds for under-inflation detection. GE Infrastructure Sensing stated that technology currently exists for TPMSs to detect a 20-percent under-inflation level.

The Tire Rack argued that the 25-percent under-inflation detection level does not provide an adequate and timely warning to the driver and may provide a false sense of security. The Tire Rack also stated that, to the extent the 25-percent under-inflation detection level reflects limitations of current technology, the final rule should establish successively more stringent requirements in order to ensure future improvements in TPMS technology. It argued that establishing goals and timetables as part of the final rule would encourage technological developments for TPMSs.

The American Automobile Association (AAA) stated that the NPRM proposes to set the under-inflation warning threshold at a level that is insufficiently stringent, because a tire that is 25 percent below the manufacturer's recommended inflation pressure could already present a dangerous situation, particularly if the vehicle is in a fully-loaded condition. AAA argued that under-inflated tires "produce increased heat, which is a major cause of failure." According to AAA, an effective TPMS is one that provides a

warning before a dangerous situation is imminent and which does not mislead motorists into equating the absence of an illuminated warning light with safety.

BERU Corporation (BERU) commented that the under-inflation detection level should be set to trigger a warning at either 25-percent below placard pressure or a minimum activation pressure of 1.4 bar.

The Rubber Manufacturers Association (RMA) commented that lost fuel efficiency was not adequately accounted for in the assessment of economic costs when selecting an under-inflation detection threshold. The RMA asserted that the NPRM's benefits calculations indicated that 26 percent of vehicles have tires that are under-inflated below placard pressure, but that associated fuel efficiency costs were not considered.

The Specialty Equipment Market Association (SEMA) argued that TPMSs should be reprogrammable in order to accommodate alternate and replacement tires with different pressure thresholds, or alternatively, the system could include "smart" software that would automatically detect the proper pressure threshold. According to SEMA, as currently proposed, when a higher-pressure tire is installed on the vehicle, the TPMS would not indicate low tire pressure until the tire is 25-percent below the value for the lower-pressure, original tire, and the converse would also be a problem, with the telltale actuating prematurely when a lower-pressure aftermarket tire is installed. SEMA stated that this situation would defeat the intent of the rule, give drivers a false sense of security, and be potentially problematic for new, low-profile tires that may be easily damaged.

As part of the final rule, we have decided to retain the proposed under-inflation detection level, by which the TPMS is required to illuminate a low tire pressure warning

telltale whenever the inflation pressure in one or more of the vehicle's tires, up to a total of four tires, is equal to or less than their the pressure 25 percent below the vehicle manufacturer's recommended cold inflation pressure or the pressure specified in the 3rd column of Table 1 of this standard for the corresponding tire type, whichever is higher. We have reached this determination for the following reasons.

Selecting an appropriate notification threshold level for the TPMS is one of the most fundamental matters to be resolved as part of this rulemaking. It involves balancing the safety benefits of alerting consumers to low tire pressure against the risks of over-alerting them to the point where the warning becomes a nuisance that may be ignored. We believe that the final rule's 25-percent under-inflation detection level strikes the proper balance in this regard.

As discussed in the June 5, 2002 final rule, NHTSA conducted a tire pressure survey that inspected over 11,500 vehicles, which reported that 26 percent of passenger cars and 29 percent of light trucks had at least one tire that was 25 percent or more below the recommended inflation pressure for that vehicle (see 67 FR 38704, 38713). However, despite this substantial percentage of vehicles with under-inflated tires at this level, incidents of tire failures remain infrequent. NHTSA conducted testing on a variety of Standard Load P-metric tires at 20 psi with 100-percent load at 75 mph for 90 minutes on a dynamometer, and none of these tires failed (see 67 FR 38704, 38726 (June 5, 2002)). This testing led the agency to conclude that warnings at less severe conditions will give drivers sufficient time to check and re-inflate their vehicles' tires before the tires experience appreciable damage. Accordingly, we believe that an under-inflation

detection level of 25 percent would have a strong fleet impact, holding driver behavior constant.

However, if we instead selected an under-inflation detection threshold that is too stringent, with some commenters arguing for a level as small as 1 or 2 psi below placard pressure, the warning telltale might illuminate frequently, and the driver would need to repeatedly stop and add a small amount of air to the tires in order to extinguish the telltale. After servicing the tires in this manner for the first few times, the driver might decide to postpone action on the TPMS's warnings or ignore such warnings entirely. Thus, if the under-inflation warning threshold were to be set too low, the safety benefits associated with the TPMS's low pressure warning could be lost. Because we have determined that a 25-percent under-inflation detection threshold already provides a warning to the driver before adverse safety consequences arise, providing a more stringent warning threshold would not be expected to provide additional safety benefits, although it could increase the risk of the nuisance warnings discussed above.

We disagree with Public Citizen's reading of the Court's decision in Public Citizen v. Mineta, implying that the Court had somehow ruled against NHTSA's development of a technology-neutral standard or its consideration of costs as a part of the rulemaking. In fact, the Court held that it was appropriate for NHTSA to consider costs as part of the rulemaking, stating "the agency was correct to consider the relative costs,"[20] although the Court disagreed with how the agency weighed those costs in setting compliance options in the June 2002 final rule. Furthermore, the Court specifically found the four-tire, 25-percent under-inflation detection level to be reasonable. The Court held, "Given that the 25 percent standard was a substantially more cost effective means of

[20] Public Citizen v. Mineta, 340 F.3d 39, 57 (2d Cir. 2003).

preventing injuries and saving lives than the 20 percent standard, we conclude that it was reasonable for NHTSA to adopt the former and reject the latter."[21]

Available agency data show that a TPMS with a four-tire, 25-percent under-inflation threshold is more cost-effective than one with a four-tire, 20-percent under-inflation threshold. This issue was specifically addressed in the Final Economic Assessment (FEA) for the June 2002 final rule, which found that the net cost per equivalent life saved for a four-tire, 20-percent system would be $5.1-$5.3 million but that the net cost per equivalent life saved for a four-tire, 25-percent system would be $4.3 million.[22] Although we realize that the precise values of these figures are somewhat outdated, we believe that their cost-effectiveness relative to each other has not changed significantly. For additional information on the cost of alternative systems considered, please consult the FEA and the Final Regulatory Impact Analysis (FRIA) for this final rule, which has been included in the docket for this rulemaking.

We are not adopting BERU's recommendations regarding the under-inflation detection test procedures because BERU has not provided any rationale to explain why the existing procedures are inadequate.

Regarding the issue of TPMS reprogrammability raised by SEMA, we have decided to permit, but not require, such a feature. However, we reiterate that we will conduct compliance testing with the tires installed on the vehicle at the time of initial sale, and we will follow manufacturer instructions for resetting the TPMS.

(b) Time Period for Low Pressure Detection

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[21] Id. at 62.

[22] See page *iv* of the FEA (Docket No. NHTSA-2000-8572-216).

As noted above, paragraph S4.2(a) of the NPRM proposed to require the TPMS to detect and provide a warning to the driver within 10 minutes after a tire becomes significantly under-inflated (*i.e.*, reaches the warning threshold specified in the standard). Under paragraph S4.2(b), the NPRM proposed to require the low pressure telltale to continue to illuminate as long as the pressure in any of the tires is equal to or less than the activation threshold specified in S4.2(a) and the ignition locking system is in the "On" ("Run") position, whether or not the engine is running. The NPRM proposed that the telltale must extinguish after the inflation pressure is corrected.

A number of commenters urged NHTSA to modify this ten-minute detection time requirement as part of the final rule, with some commenters recommending a longer time period and others recommending a shorter one.

Manufacturers that commented on low pressure detection time generally recommended extending the time period. BMW of North America, LLC (BMW) stated that the TPMS requirements should reflect real world needs. As a result, BMW stated that the NPRM's 10-minute detection requirement should be retained when only one tire becomes significantly under-inflated (*e.g.*, to detect situations where a tire is punctured by a nail or sustains other damage that could result in a relatively rapid loss of inflation pressure). BMW stated that when two, three, or all four tires become significantly under-inflated at the same time, the detection time requirement should be extended to 90 minutes, because under-inflation in these circumstances is likely to result from slow diffusion over months and is not likely to result in a problem requiring immediate attention. NIRA Dynamics provided similar arguments and reasoning, although it

recommended a detection time of 20 minutes for a single tire and at least one hour for multiple tires.

Sumitomo Rubber Industries (Sumitomo) offered a different assessment of the time needed for low pressure detection. Sumitomo stated that it is appropriate to maintain a 10-minute detection (and extinguishment) requirement for one tire, but that a TPMS would need at least 30 minutes (preferably one hour) to detect (and extinguish) multiple under-inflated tires.

In its comments, Hyundai American Technical Center, Inc./ Kia Motors Corporation (Hyundai) provided yet another recommendation regarding low tire pressure detection time, stating that the time period for detection and verification of low tire pressure under the standard should be extended to at least 20 minutes. Hyundai stated that delivery frequency for data from the direct TPMS tire pressure sensor to the main control unit can take as long as three minutes, which is a function of Federal Communications Commission (FCC) requirements[23] that limit signal transmissions and the capacity of the battery in the sensor. In addition, Hyundai stated that a number of transmissions may be required to correctly diagnose low tire pressure. Therefore, if a wireless data error occurs, Hyundai argued that the TPMS may not be able to gather sufficient data within the NPRM's proposed 10-minute time limit to assess the vehicle's tire pressures. Accordingly, Hyundai argued that the final rule should permit at least 20 minutes for low tire pressure detection in order to give the TPMS sufficient time to gather enough data to make an accurate assessment.

Volkswagen of America, Inc., Volkswagen AG, and Audi AG (VW/Audi) commented that in order to overcome the technology-limiting requirements of the

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[23] See 47 CFR 15.231.

NPRM, the final rule should permit a driving time of up to one hour for the low tire pressure warning, a time period consistent with detecting the unlikely situation where all four tires become under-inflated due to slow air leakage or changes in ambient temperature.

In contrast, other commenters argued that the NPRM's 10-minute under-inflation detection time is too long and should be reduced. Public Citizen argued that the requirement for under-inflation detection time should be reduced to one minute in the final rule, because direct TPMSs can meet such a requirement. Public Citizen stated that in proposing a 10-minute under-inflation detection requirement, NHTSA has unjustifiably lowered the bar in order to accommodate more manufacturers (*i.e.*, to permit indirect TPMSs requiring a longer time period for detection).

ETV commented that the TPMS should be required to activate (and extinguish) its warning within 10 seconds of vehicle start-up in order to prevent the vehicle from entering traffic with a potentially dangerous level of tire under-inflation.

The EC commented that the 10-minute detection time for the low tire pressure warning does not adequately address the tire safety problem, because during this period, the tire(s) may be operated at pressures even lower than 25-percent below the recommended pressure and significant structural damage could occur during that time period. The EC expressed concern that a combination of high speed, a long activation period, and a 25-percent under-inflation detection level could significantly reduce the time available to the driver to take appropriate action. (The European Tyre and Rim Technical Organisation (ETRTO) provided a similar comment.) The RMA similarly objected to the 10-minute activation time period as being unsafe; the RMA argued that,

particularly at higher speeds, that activation time would allow the vehicle to travel with under-inflated tires for many miles with excessive heat, over-deflected body cords, and possible structural damage.

According to Emtop Ltd. (Emtop), the NPRM's 10-minute under-inflation detection requirement does not address the 15 percent of incidents of under-inflation caused by rapid pressure drop (Emtop's estimate). Emtop argued that the proposed requirement is dictated by the inability of many current systems to meet a more stringent requirement for detection time. Emtop stated that its TPMSs can detect rapid pressure losses "in a fraction of a second" and that the TPMS rule should not create barriers to such high-performance systems.

MLHO, Inc. (MLHO), which has developed a battery-less, non-radio-frequency (RF) TPMS that relies on directional magnetic coupling to send pressure information, commented that there is no need for a TPMS to provide either an under-inflation warning or a malfunction warning while the vehicle is stationary. (In simple terms, in the MLHO TPMS system, wheel rotation powers the transmitter.) The commenter argued that a very flat tire will be obvious to the driver or will trigger the warning before the vehicle has traveled a significant distance. As to the malfunction indication, MLHO argued that since a TPMS malfunction does not constitute an emergency, the malfunction need not to be detected prior to vehicle movement.

Instead, MLHO recommended that the proposed detection requirements in S4.2 of the NPRM should be revised to require the TPMS to detect the significantly under-inflated tire(s) and to illuminate the low tire pressure telltale within 10 minutes after the vehicle is in motion within the standard's designated speed range. MLHO requested that

NHTSA also include language in S4.2 to specify that the TPMS will not be expected to either illuminate or extinguish the low tire pressure telltale without the vehicle being in motion, as motion is necessary for some systems to assess the vehicle's tire pressure status.

MLHO stated that as currently proposed, the NPRM imposes unnecessary design restrictions, favors the "present dominant RF-based technology," and discriminates against small businesses.

NHTSA has carefully considered the commenters' countervailing arguments regarding the time limit for the TPMS to detect a significantly under-inflated tire, and we have decided to modify the relevant requirement in this final rule. As revised, under S4.2 of the standard, the TPMS must illuminate a low tire pressure warning telltale not more than 20 minutes after the inflation pressure in one or more of the vehicle's tires, up to a total of four tires, is equal to or less than the pressure 25 percent below the vehicle manufacturer's recommended cold inflation pressure or the pressure specified in the 3rd column of Table 1 of this standard for the corresponding tire type, whichever is higher. We believe that this detection time period is appropriate for the following reasons.

As noted in the agency's June 5, 2002 Federal Register notice, TPMSs were not developed to warn the driver of extremely rapid pressure losses that could accompany a vehicle encounter with a road hazard or a tire blowout.[24] According to the tire industry, those types of events account for approximately 15 percent of pressure loss cases.[25] Arguably, a driver would be well aware of the tire problem in those situations, and the TPMS would provide little added benefit. Instead, TPMSs' benefits lie in warning

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[24] 67 FR 38704, 38728 (June 5, 2002).
[25] Id.

drivers when the pressure in the vehicle's tires is approaching a level at which permanent tire damage could be sustained as a result of heat buildup and tire failure is possible; this low level of inflation pressure generally results from a more measured pressure loss (produced over weeks or months) caused by a slow leak, defective valve, or diffusion. According to the tire industry, approximately 85 percent of all tire pressure losses are slow air losses that occur over hours, weeks, or months of vehicle use.[26] In those cases, a detection time of 20 minutes is not likely to pose a safety risk to the driving public.

The agency's tire research suggests that even in a 25-percent under-inflated condition, the vehicle can be operated safely for this detection period without an appreciable risk of tire failure. Specifically and as noted above, NHTSA conducted testing on a variety of Standard Load P-metric tires at 20 psi with 100-percent load at 75 mph for 90 minutes on a dynamometer, and none of these tires failed.[27] This testing led the agency to conclude that warnings at less severe conditions will give drivers sufficient time to check and re-inflate their vehicles' tires before the tires experience appreciable damage. Commenters advocating a reduced detection time did not provide any evidence to demonstrate that operation of the vehicle with one or more tires under-inflated by 25 percent leads to tire damage or tire failure. Although manufacturers are encouraged to provide the low tire pressure warning as quickly as possible, we believe that a 20-minute detection period is unlikely to result in any adverse safety consequences.

We further believe that a change in the detection time is necessary in order to articulate a standard that is practicable and technology-neutral. According to manufacturers' comments, even direct TPMSs will require additional time to detect and

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[26] Id.
[27] Id. at 38726.

verify low tire pressure, in part as a result of FCC regulations limiting the frequency of electronic transmissions.

Furthermore, we anticipate that the extended time period also will ease compliance for indirect systems (particularly when detecting multiple under-inflated tires). Most indirect and hybrid TPMSs cannot currently meet the four-tire, 25-percent under-inflation detection threshold within 20 minutes. However, we are aware of at least one indirect TPMS that is currently capable of doing so,[28] and we expect that with additional time and effort, other indirect and hybrid systems also would be able to meet the requirements of the standard.

In sum, without an extension of the time period for low tire pressure detection and warning, the number of TPMS technologies available for use under the standard may be significantly curtailed. Available information does not demonstrate a safety need for imposing such limitations, and we believe that drivers would operate the vehicle for 20-minutes periods with some frequency. For these reasons, we believe that a 20-minute detection time period is both practicable and meets the need for motor vehicle safety.

We have decided not to extend the low tire pressure detection time beyond 20 minutes, however, as requested by some manufacturers in their comments. Available research shows that 75 percent of commuters regularly experience commute times of 30 minutes or less.[29] A recent study by the U.S. Census Bureau, using 2002 survey data, found that average commute times for most major U.S. cities range from 20 to 30

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[28] Docket No. NHTSA-2004-19054-96.

[29] This statistic is based upon the results of a Washington Post-ABC News-Time poll conducted by telephone from January 27-31, 2005 among 1,204 randomly selected adults nationwide. Results of this poll were reported in the Washington Post on February 13, 2005, at page A1.

minutes.[30] Many other trips, such as routine errands, may also involve drive times of less than 30 minutes. Therefore, if we were to require a low tire pressure detection time of 30 minutes or more, it is conceivable that consumers could be driving on significantly under-inflated tires for a potentially extended period of time without receiving a warning from the TPMS.

In addition, we are concerned that extending low pressure detection time period beyond 20 minutes could be problematic in other situations. For example, where a tire is punctured by a nail or is otherwise damaged and may experience a moderately rapid pressure loss. As to damaged tires but experiencing a relatively less rapid pressure loss, research into the rate of temperature buildup shows that for constant load, pressure, and speed conditions, tires generally warmed up and stabilized their temperatures within 15 minutes of testing;[31] thus, the tire will rapidly reach a temperature that places stress on an under-inflated tire. In both of those cases, we are concerned that a 30-minute detection time could delay the warning to the driver too long. For these reasons, we have decided that a requirement that would permit a low tire pressure detection time longer than 20 minutes could diminish the overall utility of the TPMS and concomitantly reduce the safety benefits associated with that system.

In response to the concerns of MLHO, it was never the agency's intention to require detection absent vehicle motion. As demonstrated by the standard's test procedures, the detection time for low tire pressure includes a period of vehicle operation within a designated speed range (see S6(f)). This provision for vehicular motion is already built in to the general requirements of S4.1, which provides that the TPMS must

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[30] See http://www.census.gov/acs/www/Products/Ranking/2002/R04T160.htm.

[31] See June 5, 2002 comments of the Rubber Manufacturers Association (Docket No. NHTSA-00-8011-64).

meet the detection requirements of S4 under the test conditions specified in S5 and the test procedures specified in S6 of the standard. We believe that no further modifications to the standard are necessary related to this point.

2. TPMS Malfunction Indicator Lamp (MIL) Activation Requirements

Paragraph S4.4 of the NPRM proposed to require each covered vehicle to be equipped with a TPMS that includes a telltale that illuminates whenever there is a malfunction that affects the generation or transmission of control or response signals in the TPMS and extinguishes when the malfunction has been corrected.

The NPRM's proposed requirement for a TPMS Malfunction Indicator Lamp (MIL) was not included in earlier rounds of the TPMS rulemaking process. Consequently, the agency expected and did receive extensive public comment on this proposed provision. Commenters offered recommendations regarding how quickly the TPMS must detect system malfunctions, the types of functions to be detected, and the test procedures for detecting such malfunctions. Each of these topics will be discussed in turn.

(a) Time Period for Malfunction Detection

The NPRM did not specify a time period for the TPMS to detect a malfunction and to illuminate the TPMS MIL.

The Association of International Automobile Manufacturers, Inc. (AIAM) expressed concern that the NPRM would require detection and notification of a TPMS malfunction immediately upon occurrence. However, AIAM stated that immediate detection is not possible in most cases, because TPMSs generally require the vehicle to be in motion in order to detect a malfunction (an argument also raised by Honda Motor

Co., Ltd. and American Honda Motor Co., Inc. (Honda) and EnTire), and several transmissions from the pressure sensor to the controller are required to validate the existence of a malfunction.

AIMA stated that the FCC requires a pause between signal transmissions at least 30 times as long as the signal transmission itself. In addition, AIMA stated that interference may result in the loss of some of these signals. AIMA argued that a requirement for immediate detection and reporting of a TPMS malfunction could result in many false positive warnings, which could undermine consumers' faith in the system and potentially lead them to ignore TPMS-related warnings (an argument repeated by General Motors North America (GM) and Hyundai in their comments). In light of the above, AIMA recommended that the agency allow the TPMS between 30 and 60 minutes to determine with a high degree of certainty whether a true malfunction is present (*e.g.*, not one caused by signals external to the vehicle). The Alliance made a similar comment, suggesting a 30-minute detection time for a malfunction.

Several other commenters also recommended that the agency specify a time period for the detection of a TPMS malfunction, although the recommended time periods varied. For example, ALPS Automotive, Inc. (ALPS) and Honda commented that a TPMS cannot detect malfunctions any faster than the system can detect low tire pressure and that the same durational parameters should be set for both functions. ALPS, BERU, Schrader Electronics, Ltd. (Schrader), and Fuji Heavy Industries USA, Inc. (Fuji) each recommended a 10-minute detection time. BERU stated that it does not support an "excessive[ly] long" duration for TPMS malfunction detection, because an extended ride (even 20 minutes) with a defective TPMS or an incompatible tire could prevent a low

pressure warning and lead to a tire blow out. BERU also recommended specification of a vehicle moving distance. BERU stated that specifications for "duration" and "vehicle moving distance" are necessary not only for the detection of a malfunction, but also for the validation of the correction of a malfunction.

EnTire and Hyundai recommended a malfunction detection time of 20 minutes. According to EnTire, if a pressure sensor is disabled, it can take over 13.5 minutes for the fault to "mature" and to be detected by the system and suggested 20 minutes as a reasonable detection time. (EnTire also suggested 20 minutes as a reasonable extinguishment time for the MIL, and Fuji recommended that a vehicle be driven at least 10 minutes at a minimum of 40 kph in order to verify that the malfunction has been eliminated.) Hyundai commented that current direct TPMSs are designed so that a failure is recognized only when the control unit does not receive data from the pressure sensor for three to four consecutive delivery cycles. Hyundai stated that current systems, therefore, require approximately 20 minutes to properly detect and verify TPMS malfunctions, a time period consistent with minimization of nuisance warnings.

GM recommended a 30-minute drive time for TPMS malfunction detection. GM stated that the MILs for its current TPMSs have a 25-minute drive period for the detection threshold, and the company is not aware of any consumer complaints arising from delayed TPMS malfunction warnings. GM argued that a TPMS that is programmed to be highly reactive in terms of malfunction detection and that provides an immediate response may result in relatively frequent malfunction warnings because common, everyday occurrences are likely to temporarily disturb the TPMS's signals.

MLHO stated that the regulatory text related to the TPMS malfunction detection requirement should be revised to focus on the detection of a malfunction or correction of a malfunction, rather than the occurrence of those events. MLHO's comment is related to those about the need for the system to have adequate time to detection the presence or absence of a malfunction.

DaimlerChrysler Corporation (DaimlerChrysler) made a general argument that NHTSA has not calculated or otherwise demonstrated any significant safety benefits associated with the TPMS MIL.

Based upon the information provided by the commenters, we have decided to modify our approach to the MIL by providing a time period for malfunction detection and a speed range in which the vehicle will be driven as part of the malfunction detection phase in the test procedures. Specifically, this final rule requires the TPMS to detect a malfunction and to illuminate the MIL within 20 minutes of the occurrence of a malfunction, when the vehicle is driven at a speed between 50 km/h and 100 km/hr.

Several commenters have stated that TPMSs generally require the same amount of time to detect and to verify a malfunction as they do for low tire pressure. As discussed above, the detection time period for low tire pressure has been increased to 20 minutes. A number of commenters stated that 20 minutes would provide adequate time for TPMS malfunction detection, with some commenters recommending an even shorter time period (*e.g.*, 10 minutes). We also believe that specifying a time period for detection addresses MLHO's comment that the standard should not imply a requirement for automatic illumination of the MIL as soon as a malfunction occurs.

We understand that certain TPMS technologies require vehicular motion in order to diagnose a TPMS malfunction, which is similar to the way in which such systems detect low tire pressure. For that reason, we are now specifying in the standard's test procedures that the vehicle will be driving within a designated speed range during the malfunction detection phase.

We see important benefits in including a MIL requirement as part of the final rule. First, the malfunction detection requirement is intended to ensure the long-term functionality of the TPMS by identifying those small number of replacement tires with construction characteristics that would prevent proper operation of the TPMS. Without the TPMS MIL, some drivers would lose the benefit of the low tire pressure warning to be provided by the TPMS. The malfunction indicator was recommended by the Alliance as a solution to this problem. In addition, the MIL could provide ancillary benefits by alerting the driver of other situations where the system becomes non-operational; in some cases, the problem may be temporary (*e.g.*, brief signal disturbance), but in other cases, the MIL may signal the need for repair of the TPMS. In all these cases, it is useful to the driver to be aware that the system is unavailable to provide a low tire pressure warning.

However, with the above said, we do believe that the above accommodations can be made without any significant decrease in safety benefits. A TPMS malfunction does not itself represent a safety risk to vehicle occupants, and we expect that the chances of having a TPMS malfunction and a significantly under-inflated tire at the same time are unlikely. Even if that is the case, we do not believe that a 20-minute detection time would increase occupant risk appreciably.

(b) <u>What Constitutes a TPMS Malfunction</u>

The NPRM proposed to require the MIL to illuminate "whenever there is a malfunction that affects the generation or transmission of control or response signals in the vehicle's tire pressure monitoring system" and to extinguish when such malfunction is corrected (S4.4(a)).

A number of commenters argued that proposed malfunction requirement is overly broad and in need of modification. The Alliance, the organization that originally suggested consideration of a TPMS MIL, stated that it remains committed to providing an in-vehicle indication when there is inadequate signal reception from one or more TPMS sensors. However, the Alliance stated that the technical specifications for the MIL proposed in the NPRM are different than the MILs that Alliance members were expecting and, in some cases, are inconsistent with the MILs that manufacturers are already voluntarily providing.

Fuji stated that although it is reasonable to require malfunction detection for components that sense and transmit tire inflation pressure data, the standard should only require malfunction detection and warning in three situations: (1) when there is inadequate (or no) input signal from the wheel sensors; (2) when there is inadequate (or no) input signal from the antenna to the electronic control module (ECM), or (3) when there is inadequate (or no) input signal from other systems used by the malfunction warning system (*e.g.*, ABS wheel speed input to the ECM). Fuji stated that malfunctions in the TPMS ECM (which contains the logic to determine that a malfunction exists) would be impossible to indicate via the MIL, because the module would not be functioning to operate the lamp.

Sumitomo commented that paragraph S4.4, as proposed, should be modified to require the TPMS to indicate a malfunction under the following two conditions: (1) when wheel speed signals cannot be transmitted from wheel speed sensors to the TPMS, and (2) when tire pressure signals cannot be transmitted from the pressure sensors to the TPMS.

ETV stated that the MIL should indicate the following malfunctions: (1) incompatibility of replacement tires/rims; (2) sensor failure; (3) signal failure in communications channel; (4) reader electronics failure, and (5) telltale bulb failure. ETV argued that there should be a redundancy or failsafe built into the system so that a burnt out telltale bulb can still produce a malfunction warning, so as to alert the consumer that that bulb needs replacement.

Hyundai stated that there are three types of TPMS malfunctions that will require addition of a separate electrical circuit to activate the MIL: (1) disconnection of the power source to the main control unit; (2) disconnection of the power source to the telltale lamp, and (3) disconnection of wiring between the main control unit and the telltale lamp. Hyundai requested that the agency exclude these three malfunctions from the requirements of the standard during the phase-in period, because incorporating detection capabilities for these types of malfunctions would require additional development time. Alternatively, Hyundai suggested that detection of these conditions could be achieved through the bulb check function and supplemental language in the owner's manual; in those cases, the TPMS lamp would not be illuminated during the bulb check, and the driver would consult the owner's manual to be alerted to the TPMS malfunction in such cases.

In addition, Hyundai stated that even though components such as the electronic control unit (ECU) or vehicle speed sensors are involved in TPMS operation, failure of these components should not be considered a TPMS malfunction. Mitsubishi stated that the MIL should not be required to provide a warning during brief interruption of communication between sensors and the ECU because the TPMS uses radio communications that can be affected by external interference; this is a common occurrence that could result in false positive warnings. GM made a similar point about not requiring the TPMS MIL to illuminate during brief and temporary interruption of signals.

The comments of American Suzuki Motor Corporation (Suzuki) discussed the malfunction detection capabilities of the TPMS currently installed on the Suzuki XL-7. According to Suzuki, that system provides a malfunction indication when there is either a loss of power to the TPMS control unit or when there is no electrical connection between the control unit and the TPMS telltale. Suzuki stated that although its system is not compliant with the NPRM's proposed MIL requirements, it believes that its system is just as effective as the MIL technical specifications in the NPRM. Therefore, Suzuki requested that NHTSA adopt "less design-restrictive" requirements for the TPMS MIL, so as to allow continued use of its system.

NIRA Dynamics commented that it is important to keep the malfunction indicator requirements generic, so that any TPMS technology may be used. As examples of limitations specific to certain types of TPMS technology, NIRA Dynamics stated that: (1) many direct systems cannot detect a malfunction when the vehicle is stationary if the sensor does not have any contact with the receiver due to wheel angle; (2) it is impossible

for indirect systems to detect a malfunction when the vehicle is stationary because the wheel must rotate to diagnose the sensor, and (3) indirect systems cannot detect tire incompatibilities. NIRA Dynamics urged that the final rule should simply require TPMSs to be designed to detect malfunctions "according to good engineering practices."

Honda's comments sought confirmation that the following system failures would be excluded from the TPMS MIL activation and warning requirements: TPMS indicator light, TPMS coupler, and meter panel. Honda argued that it would be unnecessary for the TPMS MIL to report these failures because they would be apparent upon bulb check. Honda also requested that the agency issue a laboratory test procedure for generating a TPMS system fault, so as to clear up any confusion related to the types of malfunctions that will be subject to testing.

Continental Teves, Inc. (Continental Teves) also commented that for a hybrid system, it would not be possible for the TPMS to illuminate the MIL to indicate an incompatible tire unless it is on a wheel with a pressure sensor. Continental Teves stated that the TPMS MIL should not be required to illuminate when an incompatible replacement tire is installed, but instead, the system should be permitted to continue to function with reduced performance without the MIL being lit. BMW also stated that the TPMS MIL should not be required to illuminate when system failure is the result of a change to an incompatible tire, because such failure is not the result of a malfunction of the TPMS.

Schrader commented that the TPMS should not be required to signal a malfunction when the ignition locking system is in the lamp-check position, because that status check should be reserved for confirming the functionality of the telltale bulb.

After careful consideration of the public comments, we have decided to retain the NPRM's requirement for the MIL to illuminate whenever there is a malfunction that affects the generation or transmission of control or response signals in the vehicle's tire pressure monitoring system. Although the commenters expressed preferences for TPMSs with reduced malfunction detection capabilities, they did not state that it would be impracticable to provide the proposed warnings. Furthermore, we believe that, given adequate lead time, this requirement is practicable, because a nearly identical malfunction requirement for anti-lock braking systems (ABS) is contained in FMVSS No. 121, Air Brake Systems, and vehicle manufacturers have certified to that standard successfully. We expect that manufacturers would similarly be able to meet the malfunction detection requirements of the TPMS standard.

As drafted, the TPMS malfunction detection requirement is technology-neutral and capable of accommodating system design changes without the need to continually amend the standard. For example, in a direct TPMS, the control signals are generated by the wheel sensor and transmitted to an electronic control unit via an antenna. In contrast, in an indirect TPMS, the control signals may be generated by the ABS wheel sensor and transmitted to the electronic control unit directly. The present requirement encompasses both types of systems.

In response to comments suggesting that the TPMS MIL should only detect specific malfunctions, the agency believes that such restrictions would unnecessarily reduce the safety benefits of the TPMS. Specifications in the standard that would limit malfunctions that must be detected could impose design restrictions on manufacturers because such specifications and the components to which they refer may not be

applicable to current or future TPMS designs. The agency recognizes that the requirement for malfunction detection includes all TPMS components and may require some additional circuitry and software, but we believe that with minor modifications, it would be practicable to monitor all TPMS components for malfunction. Therefore, we are not adopting the specific limitations recommended by the commenters.

We agree with the comment of Schrader that the MIL should not be required to signal a burned out bulb as a TPMS malfunction, because that problem would already be identified during the check-of-lamp function at vehicle start-up.

As discussed previously, we recognize that most TPMSs require vehicular motion in order to detect a system malfunction, so we have incorporated a 20-minute drive time in a designated speed range as part of the standard's test procedures for malfunction detection.

We do not agree with the comments stating that the MIL should not be required to illuminate during periods of brief external signal disturbance. The TPMS is unlikely to know for how long a signal disturbance will continue. Instead, we believe that the driver should be provided a warning that the TPMS system is unavailable to detect low tire pressure. This situation is not a false positive, but instead, it involves a period when the TPMS is unavailable, although through no fault of its own. Once the period of signal disturbance passes, the TPMS should detect that the problem has been resolved and extinguish the MIL, and no additional action on the part of the driver would be required.

In addition, during periods of brief disturbance, the TPMS's circuitry and software may require time to detect a malfunction, and the MIL telltale may ultimately not illuminate. As discussed above, we are requiring the TPMS to detect a malfunction

and to illuminate the TPMS MIL within 20 minutes of the occurrence of such malfunction. This time period for detection should provide the system with an adequate opportunity to determine whether the disturbance is, in fact, brief before illuminating the MIL.

We also disagree with commenters who suggested that the TPMS MIL should not be required to signal when the vehicle is equipped with alternate or replacement tires that prevent continued proper functioning of the TPMS. That requirement is key to the long-term functionality of the TPMS, and unless such a warning is provided, some drivers may lose the benefits of the system entirely. It is plainly foreseeable that most vehicles will outlast their original set of tires, so this requirement is necessary to ensure that consumers continue to receive the TPMS's important information related to low tire pressure.

In response to Honda's comment that the agency should rapidly issue a laboratory test procedure for generating a TPMS system malfunction, we would offer the following clarification and cautionary note. It is our intention to publish guidelines to test facilities that the agency contracts with to conduct compliance testing in the near future. These guidelines are referred to as compliance test procedures, and they are intended to provide a standardized testing and data recording format among the various contractors that perform testing on behalf of the agency, so that the test results will reflect performance characteristics of the product being tested, not differences between the various testing facilities. However, we would stress that vehicle manufacturers' certification responsibilities are linked to the requirements, test procedures, and test conditions articulated in the standard, not the laboratory test procedures.

(c) MIL Disablement

The NPRM did not contain any provision for MIL disablement.

Honda requested clarification as to whether it would be permissible to disable or to suppress the MIL when the TPMS sending units have been removed as a result of the replacement of the original equipment tires and rims with aftermarket components that are not compatible with the direct-sensing TPMS. Honda stated that it had previously received complaints from customers and dealers who encountered this situation and were confronted with a recurrent malfunction warning. The company expressed concern that if the MIL cannot be suppressed in these situations, consumers may become desensitized to MILs generally, which could have negative implications for occupant safety. NADA provided a similar comment.

We do not believe it is appropriate to permit disablement of the MIL when aftermarket tires and rims are installed on the vehicle that are not compatible with the continued proper functioning of the TPMS. In such cases, the TPMS MIL is performing its intended function. We believe that the MIL should continue to operate when tires and rims that are incompatible with the TPMS are mounted on the vehicle, not only to discourage such actions, but also to provide an ongoing reminder that the TPMS is unavailable to provide low tire pressure warnings.

3. Telltale Requirements

The NPRM proposed to require installation of either a single TPMS telltale (*i.e.*, a combination telltale indicating both low tire pressure and system malfunction) or separate telltales for low tire pressure and malfunction indication.

For the low tire pressure warning, paragraph S4.3 of the NPRM proposed to require a telltale that is mounted inside the occupant compartment in front of and in clear

view of the driver, which is identified by one of the symbols for "Low Tire Pressure Telltale" in Table 2 of FMVSS No. 101, Controls and Displays, and is illuminated under the conditions specified in S4.2. For low tire pressure telltales that identify which tire(s) is (are) under-inflated, the NPRM proposed to require that each tire in that symbol must illuminate when then tire it represents is under-inflated to the extent specified in S4.2. That paragraph also proposed to require the low tire pressure telltale to illuminate during a check-of-lamp function, and stated that the telltale would not be required to illuminate when a starter interlock is in operation.

For the TPMS MIL, paragraph S4.4 of the NPRM proposed two options for compliance. As the first option, under S4.4(b), a vehicle manufacturer could install a dedicated TPMS malfunction telltale that is mounted inside the occupant compartment in front of and in clear view of the driver, which is identified by one of the symbols for "TPMS Malfunction Telltale" in Table 2 of FMVSS No. 101, and is continuously illuminated under the conditions specified in S4.4(a). That paragraph also proposed to require the MIL to illuminate during a check-of-lamp function, and stated that the telltale would not be required to illuminate when a starter interlock is in operation.

As the second option, under S4.4(c), a vehicle manufacturer could install a combined Low Tire Pressure/TPMS Malfunction telltale that continues to meet the low tire pressure detection requirements of S4.2 and S4.3 and meets the MIL requirements of S4.4(a) in the following fashion. The NPRM proposed to require the combined telltale to flash for one minute upon detection of any malfunction condition specified in S4.4(a) after the ignition locking system is turned to the "On" ("Run") position. After the first minute, the telltale would be required to remain continuously illuminated as long as the

malfunction exists and the ignition locking system is in the "On" ("Run") position. The NPRM proposed that this flashing and illumination sequence would be required to be repeated upon subsequent vehicle start-ups until the situation causing the malfunction has been corrected, after which time the telltale must extinguish.

(a) Function and Format of the Combined Low Pressure Warning/Malfunction Indicator Lamp

A number of commenters discussed the issue of how the MIL would operate, particularly when it is combined with the low pressure warning telltale. No consensus was evident, as reflected by the variety of viewpoints in the following discussion of comments.

Some commenters argued that the proposed requirements for the TPMS MIL are design-restrictive and may impose unnecessary costs. In its comments, AIAM opposed the use of a flashing low pressure telltale to indicate TPMS malfunction when the MIL is part of a combined format, because such a format may require significant software and hardware changes. AIAM stated that a separate MIL will not be feasible for many vehicles, and that the NPRM's limited MIL design options would restrict a number of potentially innovative solutions (*e.g.*, voice malfunction indicators, other visual or text messaging displays).

AIAM argued that NHTSA instead should include a technology-neutral requirement for a MIL, but leave MIL design to the discretion of the vehicle manufacturer. Porsche Cars North America, Inc. (Porsche) argued that there is no evidence that clear and concise text messages create confusion, and the company recommended that the final rule permit text messages related to TPMS malfunction and

permit those messages to be cleared by the driver (but not permit clearing of the low pressure telltale). The Alliance, BMW, DaimlerChrysler, and VW/Audi all expressed similar views regarding allowing design freedom for MILs with a mix of product offerings. Suzuki suggested that manufacturers should be permitted to explain how different malfunctions are identified in the vehicle owner's manual.

DaimlerChrysler stated that its experience has shown TPMS malfunctions to be uncommon events, and therefore, detailed MIL specifications are not warranted because they do not address a significant safety problem or provide a significant safety benefit. DaimlerChrysler argued that it should be sufficient to have the final rule that the malfunction indicator "be present, visible to the driver, perceptually upright, and explained in the owner's manual."

Others were concerned that the flashing-to-steady-burning MIL could lead to consumer confusion. The Alliance questioned whether having the combined telltale flash for one minute and then become steady burning to indicate a malfunction would confuse consumers as to whether a malfunction or a low tire pressure condition exists. More specifically, Hyundai stated that the initial one-minute flashing sequence may be an insufficient period of time, because, particularly at vehicle start-up, the driver may be preoccupied with other tasks and may not notice the flashing telltale until it becomes steady-burning, at which time it may be misconstrued to be a low pressure warning (a similar comment was provided by Emtop). Hyundai recommended that NHTSA either consider other alternatives (*e.g.*, periodic flashing) or an extension of the one-minute time period for the initial flashing. The comments of Mitsubishi Motors R&D of America, Inc. (Mitsubishi) and the TIA shared this view. DaimlerChrysler, Mitsubishi, and Nissan

North America, Inc. (Nissan) went even further in their comments and suggested a continuously flashing TPMS MIL, which would be distinct from the continuous warning for low tire pressure.

TIA also expressed concern that even if the driver does notice the initial flashing sequence of the combined TPMS telltale, that person still may not comprehend its significance, instead misconstruing it as part of normal vehicle start-up. According to TIA, if that were the case, even a more detailed explanation in the owner's manual would be insufficient because the driver may never realize the need to consult it. TIA also commented that a separate TPMS MIL telltale would add yet another light to an already crowded dashboard. (BMW and Porsche provided similar comments.) BMW commented that a combined telltale would preserve space for future safety-related technologies and warnings.

Porsche argued that the 60-second flashing format for the proposed combined telltale is unwarranted and a potentially dangerous way to signal a TPMS malfunction. According to Porsche, a flashing telltale would send an incorrect message to the driver that something is seriously wrong with the vehicle, potentially alarming the driver and leading to a panic situation that could distract the driver's attention from driving.

In contrast, Emtop argued that there is not any evidence to suggest that flashing telltales produce inappropriate driver responses or that the intended messages are misunderstood, unless the indication is inconsistent.

Fuji's comments suggested that the form of the MIL warning should depend upon the type of malfunction encountered. More specifically, Fuji stated that malfunctions in the TPMS ECM (which contains the logic to determine that a malfunction exists) would

be impossible to indicate via the MIL, because the module would not be functioning to operate the lamp. Fuji recommended that the MIL should flash as long as the malfunction exists in components "downstream" of the ECM (*e.g.*, loss of signal from a wheel sensor) but that the MIL should have continuous illumination for malfunctions of components "upstream" of the ECM (*e.g.*, wiring harness to telltale, loss of power to the ECM). Fuji stated that this hierarchy would not apply to situations where the TPMS failed the bulb check.

NADA stated that the TPMS could use a single warning lamp to indicate a variety of conditions (*i.e.*, low tire pressure, incompatible tires, TPMS malfunction). Under the approach recommended by NADA, when the telltale is illuminated, the owner would consult (at least the first time) the following decision tree provided in the vehicle owner's manual in order to determine the meaning of that illumination: (1) There is an inflation concern. Check tire pressures. If okay, proceed to (2); (2) A tire is incapable of being monitored. Check tires. If okay, proceed to (3); (3) The system is faulty. See your motor vehicle dealer. NADA stated that the final rule should include a requirement for owner's manual language consistent with its recommended approach.

Emtop commented that having separate TPMS telltales for low tire pressure and the malfunction indicator is inadvisable because an additional telltale is costly, would consume limited display space, and would provide little or no additional safety benefit. In contrast to earlier commenters, Emtop argued that having separate telltales would confuse drivers and undermine confidence in the TPMS, and it also argued that allowing a choice in format could further confuse consumers who drive multiple vehicles when they encounter systems with different indicators.

In addition, Emtop recommended reversing the NPRM's approach to the low pressure and MIL warning signals, urging the agency to require the telltale to flash to indicate low tire pressure and to be continuously illuminated to indicate a TPMS malfunction. According to Emtop, a flashing telltale is more likely to be noticed and implies a potential danger, so in this case, Emtop recommended requiring the telltale to flash continuously to indicate low tire pressure, a potentially serious condition which is relatively easy for the driver to correct. (Honda provided a similar comment.) Emtop also recommended this approach because a flashing malfunction indicator would require a control signal that may be unable to produce the requisite flashing if the malfunction affects the control signal itself; according to Emtop, indicating a malfunction in a steady state would be more appropriate because an indicator can be made to default to a fixed state in the absence of a control signal.

In its comments, Emtop also questioned the message conveyed by a flashing-to-steady MIL, which it argued may be confusing, counter-intuitive, and context dependent. According to Emtop, drivers may equate a change in the indicator with a change in condition. Emtop also suggested that the messages in a combined telltale could be confused in situations where low tire pressure is masked by the malfunction warning or where a low pressure warning flickers (*e.g.*, due to fluctuating pressure causing the light to turn on and off), problems which may increase as future TPMS technology reduces system reaction time.

Emtop recommended specifying a flash rate of one to three times per second, noting that the flash rate could be changed to convey a greater sense of urgency to the driver if the situation deteriorates without being remedied. Emtop stated that its TPMSs

already have a progressive flash rate that has been tested and well received by consumers. (EnTire and Honda also recommended specification of a flash rate for the 60-second flashing malfunction indication, as well as a tolerance for the 60-second period. EnTire recommended a tolerance for the 60-second period of ± 10 seconds, whereas Honda recommended a tolerance of ± 5 seconds.)

Public Citizen urged the agency to mandate separate warning indicators for low tire pressure and TPMS malfunction because a combined telltale could be confusing, particularly for older drivers who may have poorer vision and slower reaction times. (Advocates provided a similar comment.) Public Citizen argued that both warning telltales should be required to flash until the underlying problem is corrected. The organization stated that flashing telltales convey a sense of urgency and are more likely to elicit a driver response, and it suggested that a flashing indicator could be programmed to provide additional information, such as by flashing more frequently at increasingly lower pressure levels. Public Citizen argued that the agency has provided no support for a determination that flashing telltales are a nuisance or otherwise unacceptable.

BERU requested clarification of whether the MIL should be illuminated while the system is running validation protocols to determine whether a problem has been corrected. (Presumably, this question applies to both combined and separate TPMS MILs.)

EnTire sought clarification as to whether vehicles that are equipped with *both* of the proposed low tire pressure telltales (*i.e.*, the single symbol and the symbol showing individual tires) are required to have both symbols indicate a TPMS malfunction per the defined procedure or whether the MIL may be incorporated in only one of those telltales.

After considering the public comments and all available information, we have decided to retain the NPRM's general approach to the telltale requirements for both the low tire pressure warning and the TPMS malfunction indicator (with minor modifications), because we believe that this approach provides an effective message to virtually all drivers. As part of this final rule, we have decided to permit use of either separate telltales for the low tire pressure warning and the TPMS malfunction indicator, or a combined telltale that incorporates both functions. We believe that a visual telltale is necessary to provide a clear and consistent message to the driver. We do not believe that other suggested alternatives (*e.g.*, audible or text messages) would be as effective in providing those warnings. Furthermore, we are concerned that leaving the MIL to manufacturer discretion could result in a proliferation of warnings that may not be sufficiently noticeable or understandable to drivers. We believe that these warnings are extremely important in terms of providing tire pressure information to drivers or of alerting drivers when the systems is not available to provide such information. However, manufacturers may supplement the required warnings with these additional messages.

The agency's cost-benefit analysis does not support a mandatory requirement for separate telltales, and we acknowledge that with limited space available on the dashboard, a combined telltale has the potential to preserve precious space for future safety warnings. However, we believe that there is sufficient justification for separate warnings to warrant permitting manufacturers to use separate warning telltales if they elect to do so. We believe that providing these two different compliance options offers manufacturers greater flexibility in terms of their designs without sacrificing the important safety messages related to the TPMS.

If the manufacturer chooses the option for separate telltales, the final rule requires a low tire pressure telltale that is mounted inside the occupant compartment in front of and in clear view of the driver, which is identified by one of the symbols for "Low Tire Pressure Telltale" in Table 2 of FMVSS No. 101, and is illuminated under the conditions specified in S4.2. For low tire pressure telltales that identify which tire(s) is (are) under-inflated, the final rule requires that each tire in that symbol must illuminate when then tire it represents is under-inflated to the extent specified in S4.2. That paragraph also requires the low tire pressure telltale to illuminate during a check-of-lamp function, and states that the telltale is not required to illuminate when a starter interlock is in operation.

For the dedicated MIL, under S4.4(b), the final rule requires the vehicle manufacturer to install a TPMS malfunction telltale that is mounted inside the occupant compartment in front of and in clear view of the driver, which is identified by the word "TPMS," as described under "TPMS Malfunction Telltale" in Table 2 of FMVSS No. 101, and is continuously illuminated under the conditions specified in S4.4(a). That paragraph also requires the MIL to illuminate during a check-of-lamp function, and states that the telltale is not required to illuminate when a starter interlock is in operation.

For the combined low tire pressure warning/MIL option, the final rule requires that the telltale must meet the low tire pressure detection requirements of S4.2 and S4.3 and also meet the MIL requirements of S4.4(a) in the following fashion. Upon detection of any condition specified in S4.4(a) after the ignition locking system is turned to the "On" ("Run") position, the combined telltale must flash for a period of 60-90 seconds, after which, the telltale is required to remain continuously illuminated as long as the malfunction exists and the ignition locking system is in the "On" ("Run") position. This

flashing and illumination sequence must be repeated upon subsequent vehicle start-ups until the situation causing the malfunction has been corrected, after which time the telltale must extinguish.

The final rule's requirement for a 60-90 second time period of flashing of the combined telltale to indicate a TPMS malfunction represents an increase from the NPRM's proposed requirement. We agree with comments that drivers may be distracted by other tasks at vehicle start-up and in some cases may miss a 60-second flashing sequence.[32] However, we remain concerned that drivers may consider a lengthy or indefinite flashing sequence to be a nuisance, which could cause the driver to ignore the safety message. We are also concerned that the flashing telltale should elicit the appropriate driver response. Thus, the final rule's time period for flashing the combined telltale represents the agency's determination as how to best balance these competing concerns. We do not believe that it is necessary to specify a flash rate for the combined telltale, so we leave this matter to the discretion of the vehicle manufacturer.

Although certain commenters objected to the manner in which the low tire pressure and MIL warnings are to be provided, those commenters did not provide any evidence to show that the agency's approach would confuse consumers or that their suggested alternatives would be more effective. The following explains our reasoning in not adopting these suggestions.

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[32] We note, however, that in those cases where the driver does not see the flashing sequence, the anticipated response would be to check and inflate the vehicle's tires. Even if none of the vehicle's tires is "significantly under-inflated," the outcome would be to return the tires to optimal pressure. This outcome would nevertheless be beneficial, although the driver may experience some consternation at the continued illumination of the telltale. In addition, we do not expect that the driver would miss the MIL's flashing sequence on a regular basis.

The TPMS standard represents a novel case in terms of the agency's use of a telltale. Prior to this final rule, NHTSA has not required a flashing telltale for any of the safety systems in any FMVSS. Although we agree with commenters that a flashing telltale is likely to attract driver attention more quickly than a continuously illuminated telltale, we also must consider the appropriateness of the driver's response to the warning.

As we have discussed at various points in the course of this rulemaking, we do not believe that the TPMS's illumination of the low tire pressure telltale represents an urgent situation requiring immediate correction. As noted above, the agency's tire testing has shown that the vehicle can be operated safely with a tire that is under-inflated by 25 percent without an appreciable risk of tire failure for some reasonable period of time (i.e., at least 90 minutes). If a significantly under-inflated tire does not constitute an urgent situation, a TPMS malfunction is even less likely to represent an emergency situation requiring immediate driver attention. Thus, in the situations that would generate a TPMS-related warning, the desired response would not be to have the driver immediately pull over to the side of busy highway. That is the primary reason why the color yellow was selected for the TPMS telltale(s), rather than red. It is also the reason why we have chosen to require continuous illumination of the dedicated TPMS MIL and to require a limited period of flashing followed by continuous illumination (rather than continuous flashing) of the combined TPMS telltale. Particularly when combined with the color yellow, we do not see any reason to believe that a flashing TPMS MIL telltale, in and of itself, would produce a panic response on the part of the driver. Furthermore, we do not

believe it is necessary to require the combined telltale to produce periodic flashing more frequent than upon subsequent vehicle start-ups.

Some commenters suggested reversing the way the warning messages are presented in a combined telltale (*i.e.*, requiring flashing to indicate low tire pressure and continuous illumination to indicate TPMS malfunction). While these arguments are not illogical, we have decided that it is appropriate, in this regard, to retain the approach proposed in the NPRM. We believe that drivers are likely to encounter the low tire pressure warning much more frequently than the malfunction warning. Thus, we believe that this situation should be assigned the continuous illumination format, which represents the norm. The presumably less frequent TPMS malfunction warning is being assigned the flashing-to-continuous illumination format. Although it is arguably true that the low pressure situation would be easier for the driver to correct, we believe that the final rule's approach would minimize the amount of flashing encountered by the driver overall.

We believe that the messages presented by the different compliance options for the TPMS telltale(s) will be clear and apparent to most drivers. However, if any confusion arises, the first time the warning is encountered, the driver would be expected to consult the owner's manual to clarify the matter.

We are not adopting NADA's recommendation to have a single TPMS telltale that would require the driver to run through a hierarchy of diagnostics to determine what type of problem is causing the telltale to illuminate. We envision significant driver frustration with such an approach, particularly in those cases where the telltale remains illuminated after pressure check and correction. This scenario can be avoided by setting

a performance requirement that differentiates between low tire pressure situations and TPMS malfunctions.

In response to BERU's request for clarification, we note that the final rule requires the TPMS MIL to remain illuminated until such time as the condition causing the malfunction has been corrected. Accordingly, the MIL must remain illuminated while the system is running any validation protocols to determine whether the problem has been resolved, as the telltale is permitted to extinguish only after the TPMS can confirm that the system is again fully operational.

In response to EnTire's question, if the vehicle manufacturer elects to incorporate both of the TPMS low tire pressure telltales, it is only necessary to include a malfunction indicator in one of those telltales. Requiring both telltales to indicate a malfunction would not only be redundant, but it would also unnecessarily increase the amount of flashing experienced by the driver. We leave it to the manufacturer's discretion to choose in which of the two telltales the MIL should be incorporated.

Regarding Fuji's comment that the MIL should flash in certain circumstances and be continuously illuminated in other circumstances (depending upon the type of malfunction), we have decided not to adopt that recommendation. We are concerned that having different types of malfunction warnings within the same system could lead to consumer confusion. In order to detect malfunctions in all TPMS components, some additional circuitry and software logic may be required, as compared to current designs. We recognize that a failure of the control unit would be difficult to detect without appropriate circuitry and logic. Nevertheless, we believe that such a requirement for a flashing MIL would be practicable and achievable for all types of malfunctions.

(b) Telltale Symbols for Low Pressure Warning and Malfunction Indication

Several commenters stated that the proposed symbols for low tire pressure and TPMS malfunction are difficult to distinguish and, therefore, potentially confusing. Emtop argued that to the extent that the symbols are confused, drivers may delay taking the appropriate remedial action, and it further stated that misunderstood telltales could undermine confidence in the TPMS.

In its comments, the Alliance challenged statements in the NPRM indicating that the proposed symbol for the TPMS MIL could be recognized by consumers or that it would help achieve the desired response. The Alliance argued that the TPMS Docket does not provide documentation of the agency's evaluation of possible icons or the results of any focus group evaluation or study of such icons. The Alliance also stated that the proposed MIL icon is not consistent with the approach to other ISO standards, which indicate malfunctions by adding an exclamation point symbol ("!"). Accordingly, the Alliance argued that, in this instance, the MIL would require the addition of another exclamation point ("!") on the side of the low tire pressure symbol. The Alliance commented that it is not aware of any ISO symbol attributing a meaning to the dashed element found in the NPRM's proposed TPMS MIL symbol, and instead, it suggested an alternate symbol (*i.e.*, the low tire pressure icon with the capital letters "TPM" in the middle).

Honda also recommended modifying the proposed TPMS malfunction warning telltale. Honda stated that the proposed malfunction symbol is new and not an internationally recognized symbol for TPMS malfunction, so Honda argued that there is

latitude for a change. It recommended using the word "TPMS" for the system malfunction telltale. (Hyundai provided a similar comment.)

VW/Audi suggested that for the malfunction indicator, a more meaningful TPMS malfunction symbol might utilize the low tire symbol with a diagonal bar across it, a feature that is generally interpreted as the negative of the underlying symbol.

ETV expressed support for the proposed TPMS telltale that has the outline of a car with lighted indicators at each tire that can provide tire-specific information by referencing its installed location. ETV commented that, as opposed to the proposed ISO telltale design (which ETV referred to as the "cutaway tire"), the alternate symbol provides a "common sense" and readily recognizable symbol for low tire pressure, which would leave the car symbol's roof area available for the TPMS malfunction signal. ETV urged NHTSA to require that the visual telltale be supplemented with an audible alarm.

Advocates stated that the final rule should only permit the low tire pressure telltale that is capable of alerting the driver as to which tire is under-inflated, because motorists may not respond appropriately to re-inflate their tires unless they can tell which tire(s) is (are) under-inflated. Advocates argued that NHTSA has not provided any data regarding how consumers will react to a warning telltale that does not indicate which tire is under-inflated.

In the final rule, we have decided to adopt the NPRM's symbols for low tire pressure, but we have decided to change the requirement for the MIL symbol. For the low tire pressure warning, an internationally recognized symbol has been developed by ISO, and we are adopting that symbol as one of the options under FMVSS No. 101. In addition, we are providing an option for a telltale with a car symbol that would allow the

TPMS to indicate which tire(s) is (are) significantly under-inflated by illuminating the corresponding tire on the telltale, which we believe would be readily understandable and also provide additional useful information to the driver. These symbols may be supplemented by the words "Low Tire."

We are not expressing any preference between these two symbols. Not all TPMSs may be able to distinguish and identify which tire is significantly under-inflated, and we expected that if the low tire pressure telltale were to illuminate, most drivers would check and adjust the pressure in all of their tires. Further, the Advocates did not provide any data to demonstrate that the consumers would be confused by ISO's international symbol for low tire pressure. Therefore, in order maintain a technology-neutral standard, we are adopting the NPRM's two options for the TPMS low tire pressure symbol.

Regarding the symbol for the TPMS malfunction indicator using a separate telltale, we have decided to modify the requirements proposed in the NPRM. (For those systems providing a combined low tire pressure/TPMS malfunction warning in a single telltale, no additional symbol is required because malfunction is indicated by the flashing sequence discussed above.) Several commenters stated that the ISO symbol for low tire pressure and NHTSA's proposed symbol for the MIL were so similar as to be confusing. In addition, as noted by Honda and Emtop, there is not any internationally recognized symbol for TPMS malfunction, so the agency has latitude in selecting an appropriate symbol for the MIL.

We agree that the TPMS-related telltales should be sufficiently distinct and comprehensible, so as to facilitate proper driver response in both low tire pressure and

TPMS malfunction situations. Accordingly, consistent with the recommendations of Honda and Hyundai in their comments, we have decided that for dedicated TPMS malfunction telltales, the telltale must display the word "TPMS," without any symbol. We understand that the term "TPMS" is becoming commonly known, and, because it references the system itself, it is distinct from the low tire pressure warning. We do not believe that VW/Audi's suggested approach of having the low pressure symbol inside a circle with a diagonal slash through it would provide sufficient clarification. In the event that the International Standards Organization (ISO), the Society of Automotive Engineers (SAE), or some other voluntary standards organization develops a symbol for TPMS malfunction, the agency would carefully evaluate such symbol and consider migration to the consensus standard as part of a subsequent rulemaking. We will carefully evaluate the distinctness and comprehensibility of any such symbol.

We are not adopting ETV's recommendation that we require an audible alarm to accompany the TPMS telltale(s), because we believe that the requirements of the final rule provide an adequate warning to the driver.

(c) Telltale Color

(i) Low Pressure Warning Telltale

The NPRM proposed to require a yellow telltale to indicate to the driver when a tire becomes significantly under-inflated (see Table 2 of FMVSS No. 101).

BMW commented that manufacturers should be permitted (but not required) to change the TPMS low pressure telltale from yellow to red once tire pressure becomes "extremely low." BMW recommended that the TPMS should be allowed to change from yellow to red once the tire(s) drop 50 percent or more below placard pressure, a point at

which the tire can be considered functionally flat. In its comments, BMW emphasized that this feature is particularly important for run-flat tires, because a consumer may not be able to determine by visual inspection or by handling feedback that the tire is flat. According to BMW, run-flat tires are designed to be driven with a loss of inflation pressure, but only at low speeds and for a limited distance; therefore, the consumer must be advised not to continue driving for an extended period of time or at highway speeds.

VW/Audi and Emtop provided similar comments about permitting the low tire pressure warning to change from yellow to red at a specified point. VW/Audi asserted that this functionality is desirable, both as a matter of safety (*i.e.*, to provide a heightened level of alert to indicate that the risk of tire failure is at a higher level) and as a matter of practicability (*i.e.*, to permit a single location for the basic warning indicator and the heightened red alert).

ETV also suggested linking a change in telltale color to a change in tire pressure, although at a much earlier point than other commenters. Specifically, ETV recommended requiring illumination of a yellow telltale when a tire is 20 percent below placard pressure, but changing the color to red (with an accompanying beep) when the pressure drops to 25 percent below placard pressure. ETV argued that this color change would not confuse drivers and that it may encourage more immediate action to remedy the under-inflation situation.

For the final rule, we have decided to adopt the NPRM's proposed requirement for a yellow low tire pressure telltale. The issues of the appropriate telltale color and the possibility of changing from one color to another have been raised in earlier rounds of this rulemaking, and the commenters on the NPRM have largely reiterated arguments

raised previously. The following summarizes our reasoning for the yellow color requirement.

As we noted in the NPRM, we believe that yellow is the most appropriate color for the low tire pressure telltale. The use of the color red is usually reserved for telltales warning of an imminent safety hazard. An example is the brake system warning telltale, which is red because a failure in the vehicle's brake system results in an imminent safety hazard that requires immediate attention. In contrast, NHTSA requires a yellow telltale for driver warnings when the safety consequences of the malfunctioning system do not constitute an emergency and the vehicle does not require immediate servicing. Based upon the results of the agency's tire testing, we have concluded that yellow is the appropriate color for the low tire pressure telltale because it conveys the intended message that the driver may continue driving, but should check and adjust the tire pressure at the earliest opportunity.

To respond to the commenters' requests that NHTSA permit a telltale that changes color from yellow to red, we are concerned that this could confuse consumers, particularly if it is left to the discretion of individual vehicle manufacturers to decide the level of under-inflation at which the red telltale is triggered. Conceivably, it would be possible for a vehicle manufacturer to program the TPMS to illuminate a yellow telltale for a fraction of a second, after which time, it would immediately turn red; such a requirement would meet the letter of the requirement, but foil its intent.

As a counterpoint to ETV's argument, we believe that it is possible that if a driver knows that the TPMS low tire pressure warning will eventually shift from yellow to red, that person may elect to postpone taking remedial action until that time, a result quite

contrary to that which is intended. It is conceivable that such drivers might actually take corrective action more quickly if they know that the illumination of the yellow low tire pressure telltale is the only warning that they will receive. However, in any case, we expect that such delayed action would be the anomalous response.

Therefore, although we are retaining the yellow color requirement for the low tire pressure telltale, we have decided that vehicle manufacturers may supplement the required low pressure telltale with an additional warning. For example, vehicle manufacturers may choose to incorporate a second, red lamp to accompany the continuously-illuminated yellow low tire pressure telltale. This red lamp could be illuminated when the pressure in one or more tires becomes dangerously under-inflated, as defined by the vehicle manufacturer. This approach is consistent with our traditional practice of allowing manufacturers to incorporate measures, consistent with Federal motor vehicle safety standards, which are designed to further enhance safety. If a vehicle manufacturer chooses to add a second, red warning lamp, its meaning and function would have to be discussed in the vehicle owner's manual.

We are not adopting ETV's suggestion for requiring an audible beep when tire inflation pressure drops to some point lower than 25 percent below placard pressure, because the commenter has not provided any evidence to show that this redundant warning signal is necessary. Likewise, we are not adopting to adopt ETV's recommendation for a 20-percent under-inflation threshold, for the reasons discussed above.

(ii) Malfunction Indicator Telltale

The NPRM proposed to require the color for the MIL to be yellow, regardless of whether it is incorporated in a combined telltale with the low tire pressure warning or is provided as a separate, dedicated telltale. For the combined telltale, the proposed MIL color requirement would carry through from the low tire pressure telltale's color requirement, and for the dedicated MIL, the proposed color requirement was set forth in Table 2 of FMVSS No. 101.

In its comments, the Alliance expressed support for requiring the dedicated TPMS malfunction indicator telltale to be yellow, to be constantly illuminated as long as the malfunction exists, and to perform a bulb check as required for other telltales.

ETV stated its belief that a systemic failure of the TPMS should illuminate a red warning telltale, because the gravity of this situation is on par with a tire failure.

In the final rule, we are adopting a yellow color requirement for the MIL, both for the combined telltale and separate telltale options. As noted under the earlier discussion of the MIL, we do not believe that a TPMS malfunction constitutes an inherently dangerous situation requiring immediate corrective action, and just because the TPMS is malfunctioning, it does not necessarily mean that the vehicle's tires are under-inflated. Thus, if a yellow telltale is appropriate for the low tire pressure warning, we do not believe that there is justification for a more stringent warning for the TPMS MIL, as would be indicated by the color red.

(d) Telltale Extinguishment Requirements

Under S4.2(b), the NPRM proposed to require that the low pressure telltale "must extinguish after the inflation pressure is corrected." Similarly, under S4.4(a), the NPRM

proposed to require that the TPMS malfunction telltale "extinguishes when the malfunction has been corrected."

Continental Teves commented that S4.2 is not technology-neutral because it does not provide for systems requiring manual reset (*e.g.*, hybrid systems). It recommended that the final rule permit the telltale to stay illuminated until the low-pressure situation has been corrected and the system has been reset in accordance with any applicable instructions in the owner's manual.

Schrader expressed concern that drivers will use TPMS reset buttons to extinguish the low pressure warning lamp without correcting the tire inflation problem, in order to extinguish the "annoying" telltale. In order to prevent such occurrences, Schrader stated that the final rule should not permit TPMSs with a manual reset feature that would allow consumers to recalibrate the system.

Emtop stated that the low tire pressure warning should not be extinguished until the tire pressure is at least 10 percent above the level specified in S4.2(a) of the NPRM.

We disagree with the comments of Continental Teves, which stated that S4.2 is not technology-neutral because that section does not specifically mention that the TPMS will be reset in accordance with any applicable instructions in the vehicle owner's manual. Although system reset was not specifically mentioned in S4.2, it is clearly addressed in S6(c), S6(i), S6(j), and S6(1) of the test procedures. However, in order to foster a better understanding of this provision, we have provided additional clarifying language in S4.2 of the final rule.

We agree with Schrader that drivers should not reset the TPMS so as to extinguish the low tire pressure warning telltale (or the MIL) until the underlying problem has been

corrected (*e.g.*, restoring proper inflation pressure or remedying other problems). We believe that vehicle manufacturers will clearly address this issue when explaining the TPMS reset feature, if applicable. We believe that no additional language is necessary on this point.

As to Emtop's recommendation that we should require the tires to be refilled to at least 10 percent above the level specified in S4.2(a) of the NPRM before permitting the telltale to extinguish, we do not believe that such a requirement is necessary. First, if a tire is inflated to a level above the TPMS low tire pressure warning threshold, it is presumably safe to drive. In addition, we do not believe that such a provision is necessary, because we would expect consumers to fill all four tires to the recommended inflation pressure once the low tire pressure telltale illuminates.

(e) Telltale Illumination Priority

The NPRM did not provide any specification for telltale illumination priority for the combined TPMS telltale, in the event that the vehicle's TPMS encounters both a low tire pressure situation and a TPMS malfunction.

Several commenters urged the agency to clarify how to prioritize the messages for the low tire pressure warning and the MIL in a combined TPMS telltale, in the event that both of the underlying conditions materialize simultaneously. In their comments, Fuji and Mitsubishi each stated that the low tire pressure warning should take precedence over the TPMS malfunction warning. Honda suggested that the flashing sequence could occur immediately before and after one minute of steady illumination.

Emtop's comments suggested that, in many cases, illumination priority may be a non-issue, because, according to Emtop, if one of the telltales is operative, the other

inevitably is not. Emtop stated that if there is a TPMS malfunction, then the low tire pressure telltale is unlikely to be able to provide reliable information. However, Emtop stated that the low tire pressure warning should take priority, if there is a malfunction affecting only one tire; in those cases, the system should continue to provide low tire pressure warnings for the unaffected tires, to the extent possible.

Fuji expressed concern that if the low tire pressure warning has complete priority over the malfunction warning, resetting the low pressure telltale could clear the malfunction telltale and would require a complete diagnostic check cycle before illuminating the malfunction telltale.

We believe that cogent arguments can be made that either the low tire pressure warning or the malfunction warning should be given priority in a combination telltale, as both messages relay important information to the driver. However, we would preface this discussion by saying that we expect that the simultaneous occurrence of a low pressure situation and a TPMS malfunction would be a very rare event.

Furthermore, we believe that the ability of the TPMS to monitor both low tire pressure and a malfunctioning component simultaneously may be a derivative of system design. For example, if a vehicle were equipped with TPMS with a low pressure telltale that depicts a vehicle with a light at each wheel, the TPMS could conceivably experience a malfunction in the sensor for one tire (thus triggering a malfunction warning) but still be capable of detecting low pressure in the remaining three tires. In contrast, a different TPMS system might be equipped with a low pressure telltale that does not distinguish individual tires, and a malfunction in its central processing unit may wholly disable the system's under-inflation detection capabilities. To the extent that a malfunctioning

system can maintain some residual level of under-inflation detection capability, that would be beneficial, but it is not a result that could be consistently expected across TPM systems or even from a single system at different times.

As a result, we have decided to leave the issue of telltale illumination priority for the combined telltale to vehicle manufacturer discretion. We believe that because the manufacturers are the ones most familiar with the capabilities of their individual systems, they are the ones best equipped to handle this issue.

(f) Supplemental Telltale

Nissan sought clarification that it would be permissible to install a "continuously-flashing yellow light" instead of a second, red light on vehicles equipped with run-flat tires, in order to warn the driver when the tires have reach a level of under-inflation necessitating more immediate action. Nissan stated that the flashing light would provide a warning that the tire may not be appropriate for continued use, but it would not indicate the level of urgency associated with a red light. Nissan commented that it believes that its proposed continuously flashing light is sufficiently distinct from the TPMS combined telltale with the one-minute flashing sequence as to permit the driver to distinguish between the two situations, and that the operation of the TPMS telltales would be fully explained in the vehicle owner's manual.

The NPRM's discussion of how it would be permissible for a vehicle manufacturer to install an additional red lamp to warn when a tire is extremely under-inflated (as defined by the manufacturer) was intended to provide one example of a supplemental TPMS telltale that could be provided. Other supplemental telltales, such as

the one suggested by Nissan in its comments, would also be permissible, provided that they do not prevent the required TPMS telltale(s) from complying with the standard.

For example, for the flashing yellow lamp proposed by Nissan, we caution that it would not be permissible for that lamp to be superimposed on the required TPMS telltale(s), either the combined telltale or either of the separate TPMS telltales. We are concerned that if that were to occur, the required, continuously illuminated yellow low tire pressure telltale could be perceived as a flashing telltale. If the supplemental lamp were included in a combined TPMS telltale, the confusion could escalate even further. Thus, a supplemental telltale for TPMS must not impede or mask the functionality of the required TPMS telltale.

4. Tire-Related Issues

(a) Replacement Tires and Spare Tires

As discussed above in further detail, the NPRM proposed to require vehicle manufacturers to certify that their TPMS-equipped vehicles comply with FMVSS No. 138 with the tires installed at the time of initial vehicle sale.

Public Citizen objected to the NPRM's approach vis-à-vis replacement tires, arguing that it would be feasible for vehicle manufacturers to recommend replacement tires that would work with the system and that TPMS technology should be flexible enough to accommodate new tires. Public Citizen argued that NHTSA should require vehicle manufacturers to certify that the TPMS will operate with all replacement tires and original equipment full-sized spare tires.

Advocates expressed concern that if consumers install tires that are incompatible with the TPMS, they may elect to disable or disregard the TPMS MIL rather than replace

the tires (presumably for reasons of cost). Even if tire incompatibility is a relatively uncommon event, Advocates argued that drivers may lose the benefits of the TPMS in those cases. Advocates stated that if NHTSA decides to permit incompatible replacement tires, the agency has an ongoing responsibility to determine which tires are incompatible and that this responsibility should not be shifted to the public. Instead, Advocates stated that the agency should issue frequent consumer notices regarding replacement tires that are incompatible with different TPMSs, perhaps as part of NHTSA's UTQG consumer information efforts. (A similar comment was provided by NADA, urging NHTSA to develop and maintain a comprehensive database of tire/rim combinations that would not work with particular TPMSs installed on certain vehicles.)

Advocates also argued that the TPMS should be required to comply with the standard when a full-sized spare is mounted on the vehicle, and that use of a compact spare tire should trigger the TPMS MIL. Advocates argued that requiring that compact spares cause illumination of the MIL presumably would encourage the driver to replace the spare tire quickly with a full-sized tire.

ETV stated that use of a spare tire should not totally disable the TPMS. ETV argued that although it would be preferable to have the TPMS monitor the spare tire as well, use of a spare tire should not mask a low tire pressure problem with another tire.

The RMA commented that the number of replacement tires in use at any given time is very high, since tires normally will be replaced two or three times over the life of a vehicle. Therefore, the RMA stated that the TPMS should be required to function with replacement tires, and that permitting incompatible replacement tires is contrary to the purpose of the TREAD Act and could compromise consumer safety. The Japan

Automobile Tyre Manufacturers Association, Inc. (JATMA) expressed support for the comments submitted by the RMA, including the comment on the need for the TPMS to continue to function properly with replacement tires.

The TIA did not agree with the NPRM's approach limiting the standard's requirements to those tires installed on the vehicle at the time of initial vehicle sale. The TIA stated that in recent years, the number of replacement tires shipped has been about four times greater than the number of OE tires shipped, which supports the common understanding that vehicles generally outlast their OE tires. In light of these statistics, the TIA argued that it would be unacceptable to allow a TPMS to cease to function after the vehicle's tires are replaced, for reasons of public safety and in observance of congressional intent under the TREAD Act.

The TIA reiterated its earlier comments on the TPMS rulemaking (submitted by the Tire Association of North America (TANA), as TIA was then known), in which the organization asked NHTSA to ensure that vehicle manufacturers provide affordable access to TPMS service information to all tire dealers and service providers. In its earlier comments, TANA stated, "Original Equipment Manufacturers (OEMs) and their wholly-owned or endorsed stores should not be the only businesses with the ability to service or reset these systems, restricting the ability of consumers, tire dealers, aftermarket specialists and others to service these TPMSs by requiring codes, special equipment, computer software, or other methods of restricting automotive service."[33]

The TIA argued that without this type of information, it would be very difficult for an independent dealer to know how to install, repair, or reset each type of TPMS. It stated that tire rotation also could become a major problem if telltales are used that

[33] Docket No. NHTSA-2000-8572-129.

indicate each individual wheel, as opposed to a TPMS that simply warns of a low tire pressure problem generally. The TIA stated that, in order to help with these issues, it is in the process of developing a comprehensive TPMS training program for the tire industry, with the goal of bringing OE and aftermarket TPMS manufacturers together to compile all necessary information on servicing each TPMS for the benefit of any individual performing tire service. According to TIA, this program should be launched in the first quarter of 2005. Because of this program, TIA argued that it is appropriate for the TPMS final rule to require vehicle manufacturer certification that the vehicle's TPMS will continue to function after the OE tires are replaced.

SEMA expressed support for NHTSA's tentative decision to apply the rule to only the original tires and wheels installed on the vehicle at the time of first sale. SEMA stated that requiring manufacturers to certify the vehicle under the standard with aftermarket tires and wheels would be unduly burdensome, although the organization urged NHTSA to go even further in terms of addressing burdens under the rule (see comments on Small Business Impacts below).

NADA argued that no legal liability should result in cases where a particular tire/wheel combination cannot be properly monitored by a particular TPMS. NADA stated that if tires and rims that meet the applicable requirements for FMVSSs directly dealing with such equipment are properly installed on a vehicle, the fact that such installation causes illumination of the TPMS MIL should not be considered a violation of 49 U.S.C. 30112(a), which prohibits the sale of noncomplying motor vehicle equipment; in such cases, the MIL would illuminate, but there would be no defect or noncompliance. In its comments, the NADA also stated that installation of incompatible replacement tires

should not be considered a violation of 49 U.S.C. 30122(b), because there would be no "make inoperative" situation (*i.e.*, action to take the vehicle out of compliance with an applicable FMVSS) unless the repair business were to somehow override the MIL. In addition, NADA suggested that tire and wheel manufacturers should be required to certify to consumers and tire installers as to the TPMSs with which their tires are or are not compatible.

Fuji requested that NHTSA adopt explicit language in the regulatory text of the final rule acknowledging that replacement tires and spare tires are not covered under the standard. Fuji recommended the definition of "tire pressure monitoring system" or paragraphs S4.2(a) and (b) of the NPRM as potential locations for inclusion of such a statement. Fuji argued that unless clarifying language is added, there may be confusion in the future as to which "four tires" must be monitored.

After considering these comments related to TPMS functionality with replacement tires, we have decided to adopt the approach presented in the NPRM to require the TPMS-equipped vehicle to be certified with the tires originally installed on the vehicle at the time of initial vehicle sale. We emphasize that it would not be permissible for dealers to install tires on a new vehicle that would take it out of compliance with the TPMS standard, and to do so would violate the prohibition on manufacturing, selling, and importing noncomplying motor vehicles and equipment in 49 U.S.C. 30112. If the consumer cannot expect to acquire a vehicle that meets all applicable safety standard at the time of first purchase, the purpose of Standard No. 138, and in fact all Federal motor vehicle safety standards, would be severely undermined. Furthermore, we expect that vehicle manufacturers, in light of their close relationship to

their dealers, would provide sufficient recommendations to allow dealers to install alternate tires that permit the TPMS to function properly.

In order to ensure continued long-term functionality of the TPMS, the final rule requires a TPMS malfunction indicator capable of detecting when a replacement tire is installed which prevents continued proper functioning of the TPMS and of alerting the driver about the problem. (The interplay between the TPMS MIL and the activities of aftermarket sales and service providers related to TPMSs, including legal implications of those activities, are discussed below.)

As noted in the NPRM, there are several factors that have contributed to our decision as to how to best ensure the long-term functionality of the tire pressure monitoring system. First, information presented to NHTSA shows that there are currently over four million TPMS-equipped vehicles.[34] Neither the agency nor vehicle manufacturers have received reports indicating any significant performance problems with those TPMSs when replacement tires are installed on the vehicle. In addition, the agency has noted previously that aftermarket direct TPMSs are available and that such systems may be capable of functioning regardless of the construction of the tires.[35] NHTSA does not have any information to suggest a significant problem with the operation of aftermarket TPMSs, although the performance capabilities of these systems are not known. This significant real world population of TPMSs suggests that TPMSs will continue to work with replacement tires in the vast majority of cases.

However, NHTSA has been presented with data demonstrating that a very small number of replacement tires (estimated at less than 0.5 percent of production) may have

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[34] Letter from Robert Strassburger, Vice President, Alliance of Automobile Manufacturers, to NHTSA (October 20, 2003) (Docket No. NHTSA-2000-8572-277).

[35] 67 FR 38704, 38731 (June 5, 2002).

construction characteristics and material content that cause the vehicle's TPMS to exhibit functional problems.[36] There is no clear design solution for this problem. In many instances, TPMSs may function properly even when equipped with replacement tires with the previously discussed characteristics. However, to date, it has not been possible to develop an appropriate performance measure that would reliably identify those anomalous tires that would prevent proper TPMS functioning.

The commenters did not provide any new information that would suggest that the technical problems related to TPMS functionality with all replacement tires have been resolved, or that it has become possible to identify that small subset of problematic tires that would prevent the TPMS from continuing to operate properly. Comments noting the prevalence of replacement tires in operation do nothing to resolve the underlying technical problems previously identified.

Further, it is NHTSA's understanding that some of the reported compatibility problems between direct TPMSs and certain replacement tires may have been related to vehicle manufacturer use of TPMS transmitters and receivers produced by different suppliers.[37] Incompatibility between different parts of the TPMS may have contributed to the overall problem in those cases. Thus, cognizance of this problem may limit further the number of incidents of incompatibility between TPMSs and replacement tires.

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[36] The RMA submitted information on the prevalence of tires with characteristics identified as potentially being incompatible with proper TPMS functioning, at least in some cases. These problems are primarily related to the tires' construction (*e.g.*, high carbon content in low aspect-ratio tires, thicker sidewall, or steel body ply sidewall). According to the RMA, in 2002, light vehicle tires having either steel body ply cords (steel casing tires) or run-flat capability accounted for less than 0.5 percent of tires distributed in the United States. (See letter from Steven Butcher, Vice President, Rubber Manufacturers Association, to NHTSA (October 31, 2003) (Docket No. NHTSA-2000-8572-282)).

[37] GM submitted a letter to NHTSA on September 11, 2003, outlining the problems that their direct TPMS was experiencing when different run-flat tires were installed on the vehicle. (Docket No. NHTSA-2000-8572-275) Subsequent discussions revealed that TPMS components from different TPMS manufacturers were used and that the same tires permitted proper TPMS functioning when TPMS components from a single TPMS manufacturer were used.

Based upon the above information, we now believe that there is not a sufficient basis to require vehicles to comply with FMVSS No. 138 with all replacement tires. While the number of tires expected to be incompatible with the TPMS is small, such a requirement would nonetheless raise significant practicability concerns. Because no one is certain which tires, either produced now or in the future, will cause various TPMSs to malfunction, it is not practicable to require vehicle manufacturers to certify that the TPMS will continue to function properly with all replacement tires.

We continue to believe, however, that the TPMS should continue to function properly beyond the point at which the vehicle's original tires are replaced, a clearly foreseeable event. Continued TPMS functionality with replacement tires is consistent with Congress' intention to improve tire and vehicle safety, as expressed in the TREAD Act. Moreover, there are other TPMS failure modes (*e.g.*, pressure sensor battery life, pressure sensor failure, antenna failure, TPMS power loss), and unless drivers are made aware of such failures, they could have a false sense of security. Therefore, we are adopting a requirement that the TPMS be equipped with a telltale indicator that would alert the driver of a TPMS malfunction, tire-related or otherwise. In addition, we are adopting owner's manual requirements to make consumers aware of this potential problem.

In the final rule, we have decided not to require the TPMS to monitor the pressure in a spare tire (either compact or full-sized), either while stowed or when installed on the vehicle, and the agency will not conduct compliance testing for low tire pressure detection under Standard No. 138 with a spare tire installed on the vehicle. As we discussed in the NPRM, we have come to this decision for a number of reasons. First, we

believe that most drivers know that temporary tires are not intended for extended use. Second, compact spare tires pose operational problems for both direct and indirect TPMSs. Such a requirement would be a potential disincentive for the vehicle manufacturer to supply a full-sized spare (or any spare tire) if TPMS compliance were required. In addition, it would increase the cost of the rule, but provide little if any safety benefit.

However, if a spare tire is installed on the vehicle and it prevents the TPMS from being able to detect low tire pressure, the TPMS must illuminate the MIL, as it would with any other TPMS malfunction. We believe that such a requirement is important to remind the driver to replace the spare tire, either by repairing the damaged tire or purchasing a new replacement tire. In that way, the TPMS would encourage drivers not to continue driving on the spare tire for extended periods and to rapidly return the spare tire to its emergency reserve status.

We do not agree with Fuji's comment regarding the need to include additional regulatory text to clarify that replacement tires are not covered under the standard. Unless some special provision is included, a FMVSS is understood to require vehicle certification with original equipment. However, because the vehicle may come equipped with a spare tire as original equipment, we have added language to the test conditions to clarify that the spare tire will not be installed for the purposes of low tire pressure testing (see S5.3.7).

Regarding the issue of consumer awareness of replacement and aftermarket tires that are inconsistent with continued proper TPMS functionality, we believe that vehicle manufacturers and the tire industry will have strong incentive to make information on

incompatible tires available to consumers and to businesses supplying automotive equipment and services. However, because no one is certain which tires, either produced now or in the future, will cause various TPMSs to malfunction, it is not reasonable to expect vehicle manufacturers to make assurances to other businesses or to consumers that the TPMS will continue to function properly with all replacement tires or to attempt to identify all incompatible tires and rims. For its part, NHTSA will notify vehicle manufacturers when incompatible tires are discovered during compliance testing, and the results of such tests are publicly available.

Finally, we would address NADA's comments regarding the legal implications for aftermarket installers and vehicle repair businesses who either install aftermarket tires or rims on the vehicle or who service the TPMS. We would begin by noting that the TPMS standard is not the first to require a malfunction indicator. Malfunction indicators are also required under FMVSS No. 105, Hydraulic and Electric Brake Systems, and FMVSS No. 121, Air Brake Systems, and a "readiness indicator" is required under FMVSS No. 208, Occupant Crash Protection. Such malfunction indicators are generally favored because they provide important information to consumers, as well as to businesses with an interest in vehicle system operations.

Under 49 U.S.C. 30122(b), "A manufacturer, distributor, dealer, or motor vehicle repair business may not knowingly make inoperative any part of a device or element of design installed on or in a motor vehicle or motor vehicle equipment in compliance with an applicable motor vehicle safety standard prescribed under this chapter [49 USC §§ 30101 *et seq.*] unless the manufacturer, distributor, dealer, or repair business reasonably believes the vehicle or equipment will not be used (except for testing or a similar purpose

during maintenance or repair) when the device or element is inoperative." As a general matter, malfunction indicators can alert consumers when one of the above entities has made a vehicle modification that has rendered a functioning system inoperative. In such instances, the business presumably took such action inadvertently and would remedy the situation accordingly once the malfunction indicator is triggered.[38] This principle is important, because such modifications may: (1) make the monitored system itself incapable of functioning; (2) have an appreciable impact on vehicle safety, and (3) be relatively difficult for the consumer to remedy.

However, the situation surrounding the TPMS malfunction indicator represents a special case. First, the TPMS itself is analogous to a malfunction indicator, because the low tire pressure telltale would only be expected to illuminate if the driver has failed to perform routine tire maintenance or if a tire has developed a leak. Therefore, the TPMS MIL is one step removed, essentially being a malfunction indicator for a malfunction indicator. In any event, even if the TPMS back-up system were not available, the driver could (and should) manually check his vehicle's tire inflation pressure on a regular basis.

In situations where the TPMS MIL is detecting aftermarket or replacement tires or rims that prevent the continued proper functioning of the TPMS, such equipment arguably has not damaged the TPMS itself, but instead has hindered its low tire pressure detection capability. (Arguably, the tires themselves meet the requirements of the relevant FMVSSs related to tires and would be suitable for safe vehicle operation, absent the TPMS problem.) Once the TPMS MIL illuminates, the consumer would be warned

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[38] An exception to this principle is where the monitored system, or a part of that system, wears out or experiences damage in a crash or similar event. In such cases, some intervening event caused the "make inoperative" situation, and a dealer or vehicle repair business is not required to bring the safety system back up to full compliance with an applicable FMVSS.

that the equipment has caused a TPMS malfunction, and the consumer could substitute other equipment that would permit the TPMS to resume normal functioning.

As noted previously, vehicle manufacturers, tire manufacturers, and other businesses may not know, or reasonably be able to know, exactly which of the many aftermarket or replacement tire and rims would prevent the TPMS from continuing to function properly. There are many tire and rim choices for a given vehicle, and a variety of businesses are involved in tire and rim installation and repair. In such cases, these businesses may only come to know of a problem once the TPMS MIL illuminates. Furthermore, because some TPMSs must be driven for a period of time in order to detect a malfunction, it is quite possible that the consumer would have driven away from such business before the MIL illuminates.

After the time of first sale, our primary goal for the TPMS MIL is to provide information and a warning to the consumer in order to ensure long-term operability of the TPMS. In the tire-related situations described above, the TPMS MIL has arguably served its purpose; the consumer has been warned of the compatibility problem, and the consumer and the installer are able to work together to resolve that problem. The intention is not to penalize the business for accidentally installing one of a very small number of incompatible replacement tires that are difficult to identify.

We note that this result might be different where it can be shown that the installer knew of the incompatibility beforehand or took some other action to disable a functioning TPMS unit. In addition, we would point out that we believe that the TPMS MIL represents a unique case, and the above discussion does not alter our approach to

malfunction indicators generally or to the other specific malfunction indicators referenced above.

(b) Tire Reserve Load

Commenters representing tire manufacturers and sellers stated that the TPMS standard should require the low tire pressure telltale to illuminate before any of the vehicle's tires have insufficient pressure to carry the actual load on the vehicle. Commenters argued that because it is difficult to determine what a vehicle's actual load will be, the vehicle maximum load should be used for the relevant TPMS calculations. The RMA discussed this issue at length in its comments, and its arguments are summarized below. ETRTO, JATMA, TIA, and the Tire Rack provided similar comments that supported RMA's position on this issue, and AAA also supported a pressure reserve requirement.

RMA argued that the NPRM was deficient and that a supplemental notice of proposed rulemaking (SNPRM) should be issued "to solicit public comment on the need to include a requirement in the TPMS rule that a low tire pressure warning telltale will be activated when the pressure is already at a level below that required to support the vehicle maximum load." RMA said that a tire pressure reserve is essential, because a TPMS may instill a false sense of security in many consumers who may rely on the TPMS to provide an under-inflation warning, rather than conducting regular tire maintenance. RMA argued that this concern was noted by NHTSA at earlier stages of the TPMS rulemaking, and it cited other sources in NHTSA's TPMS docket to conclude that the record establishes that consumers may rely on the TPMS in this manner. As a result, RMA

stated its belief that there is a high probability that tires will be operating below placard pressure, but above the TPMS warning threshold.

The RMA further argued that placard pressure (upon which the low tire warning is based) is set by the vehicle manufacturer, and oftentimes for reasons such as handling and comfort, the placard pressure is set only slightly above the minimum pressure needed to carry the vehicle's maximum load. Such minimum pressures are specified in the load/pressure tables published by relevant tire industry organizations, such as those contained in the Tire & Rim Association Yearbook. As a result, the RMA stated that in a significant number of cases, by the time a vehicle's tires drop to 25 percent below placard pressure and the driver receives a low pressure warning from the TPMS, tire pressure would have dropped below the minimum pressure required to safely carry the vehicle's weight at maximum load. The RMA argued that overloaded tires in a fully-loaded condition could result in cumulative structural damage to the tire and an increased risk of tire failure.

Therefore, RMA argued that in the interest of safety, NHTSA should adopt a tire pressure reserve requirement to ensure that the tires can carry the vehicle maximum load at the point at which the TPMS low tire pressure warning telltale illuminates. As already noted, the RMA urged NHTSA to issue an SNPRM to address this issue.

In its comments, the EC stressed that the maximum load capacity and minimum inflation pressure compatible with the load (along with the speed of travel) are important factors for tire performance and safety. The EC stated that the pressures recommended by the tire manufacturers should be regarded as minima, because tires might suffer structural damage at pressures below those recommended pressures.

The TRA's comments also expressed concern that the proposed rule would permit the vehicle to operate without a warning in situations where tire inflation pressure is below the minimum load/inflation pressure values established by the tire industry. TRA argued that the NPRM's approach is a deviation from other NHTSA rulemakings, which have incorporated language to ensure that the tire pressure is appropriate for the vehicle's load (*e.g.*, requirements in FMVSS Nos. 109, New Pneumatic Tires, and 110, Tire Selection and Rims).

This issue is already before the agency in a separate proceeding. RMA submitted a petition for rulemaking with the agency to amend FMVSS No. 110 to establish a tire reserve load requirement.[39] RMA's comments on the NPRM reiterate the arguments raised in its petition, and those other commenters who addressed the tire reserve load issue made arguments consistent with those of RMA.

In response to the RMA's petition, NHTSA re-examined a 1981 NHTSA study of tire failure and reserve load did not demonstrate any correlation between failure and load,[40] and decided to conduct a newer and more comprehensive study of tire failure and reserve load, which would reflect changes in both tires and the vehicle fleet. NHTSA noted in the TPMS NPRM that if new data indicate a sufficiently strong correlation, the agency would propose appropriate amendments to its standards in a separate proceeding.[41]

As we noted in the NPRM, we believe that the issue of reserve load is a tire issue most properly considered under FMVSS No. 110, as amended (see 67 FR 69600

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[39] Docket No. NHTSA-2002-11398-8.
[40] "The Relationship Between Tire Reserve Load Percentage and Tire Failure Rate," Crash Avoidance Division, Office of Vehicle Safety Standards, NHTSA (81-09-NPRM-N01-002) (1981).
[41] 69 FR 55896, 55914 (Sept. 16, 2004).

(November 18, 2002) and 68 FR 37981 (June 26, 2003)). Instead of issuing an SNPRM, we have decided to address this issue in our response to the RMA's petition for rulemaking on tire reserve load. We are publishing a separate notice that responds to that petition.

(c) Changes to Tire Publications

Because of its potential to impact NHTSA's TPMS and tire standards, we are taking this opportunity to address the comment submitted by the Tire and Rim Association[42] and the related supplemental comment submitted by the Alliance[43] regarding changes to the 2005 TRA Year Book. In its comment, the TRA expressed concern that, in its opinion, the NPRM may "inappropriately" permit under-inflation of passenger car and light truck tires below the recommended load/inflation limits established by the tire industry, as reflected in the TRA Year Books. (As discussed in further detail below, FMVSS Nos. 109 and 110 currently reference the publications of a number of tire organizations, including the TRA, as source documents that vehicle manufacturers must consult in specifying tire inflation pressure values.)

The TRA stated its intention to modify its 2005 TRA Year Book by adding the following statement: "If the vehicle is equipped with a Tire Pressure Monitoring System (TPMS), the load on the tire must not exceed the tire load capacity based on the inflation pressure at the point of illumination of the TPMS warning telltale." (This language has since been incorporated in a footnote in the 2005 TRA Year Book.)

The Alliance's supplemental comment stated that TRA's actions create potential compliance problems for TPMS-equipped vehicles. The Alliance stated that the TRA's

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[42] Docket No. NHTSA-2004-19054-72.
[43] Docket No. NHTSA-2004-19054-90.

amendment of its Year Book in this fashion amounts to a unilateral attempt to modify substantive provisions of a vehicle safety standard. It also faulted the TRA for eliminating information from its Year Book about load limits at pressures between 20 psi and 26 psi. According to the Alliance, NHTSA granted a privileged status to the TRA and other tire organizations named in FMVSS Nos. 109 and 119, New Pneumatic Tires for Vehicles Other Than Passenger Cars, by authorizing those organizations' publications to serve as source documents for the tire load limit and other information required on certain vehicle labels. Other industry standards incorporated in FMVSSs and other NHTSA regulations refer to a specific version or year of issuance. According to the Alliance, the TRA's actions amount to an abuse of this privilege.

The Alliance argued that the load rating information in the publications of the TRA and other referenced organizations have remained relatively stable for nearly two decades, except for introduction of new tire sizes, and that the information has been generally predictable, having been calculated on the basis of universally adopted formulae for tire load rating. The Alliance argued that the TRA's action undermines NHTSA's rulemaking authority by taking steps which would have the effect of modifying the threshold for illumination of the TPMS low tire pressure warning telltale in a manner consistent with the TRA's policy preference.

In light of the above, the Alliance urged NHTSA to clarify in the final rule for TPMS that the footnote in the 2005 TRA Year Book related to TPMS-equipped vehicles has no regulatory significance and does not affect the tire load rating for purposes of S4.3.1(c) of FMVSS No. 110 and the related provision in FMVSS No. 120, Tire Selection and Rims for Motor Vehicles Other Than Passenger Cars. In addition, the

Alliance requested that NHTSA amend FMVSS Nos. 109, 119, and 139, New Pneumatic Tires for Light Vehicles, to specify use of the 2004 publications of the listed tire organization in those tire standards as the appropriate sources for determining permissible tire load ratings. The Alliance argued that good cause exists for so amending FMVSS Nos. 109, 119, and 139 without notice and comment, because of the potential compliance problems that could arise upon publication of the 2005 TRA Year Book. In the alternative, the Alliance asked that its supplemental comment be treated as a petition for rulemaking to amend FMVSS Nos. 109, 119, and 139.

We would begin by briefly explaining the relevant requirements currently contained in our safety standards for tires and our reasoning for referencing certain tire industry publication without a specific year or volume designation. Paragraph S4.4.1 of FMVSS No. 109 requires that each tire manufacturer make available to the public information on the rims that may be used with each tire that it produces.[44] Such information may: (1) take the form of a list that must be furnished to dealers of the manufacturer's tires, NHTSA, and any person upon request; or (2) be contained in a publication by one of the following organization: (a) the Tire and Rim Association; (b) the European Tyre and Rim Technical Organization; (c) the Japanese Automobile Tyre Manufacturers Association; (d) Deutsche Industrie Norm; (e) the British Standards Institution; (f) the Scandinavian Tire and Rim Organization; and (g) the Tyre and Rim Association of Australia. In most instances, the relevant information is listed in one of these industry publications.

The current requirements, discussed above, were adopted in 1981, when NHTSA amended its tire standards to authorize the publications of the organizations listed above

[44] Similar requirements are contained in S5.1 of FMVSS No. 119 and S4.1.1 of FMVSS No. 139.

to serve as the source documents for tire load limits and other tire safety information.[45] The purpose of this rulemaking action was to expedite the introduction of new tires to the market. (Before the 1981 amendment to the tire standards, tire manufacturers were required to petition NHTSA each time they intended to introduce new tires. NHTSA maintained a listing of all registered tires in Table 1, Appendix A of FMVSS No 109.) The current system worked predictably and generated little controversy until now.

However, the TRA's recent action (*i.e.*, amending its 2005 Year Book by incorporating additional text in a footnote to its tire selection procedure) represents a *de facto* substantive change to our tire placard requirements. This change could have an impact on vehicle manufacturers' tire and rim selections, because FMVSS Nos. 110 and 120 require vehicle manufacturers to rely on information provided by the tire industry. Specifically, S4.3.1(c) of FMVSS No. 110 allows vehicle manufacturers to recommend a lower-than-maximum tire inflation pressure so long as the tire load does not exceed the tire load rating appearing in one of the publications described in S4.4.1(b) of FMVSS No. 109.[46] Because the new TRA language may change how the tire load information is calculated, this represents a substantive change to our tire safety information regulations.

Only NHTSA has the authority to amend the FMVSSs pertaining to tires. Any substantive changes to our regulations, including ones involving maximum tire load formulae, require agency action, as well as notice and comment. Because no such action has taken place and because TRA's above-discussed amendment to its 2005 Year Book may affect our regulations, we believe that it is necessary to clarify the regulatory effect of the TRA's footnote.

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[45] See 46 FR 61473 (Dec. 17, 1981).

[46] Similar requirements are contained in S5.1 of FMVSS No. 120.

In order to avoid the impermissible regulatory effect of the TRA's footnote, we are clarifying that the provisions of FMVSS Nos. 110 and 120 pertaining to tire selection only require vehicle manufacturers to consult the numerical values contained in the load/pressure tables provided in the publications of the enumerated tire industry organizations. Thus, the footnote related to TPMSs in the 2005 TRA Year Book has no legal or regulatory effect.

We caution the tire organizations referenced in our tire standards that action to achieve the footnote's results through direct manipulation of the values in the load/pressure tables would have the equally impermissible effect of amending our tire standards. If that were to occur, the agency would be forced to consider other options, such as specifying a specific year(s) for these tire industry publications (*e.g.*, 2000 or later), reverting to the prior system under which tire manufacturers would be required to petition the agency before introducing new tires, or publishing the equations for calculation of recommended tire pressures (thereby allowing vehicle manufacturers to directly recommend pressures).

(d) Minimum Activation Pressure

Paragraph S4.2 of the NPRM proposed to require that the TPMS must illuminate a low tire pressure warning telltale not more than 10 minutes after the inflation pressure in one or more of the vehicle's tires, up to a total of four tires, is equal to or less than either the pressure 25 percent below the vehicle manufacturer's recommended cold inflation pressure, or the pressure specified in the third column of Table 1, Low Tire Pressure Warning Telltale – Minimum Activation Pressure, whichever is higher. Table 1 proposed minimum activation pressures (MAPs) for different tires, based upon: (1) tire

type, and (2) maximum or rated inflation pressure. The specified tire types included P-metric (Standard Load), P-metric (Extra Load), Load Range "C," Load Range "D," and Load Range "E."

In general, the proposed MAPs in Table 1 were based on the lowest inflation pressure values provided in the TRA, JATMA, and ETRTO Year Books for loads specified, as well as available information on minimum activation pressures for TPMSs. The relevant tire industry Year Books in 2000 consistently reported low pressure values down to 140 kPa (20 psi) for standard P-metric tires.

However, the agency found that for light truck tires, the low values reported in the tire industry Year Books were not consistent, although further analysis demonstrated that minimum pressure values were approximately 58 percent of the maximum inflation pressure for the tires. Therefore, the agency utilized this formula in proposing values for LT tires in Load Ranges "C," "D," and "E."[47]

In its comments, the Alliance requested that, as part of the final rule, the agency respond to the Alliance's earlier petition for rulemaking[48] seeking revision of Table 1 for minimum activation pressures for vehicles with Load Range "C," "D," and "E" light truck tires. The Alliance's petition stated that the MAPs currently contained in Table 1 do not allow tires (particularly Load Range "D" and "E" tires) to be used across the safe operating ranges of inflation pressures for which loads are specified in the Tire and Rim Association Yearbooks. According to the Alliance, on some vehicles such as 15-passenger vans and large pick-up trucks with a large differential between front and rear

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[47] We note that the TRA 2000 Year Book did report values lower than 58 percent for some LT tires. However, the agency believes that at 58 percent below the maximum pressure, most tires would be significantly under-inflated for most vehicle applications. Consequently, we did not propose MAPs for LT tires below this level.

[48] Docket No. NHTSA-2000-8572-265.

GAWRs, the front tires may be over-specified for the load they carry. In such cases, vehicle manufacturers may specify tires that are appropriate for the heaviest axle (*i.e.*, the rear axle), thereby minimizing potential consumer confusion related to different front and rear placard pressures and different front and rear replacement tires. The Alliance argued that the MAPs proposed in Table 1 for LT Load Range "C," "D," and "E" tires are set too close to the placard pressure for these vehicle applications and, accordingly, should be set at lower values.

The Alliance argued that for Load Range "D" and "E" tires, field performance data and other test data show that there is no safety need for the MAPs for these tires currently contained in Table 1, and in fact, the Alliance stated that the currently listed MAPs for those tires could actually have adverse safety implications. According to the Alliance, the MAPs recommended in its petition as revisions to Table 1 would allow LT tires to be used safely in different load applications in a manner consistent with the TRA Yearbook. The Alliance's petition asserted that if the agency retains Table 1 as proposed, it "would necessitate significant vehicle redesigns, cost penalties, and adverse safety and non-safety effects that are not justified by any safety need."

Based upon the above, the Alliance's petition requested modification of Table 1 to set minimum activation pressure for LT tires based upon the vehicle's load range. For example, if a Load Range "E" tire were used in a Load Range "D" application, the Load Range "D" minimum activation pressure could be used for TPMS activation purposes. For a more complete explanation, readers should consult the Alliance's petition.

Alternatively, the Alliance stated that if the petition for rulemaking related to MAPs could not be resolved in time for issuance as part of the final rule, NHTSA should

not specify MAPs for the affected vehicles and instead defer implementation of the MAP requirements for those vehicles until rulemaking can be conducted at a later date.

The major vehicle manufacturers that commented on the MAP issue supported the Alliance petition and the arguments raised therein. DaimlerChrysler stated that the NPRM does not accommodate vehicles that require multiple tire pressures for different driving conditions (*i.e.*, Load Range "C," "D," and "E" tires). DaimlerChrysler commented that the MAPs for LT tires in Load Ranges "D" and "E" in Table 1 are 38 psi and 46 psi, respectively, but that it uses these tires in applications with a placard pressure of 40 psi. Thus, DaimlerChrysler requested that the MAP for these tires be set at 35 psi, a value consistent with the TRA minimum recommended pressure for those tires. (However, in a supplementary comment dated February 8, 2005, DaimlerChrysler subsequently retracted its support for a MAP set at 35 psi for Load Range "D" and "E" tires.[49] In that letter, DaimlerChrysler stated that it supports a solution consistent with the recommendation in the Alliance's petition for rulemaking on the MAP issue.)

In its comments, DaimlerChrysler also provided its view of the practical implications of the MAP issue. It stated that if proposed Table 1 were adopted without change, vehicle manufacturers' current practices for use of Load Range "C," "D," and "E" tires would result in the low tire pressure telltale being illuminated much of the time when the vehicle is lightly loaded. DaimlerChrysler argued that this situation could result in desensitization of the driver and that such drivers may lose the benefits of the TPMS. DaimlerChrysler further argued that this situation would leave vehicle operators with the choice of ignoring the safety warning, permanently disabling the warning, or over-inflating their tires.

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[49] Docket No. NHTSA-2004-19054-89.

DaimlerChrysler suggested that the vehicles in question could be equipped with a driver-selectable TPMS. DaimlerChrysler stated that this mechanism would make TPMSs technology-neutral and tire type-neutral, because the driver (or the service shop) could set the reference pressure based on the load, driving conditions, or recommended replacement tire pressure. According to DaimlerChrysler, such a system would provide a reliable warning when there is a pressure loss of 25 percent under this reference level.

DaimlerChrysler suggested that if NHTSA is not prepared to address this MAP issue quickly, the final rule could defer the rulemaking's requirements for trucks greater than 8,500 pounds (3,856 kg) (not passenger cars or MPVs) to allow more time to respond to the issue.

General Motors stated that it conducted tests of four vehicles using lightly-loaded and GVWR loading conditions. GM stated that the vehicles were tested both at the recommended pressures and at the increased pressures that would be required by the proposed MAPs in Table 1. According to GM, the higher pressures resulted in adverse effects, including decreased rollover resistance, reduced understeer (2 vehicles), increased response time (2 vehicles), and degraded on-center handling (3 vehicles). GM commented that the MAPs currently proposed could provide a disincentive for vehicle manufacturers to select tire types that exceed load-carrying requirements for particular vehicle applications, resulting in lower load range tire types for some vehicle models than would otherwise have been chosen.

The issues raised by the Alliance's petition related to MAPs involve a key aspect of the low tire pressure warning provided by the TPMS, in that the MAP represents a threshold value for maintaining safe tire operation, because a higher MAP could provide

an earlier warning to the driver. Although the MAP issue raised by the Alliance is only expected to impact a small percentage of vehicles using LT tires (*i.e.*, typically vehicles with a GVWR of over 8,500 pounds), the agency must fully understand the potential rollover and handling implications of the final values it selects for the MAPs. This is particularly true for vehicle applications where the recommended inflation pressure is close to the MAP or where it is much lower than the maximum inflation pressure. For example, 15-passenger vans and some pickup trucks may have a greater propensity for rollover when their tires are significantly under-inflated, so prompt application of FMVSS No. 138 (with appropriate MAPs) to such vehicles is important for achieving the safety benefits of the TPMS standard. The agency is currently analyzing the issue of minimum activation pressures for LT tires, and it is our intention to respond to the Alliance's petition on MAPs as part of a separate rulemaking.

We would emphasize that vehicles equipped with LT tires load range "D" and "E" must be equipped with a TPMS that conforms to the requirements of FMVSS No. 138. However, in the interim period, we have decided to alter the MAPs listed in Table 1 for load range "D" and "E" tires from the values proposed in the NPRM. As the commenters pointed out, the TRA Yearbooks report load rating values for LT load range "D" and "E" tires as low as 35 psi. Hence, according to the TRA, these tires can be used at that inflation pressure at the specified load rating. Therefore, we are adopting a MAP of 35 psi for LT Load Range "D" and "E" tires as part of this final rule. (The values for P-metric and LT Load Range "C" tires are unchanged from the NPRM.)

Once the agency completes its analysis of the relevant data, the MAP values set forth in this final rule will be either confirmed or we will propose to modify them as part of our rulemaking response to the Alliance's petition.

5. Owner's Manual Requirements

Paragraph S4.5 of the NPRM proposed to require each certified vehicle to provide an image of the low tire pressure telltale symbol (and an image of the TPMS malfunction telltale symbol, if a dedicated telltale is utilized for this function) and the following specific, standardized statement in English regarding the presence of a TPMS in the vehicle and its function:

> Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should consult the appropriate section of this owner's manual to determine the proper tire inflation pressure.) When the low tire pressure telltale is illuminated, one or more of your tires is significantly under-inflated. You should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.
>
> Your vehicle has also been equipped with a TPMS malfunction telltale to indicate when the system is not operating properly. When the malfunction telltale is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of incompatible replacement tires on the vehicle. Always check the TPMS malfunction telltale after replacing one or more tires on your vehicle to ensure that the replacement tires are compatible with the TPMS.

That paragraph of the NPRM also proposed to permit the owner's manual to include additional information about the significance of the low tire pressure warning telltale illuminating, a description of corrective action to be undertaken, whether the tire pressure monitoring system functions with the vehicle's spare tire (if provided), and how to use a reset button, if one is provided (S4.5(b)). For vehicles that do not come with an owner's manual, the NPRM proposed to require the mandatory information to be provided in writing to the first purchaser (S4.5(c)).

In its comments, Nissan argued that the NRPM's proposed owner's manual statement is restrictive and would prevent manufacturers from tailoring the TPMS discussion in the owner's manual to the specific system installed on the vehicle. Nissan stated that NHTSA should refrain from adopting specific owner's manual language for TPMS, but instead provide requirements for its general content (*i.e.*, alerting consumers regarding: (1) potential problems related to compatibility between the vehicle's TPMS and various types of replacement tires, and (2) the presence and operation of the TPMS malfunction indicator).

Nissan stated that if the agency nevertheless decides to adopt specific owner's manual language similar to that proposed in the NPRM, the following points should be considered. First, Nissan expressed concern about the use of the terms "compatible" and "incompatible replacement tires" without defining those terms. Nissan stated that consumers could be misled unless they are made aware that the purpose of this warning is to inform the consumer that the construction or other design characteristics of some replacement tires may cause the TPMS to experience inadequate signal reception.

Accordingly, Nissan recommended that additional language be added to clarify the terms compatible/incompatible in the owner's manual language.

Nissan commented that the proposed owner's manual language seemed to focus on systems with a separate TPMS MIL telltale, without discussion of TPMSs providing a combination low pressure/malfunction telltale. Nissan argued that as proposed, the owner's manual language could confuse consumers whose vehicles are equipped with a combination telltale, so its comments stated that the owner's manual language should be revised to also include a discussion of the combination telltale. The comments of AIAM, Fuji, and Suzuki raised similar arguments.

In its comments, Nissan also recommended that the following sentence from the proposed owner's manual language not be included in the final rule: "If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should consult the appropriate section of this owner's manual to determine the proper tire inflation pressure." Nissan stated that there is not currently any requirement to include in the owner's manual information regarding tire sizes other than those included as original equipment on the vehicle. According to Nissan, vehicle manufacturers do not and cannot provide such information for all tires that might conceivably be used in wheel/tire/inflation pressure combinations not designed by the vehicle manufacturer, but which the consumer may nonetheless choose to install. Nissan expressed concern that such a statement could confuse consumers whose owner's manual does not include supplemental tire information.

SEMA recommended four modifications to the proposed owner's manual language. First, it stated that the owner's manual language should reflect the fact that the

recommended tire pressure for the originally-installed tires may not be applicable to certain replacement tire/wheel combinations. Therefore, SEMA recommended adding a statement to "select a tire pressure that considers the vehicle's loading characteristics and is appropriate for the wheel and tire combination installed on the vehicle."

Second, SEMA stated that the proposed owner's manual language alerts the consumer that replacement tires may trigger the TPMS malfunction telltale, but that it does not specifically address combined wheel/tire packages. SEMA argued that because consumers frequently replace both the vehicle's tires and wheels and also can replace the wheels while maintaining the original tires, the owner's manual language should add the term "wheels" (to read "tires or wheels") in order to avoid any consumer confusion.

Third, SEMA objected to the term "incompatible" to describe replacement tires whose installation causes the TPMS malfunction indicator to activate. SEMA seems to be arguing that the replacement tires (and/or wheels) may be an appropriate match in terms of supporting the vehicle, but the construction nevertheless may prevent the TPMS from functioning properly. Accordingly, SEMA recommended substituting the word "alternate" for "incompatible."

Fourth, SEMA recommended that the owner's manual should note that dealers, retailers, and installers should have access to all service information necessary to make the alternate tires and wheels operate correctly in conjunction with the TPMS malfunction indicator lamp. However, SEMA stated that this recommendation would apply only if NHTSA mandates that vehicle manufacturers share such service information with other relevant parts and service suppliers.

Sumitomo urged NHTSA to modify the proposed owner's manual language to reflect the responsibility of the vehicle operator to maintain the correct tire pressure. Sumitomo argued that the NPRM could be interpreted as shifting this responsibility to the vehicle manufacturer. Therefore, Sumitomo proposed that the following additional statement be required in the owner's manual: "The vehicle operator has the responsibility to maintain the correct tire pressure even though the tire pressure indicator warning may not be illuminated due to the lower than specified tire pressure." Sumitomo also recommended adding a statement to reflect the fact that the TPMS itself will not maintain correct tire pressure.

Consistent with Sumitomo's comments immediately above, the RMA stated that the owner's manual should include language explicitly stating that the TPMS does not verify that proper tire pressure is maintained (*i.e.*, even when the TPMS telltale is not illuminated, the tires may not be at optimum pressure). The RMA expressed concern that the NPRM's proposed owner's manual language could induce consumers to substitute reliance on the TPMS for routine tire maintenance.

The TIA stated the owner's manual should require a statement that even for a TPMS-equipped vehicle, the vehicle operator should check the tires regularly for proper inflation pressure and tread depth and should rotate the tires every 6,000 miles for optimum performance and fuel economy.

NADA questioned the NPRM's discussion of vehicles without an owner's manual, which NADA thought might refer to used vehicles (see 69 FR 55896, 55906 (Sept. 16, 2004)). NADA commented that NHTSA does not have authority to require

point-of-sale dissemination of TPMS information other than through the vehicle owner's manual.

Particularly for a new safety standard for a device whose function might not be apparent to the average driver, we believe that a clear and consistent written statement in the vehicle's owners manual is necessary to explain the benefits and limitations of the TPMS and the driver's responsibility to maintain proper tire pressure. Consequently, as part of this final rule, we are including a required statement in the owner's manual (or in writing to the first purchaser for vehicles without an owner's manual).

In response to NADA's comments, we would clarify that this requirement only applies to new vehicles. Regarding NADA's comment about the requirement for a statement in writing outside the owner's manual (in cases where there is no owner's manual), we believe that this TPMS-related information is important and must be provided to the first purchaser. However, rather than requiring that vehicle manufacturers provide an owner's manual, we believe that it is preferable to allow vehicle manufacturers the flexibility to instead provide this information through a written statement.

We disagree with the comment of Nissan that the proposed owner's manual language is overly restrictive and would prevent vehicle manufacturers from tailoring the owner's manual discussion of the TPMS to the specific system installed on the vehicle. Paragraph S4.5(b) of the NPRM proposed to permit manufacturers to discuss a variety of issues related to the operation of their particular system. We believe that requiring a specified statement in the owner's manual in the final rule does not diminish the ability of vehicle manufacturers to provide explanation of the TPMS and its operation.

In response to public comments, we have made some modifications to the NPRM's proposed owner's manual statement. We have modified our discussion of "incompatible" replacement tires. We recognize that replacement tires may be compatible with the vehicle in terms of carrying the maximum vehicle load, but may nevertheless be incompatible with continued proper TPMS functioning. However, replacement tires that prevent proper TPMS functioning are indeed incompatible with the TPMS. With that said, we have revised the owner's manual statement to provide further clarity. We have also modified the owner's manual statement to reflect the fact that drivers frequently replace both the vehicle's tires and wheels (rims).

We have decided to include tailored language reflecting the fact that there are two options for the MIL, a dedicated TPMS malfunction telltale or inclusion as part of a combined low tire pressure/TPMS malfunction telltale.

We agree with Nissan that vehicle manufacturers are unlikely to provide recommended inflation pressures for every possible replacement tire in the vehicle owner's manual. However, it remains important for consumers to inflate their tires to a pressure level appropriate for those tires. Accordingly, we have modified the relevant statement in the owner's manual to delete the statement regarding consultation with the owner's manual to find such alternate tire pressures. We expect that consumers will be able to easily obtain the relevant pressure information from tire industry sources.

We agree with Sumitomo that it remains the driver's responsibility to maintain proper tire inflation pressure and that the TPMS is not designed to signal as soon as the tires have deviated from the optimal inflation level, and we have added language to stress the importance of proper tire maintenance. Regarding Sumitomo's other comments that

the TPMS is a detection device that does not act to add air itself to maintain inflation pressure, we believe that in the future, TPMSs may become available that combine under-inflation detection and re-inflation features; accordingly, we have decided not to opine as to future TPMS capabilities in this regard. We also agree with SEMA that some replacement tires may call for an inflation pressure different than that of the OE tires that is reflected on vehicle placard. The owner's manual statement has been revised to include language related to these points.

We have decided not to adopt TIA's recommended language concerning tire maintenance advice related to checking tread depth and rotating the tires every 6,000 miles. Although this information may be useful for voluntary inclusion in the owner's manual, we do not believe that it is necessary to require such language for the following reasons. First, we believe that discussion of other aspects of tire maintenance is outside the scope of the TPMS rulemaking. In addition, we believe that there may be reasonable differences of opinion regarding proper tread depth or frequency of tire rotation. We do not agree with the TIA's conclusion that consumers cannot be trusted to consult their vehicle's owner's manual in appropriate situations.

Regarding SEMA's recommendation to require vehicle manufacturers to make TPMS information available to tire retailers and dealers and to provide related language in the owner's manual, we are addressing that issue in this notice under section IV.C.8. Please consult that section for further details.

Accordingly, we have decided to require the following statement, in English, in the vehicle's owner's manual (or in writing for the first purchasers of vehicles without an owner's manual):

Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should determine the proper inflation pressure for those tires.)

As an added safety feature, your vehicle has been equipped with a tire pressure monitoring system (TPMS) that illuminates a low tire pressure telltale when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale illuminates, you should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.

Please note that the TPMS is not a substitute for proper tire maintenance, and it is the driver's responsibility to maintain correct tire pressure, even if under-inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale.

[*The following paragraph is required for all vehicles certified to the standard starting on September 1, 2007 and for vehicles voluntarily equipped with a compliant TPMS MIL before that time.*] Your vehicle has also been equipped with a TPMS malfunction indicator to indicate when the system is not operating properly. [*For vehicles with a dedicated MIL telltale, add the following statement*: The TPMS malfunction indicator is provided by a separate telltale, which displays the symbol "TPMS" when illuminated.] [*For vehicles with a combined low tire pressure/MIL telltale, add the following statement*: The TPMS malfunction indicator is combined with the low tire pressure telltale. When the system detects a malfunction, the telltale will flash for approximately one minute and then remain continuously illuminated. This sequence will continue upon subsequent vehicle start-ups as long as the malfunction exists.] When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction indicator after replacing

> one or more tires or wheels on your vehicle to ensure that the replacement or alternate tires and wheels allow the TPMS to continue to function properly.

Vehicle manufacturers may include information in the owner's manual about the time for the TPMS telltale(s) to extinguish once the low tire pressure condition or the malfunction is corrected. They may also include information in the owner's manual about the significance of the low tire pressure warning telltale illuminating, a description of corrective action to be undertaken, whether the TPMS functions with the vehicle's spare tire (if provided), and how to use a reset button (if one is provided).

6. Test Procedures

As a general comment, the Alliance argued that the NPRM's test procedures may not be sufficiently technology-neutral so as to accommodate developing and advanced TPMS technologies. In response, we note that it is NHTSA's practice to issue performance standards that meet the need for motor vehicle safety, are practicable, and are stated in objective terms. Although NHTSA tries to develop standards that are technology-neutral, that does not mean that we will sacrifice safety in order to accommodate every available technology. However, when public comments identify areas where an NPRM, such as the one for FMVSS No. 138, could be refined to promote advanced technologies without sacrificing safety, we will consider those comments carefully. Other specific comments related to the NPRM's test procedures are addressed below.

(a) Calibration Time

Under paragraph S6(d), the NPRM proposed a cumulative driving time of not less than 20 minutes for the "system calibration/learning phase," which would include driving

the vehicle in two directions on the test course. The NPRM proposed that time would not be accumulated while the vehicle's brakes are being applied.

Schrader commented that a calibration/learning phase should not be necessary, regardless of the technology used. According to Schrader, because calibration requires a significant amount of user knowledge and interaction to ensure proper performance, the TPMS should be ready to use and fulfill its intended purpose without user interaction. Schrader argued that the only time a calibration phase should be necessary is when a malfunctioning system has been repaired by a qualified technician and needs to be recalibrated in order to restore proper performance.

Sumitomo recommended that the time period for specified calibration in the test procedures should be increased to one hour, in order to reasonably accommodate indirect TPMSs and thereby keep the standard technology-neutral. Sumitomo stated that indirect TPMSs require a calibration time of at least 30 minutes under good conditions to detect 25-percent under-inflation in multiple tires, but that one hour is preferable in order to account for the variety of circumstances the system may encounter.

NIRA also recommended increasing the calibration time to one hour, in order to be comparable with NIRA's recommended detection time for low tire pressure. NIRA argued that the additional calibration time would not affect the life-saving potential of TPMSs. It also recommended that the final rule explicitly state that the calibration procedure will be conducted at normal driving speeds, at a varied speed profile, and without engagement of cruise control (if equipped).

For the final rule, NHTSA has decided to retain a 20-minute time period for TPMS calibration as part of the standard's test procedures. We believe that a 20-minute

time period is appropriate in order to provide a technology-neutral standard that accounts for the need of some TPMSs to have time to calibrate the system when the vehicle is new, when new tires are installed, and when a tire is replaced or rotated. We do not agree with Schrader's comment that calibration would require a significant amount of user knowledge and interaction to ensure proper performance. Not all TPMSs require calibration, and for those that do, a driver would most likely need to press a reset button at an appropriate point, as described in the owner's manual. We do not believe that this process would be difficult or require any specialized knowledge.

However, we are not adopting commenters' suggestions to increase the calibration time in the test procedures. We believe that an excessively long calibration period would increase the likelihood that a tire could develop a leak during calibration that would go undetected. Available information suggests that most TPMSs requiring calibration could do so within this 20-minute time period, so we do not see any reason to delay the timing for the TPMS to begin providing low tire pressure warnings to the driver.

In response to NIRA's comment that the calibration procedure should be conducted at normal driving speeds, at a varied speed profile, and without engagement of cruise control (if equipped), we note that the final rule's test procedures provide for a cumulative driving time of 20 minutes within a speed range of 50-100 km/hr. We believe that this speed range is adequate for proper TPMS calibration. However, we agree with the commenter that use of cruise control during calibration could provide the TPMS with a large amount of redundant information, as compared to information obtained while driving at different speeds, and we also believe that it is important to ensure that the

system performs properly over a range of speeds, an objective that could be foiled by the use of cruise control in this context. Accordingly, we have included a statement in S5.3.2 that for vehicles equipped with cruise control, cruise control will not be engaged during testing.

(b) Driving Conditions

Under the test procedures section, the NPRM proposed that the ambient temperature for testing would be between 0º C (32º F) and 40º C (104º F) (see S5.1) and that the road surface would be dry during testing (see S5.2). It also proposed that the vehicle's TPMS would be calibrated and tested at speeds between 50 km/h (31.1 mph) and 100 km/h (62.2 mph) (see S5.3.2). The NPRM proposed that testing would be conducted on any portion of the Southern Loop of the Treadwear Test Course defined in Appendix A and Figure 2 of 49 CFR 575.104.

The RMA commented that the TPMS test conditions and performance parameters should be expanded to capture a fuller range of real world driving conditions. (AAA and ETRTO provided similar comments.) Accordingly, the RMA argued that the temperature range for testing should be expanded to include ambient temperatures below freezing (32º F) and above 104º F. The RMA also advocated testing under slippery road conditions and increasing the range for the driving speed to include speeds over 100 km/hr for low tire pressure detection. The RMA argued that as currently proposed, the TPMS test procedures would not test at higher speeds (arguably when the TPMS is most important), on wet/snowy/icy roadways, under extreme temperatures, on secondary roads, or during turning or braking maneuvers. RMA stated that these conditions do not occur in isolation, but instead create situations where multiple factors contribute to an increased

level of risk. (The Advocates, the EC, Public Citizen, TIA, Tire Rack, and ETRTO provided similar comments. In addition, ETRTO also called for testing at speeds below 31 mph.) VW/Audi recommended that the test procedures should incorporate a variety of speed ranges without the use of cruise control in order to be technology-neutral.

Sumitomo recommended establishing a limit in the test procedures on longitudinal acceleration. Sumitomo argued that such a limit is necessary to reflect ordinary driving conditions, so the company recommended that longitudinal acceleration should be limited to $\pm$ 0.05 G during the calibration and low tire pressure detection phases.

For the final rule, we have decided to adopt the test conditions as proposed in the NPRM. Commenters who requested a broader range of test speeds (both higher and lower) did not provide any evidence to show that the vehicle's TPMS would not function properly at vehicle speeds outside the 50-100 km/hr range. Furthermore, the commenters did not specify maximum or minimum test speeds that would ensure that real world driving conditions would be represented.

Similarly, commenters who requested a broader range of ambient temperatures for testing (both higher and lower) did not provide any evidence to show that the vehicle's TPMS would not function properly at temperatures below 0º C (32º F) or above 40º C (104º F). We believe that this temperature range covers a large percentage of the temperatures normally encountered by most of the driving public in the United States. Furthermore, the commenters did not specify an ambient temperature range that they would consider to be more appropriate.

We have decided not to include longitudinal acceleration limits in the test procedures for either system calibration or low tire pressure detection. It is our understanding that TPMS technology has improved since the time that the June 2002 final rule was published and that current systems detect and compensate for short periods of abnormal longitudinal acceleration. Accordingly, we do not believe that it is necessary to set longitudinal acceleration limits as part of the final rule.

Regarding suggestions that compliance testing should be conducted on slippery road surfaces, commenters did not provide any evidence to show that the TPMS would not function normally on road surfaces with a coefficient of friction lower than the coefficient of friction of the road surface during compliance testing. Although surfaces with a lower coefficient of friction may result in increased wheel slip, which in turn could result in a slightly longer time to detect low tire pressure, we do not anticipate that additional safety benefits would arise from testing on slippery surfaces. Furthermore, the commenters did not specify a coefficient of friction or provide any other quantification for the recommended surface.

We believe that the test conditions specified in this final rule will result in robust TPMSs that will function normally over a wide range of operating conditions. We do not believe that additional specifications related to temperature, weather, or speed would appreciably change the TPMS's performance or result in design changes yielding greater safety benefits.

(c) MIL Activation

Under paragraph S6(l) of the proposed test procedures, the TPMS malfunction indicator would be tested by simulating one or more TPMS malfunction(s) by

disconnecting the power source to any TPMS component, disconnecting any electrical connection between TPMS components, by simulating a TPMS sensor malfunction, or by installing a tire on the vehicle that is incompatible with the TPMS (S6(l)(1)). When the ignition locking system is turned to the "On" ("Run") position (or, where appropriate, the position for lamp check), the TPMS malfunction telltale would be required to illuminate (S6(l)(2)). The NPRM also proposed that for systems equipped a TPMS reset feature to extinguish the low tire pressure and/or malfunction telltale, the system would be reset in accordance with the manufacturer's instructions, after which, continued illumination of the MIL would be verified (S6(l)(3)). Finally, the proposal stated that the malfunction would be corrected, that the system would be reset (if necessary), and that there would be verification that the telltale has been extinguished (S6(l)(4)).

Public comments on this issue relate to the previous discussion of what types of malfunctions the system should be required to detect and how quickly they should be detected. EnTire provided draft regulatory text for the portion of the standard's test procedures related to the TPMS malfunction indicator. The following paraphrases EnTire's recommended approach for the final rule on this issue. First, disable one of the following TPMS functions: (a) control/transmission of information to the low pressure lamp; (b) transmission of pressure data from a sensor; or (c) capability of the controller to receive pressure information. Verify that the TPMS telltale(s) perform the check of lamp function. Drive for 15 minutes or until the malfunction lamp illuminates. If the MIL did not illuminate within that time period, reverse direction and drive for up to a total cumulative time of 20 minutes or until the MIL illuminates. If the MIL does not illuminate, discontinue the test. If the MIL does illuminate, restore the system to normal

operation. Drive for up to 15 minutes or until the malfunction lamp extinguishes. If the MIL did not extinguish within that time period, reverse direction and drive for up to a total cumulative time of 20 minutes.

EnTire argued that this approach would resolve a number of questions which EnTire believes were left unanswered by the NPRM. According to EnTire, by focusing on the primary TPMS functions, it would clarify what malfunctions must be detected by the system. It would specify a time for the TPMS to discover the malfunction. It would specify that the vehicle is to be driven, because vehicular motion is necessary for many systems to run malfunction diagnostics. It would provide for verification of both the MIL lamp check and malfunction indication.

EnTire also stated that because various malfunction conditions may require different recovery mechanisms to take place, the driving sequence for extinguishment may be avoided or reduced if the standard were to permit reference to additional instructions in the owner's manual procedures (if applicable).

In its comments, NIRA Dynamics recommended that the final rule's test procedures should simulate a TPMS malfunction by disconnecting the power source to any TPMS component or by disconnecting any electrical connection between TPMS components, thereby limiting the requirements to only electrical and radio transmission errors. NIRA stated that the test procedures should be limited to detection of these types of malfunctions in order to keep the test procedures technology-neutral.

Related to its earlier comments on the types of malfunctions that the system should be required to detect, Fuji commented that the proposed test procedures may

involve disconnecting the power to the TPMS ECM, but that such action could make it impossible for the system's malfunction logic to operate.

GM recommended adding 30 minutes of cumulative driving time for malfunction detection, under S6(l)(2) of the NPRM's proposed test procedures, in order to ensure that the TPMS has time to accumulate sufficient data to make a sound decision about whether a malfunction has occurred. The Alliance recommended a similar period of 30 minutes of continuous driving under S6(l)(4), in order to allow the TPMS the time necessary to confirm that a malfunction no longer exists.

Fuji's comments made similar arguments, stating that in order to provide a reasonable battery life (8-10 years) for the wheel-mounted pressure sensors and transmitters, it and other vehicle manufacturers have designed their TPMSs to have the wheel sensors remain inactive until wheel rotation is above 40 kph. Fuji also commented that vehicle motion is required for the TPMS to begin its diagnostic cycle, along with a sufficient time period to make a reliable diagnosis of the malfunction. Accordingly, Fuji recommended that the final rule's test procedures include a drive time of at least 10 minutes with a vehicle speed of at least 40 kph.

Nissan also commented that the test procedures related to malfunction detection should specify a time for detection and vehicle speed. Nissan recommended that the TPMS should be required to detect a malfunction under the same conditions and same timeframe as that required for detection of low tire pressure (*i.e.*, within 10 minutes at speeds between 50 km/hr and 100 km/hr).

In its comments, Schrader urged NHTSA to clarify its "confusing" test procedures related to TPMS malfunction detection. Schrader recommended that the TPMS test

procedures should limit the simulation of a malfunction to removal of a component from the system.

As noted above, the comments on the test procedures for the TPMS malfunction indicator intertwined substantive discussions of what types of malfunctions the system would be required to detect with procedural discussions of how the standard's test procedures would create those malfunctions and confirm that the TPMS can detect them. However, the substantive issue of what types of malfunctions the system must detect has been addressed in Section IV.C.2(b); that discussion will not be repeated here. Similarly, the time period for the TPMS to detect a system malfunction and to illuminate the MIL, was discussed in Section IV.C.2(a). For a complete discussion of those aspects of the test procedures, please consult those sections of this final rule.

We recognize that most direct and indirect TPMSs will require that the vehicle be driven in order for the system to detect malfunctions. Commenters such as Nissan stated that most TPMSs use the same analytical processes for TPMS malfunction detection as they would for low tire pressure detection. Therefore, even though some commenters (*e.g.*, Fuji, Nissan) suggested that malfunction detection would be possible for certain systems within a shorter timeframe, we have decided to adopt the same 20-minute driving time for TPMS malfunction detection as for the low tire pressure warning. In addition, we have incorporated the same test conditions (with some minor modification) as were proposed in S5 of the NPRM, including the requirement that the vehicle will be driven within a speed range of 50-100 km/hr, with no time accumulating when the service brake is applied. Again, we recognize that most TPMSs will require vehicular motion to detect that a TPMS malfunction has been corrected as well.

Regarding EnTire's suggestion that there should be a specification for a MIL bulb check, such a requirement was already proposed in S6(b) of the NPRM, and it has been retained in this final rule. Further, we are not adopting EnTire's recommendation that the owner's manual be consulted for additional instructions related to operation of the MIL because we do not believe it is necessary. We believe that the final rule's requirements for MIL operation will provide a simple, consistent, and timely warning to the driver in the event of a TPMS malfunction.

(d) Vehicle Cool-Down Period

Under S6(e) of the NPRM, the vehicle would be stopped and kept stationary with the engine off for up to one hour, after which time one or more tires would be deflated to 7 kPa (1 psi) below the level that should cause the TPMS low pressure warning telltale to illuminate. This provision would allow the tires time to cool prior to initiating the system detection phase of testing.

In its comments, the Alliance recommended reducing the cool-down period in S6(e) from "up to one hour" to "up to five minutes." The Alliance argued that, as currently proposed, this cool-down period could make the rule technology-dependent, because only direct TPMSs could comply. According to the Alliance's understanding, air would be let out of the vehicle's tire(s) after the cooling-down period, but some systems may not be able to detect the changes immediately, and by the time they can, the tires may have warmed up to a level above the warning threshold. However, the Alliance stated that if the test is conducted with tires that were under-inflated just after having been warmed up during the calibration phase, then those systems should be able to detect the differential.

As a related matter, the Alliance argued that proposed S6(f)(3) of the NPRM, which provides instructions in the event that the TPMS low pressure telltale fails to illuminate after the tires are deflated and the vehicle is driven as required, should be revised to provide for an additional check of the tires' inflation pressures prior to discontinuing the test. The Alliance stated that it is requesting this change to avoid incorrect findings of noncompliance in cases where the tire inflation pressure is higher than the required TPMS activation threshold due to a tire temperature increase as a result of driving, ambient temperature changes, or a difference in temperature from the road surface in a stationary location to that of the test road surface. The Alliance recommended similar modifications to proposed paragraph S6(g).

NIRA Dynamics made a similar comment, arguing that the portion of the NPRM's test procedures in which the tires are deflated could conceivably result in tires inflated above the warning threshold during the test. According to NIRA, tests have shown that tire pressure increases due to temperature changes after rapid deflation, which can negate the pressure change to some extent. Therefore, NIRA Dynamics recommended that the tire pressure be decreased to 2 psi below the warning threshold, and that if the TPMS does not issue a warning during the test, the tire pressure should be double-checked. Similarly, VW/Audi recommended that the final rule should provide no more than five minutes to adjust and check the tires' inflation pressures before starting the system detection phase, and it supported decreasing the tire pressure to 2 psi below the warning threshold.

Sumitomo stated that its experience has shown that it can take several minutes for the tire pressure to become stable after being set to a certain value. Thus, Sumitomo

recommended that the test procedures be modified to set the tire 1 psi below the activation pressure, wait three minutes, and then verify the tire pressure to ensure that the pressure has been accurately set.

In order to compensate for the temperature effects discussed by the Alliance, NIRA Dynamics, VW/Audi, and Sumitomo, we have decided to reduce the tire cool-down period in S6(e) from "up to one hour" to "up to five minutes," as requested by the commenters. We believe that the pressure differential between cold tire inflation pressure and running tire inflation pressure is approximately 8-10 percent. Therefore, tires that have their pressure reduced to the TPMS activation pressure while cold may experience a tire pressure increase once the vehicle has been driven for a short period of time, and this increase in pressure may prevent the TPMS from providing the low tire pressure warning.

Regarding the commenters' recommendations for a decrease in the tire pressure deflation in S6(e) from the current 1 psi below the TPMS activation threshold to 2 psi below that level and for an additional pressure check, we have decided to adopt the 2 psi recommendation. We believe that this modification would be sufficient to account for the temperature effect described by the commenters without the need for additional pressure checks.

(e) Testing with Pressures Other Than Placard Pressure

Under S6 of the NPRM, the proposed test procedures set placard pressure as the baseline for inflating and deflating tires during testing.

The Alliance argued that because FMVSS No. 110 requires the new tire pressure label to specify only one recommended pressure, other recommended pressures for

special conditions (*e.g.*, extreme temperatures, heavy loads, off-road use) must now be provided in the owner's manual. Accordingly, the Alliance recommended revising the test procedures to provide that in conducting testing, NHTSA would consult the owner's manual and, if covered special conditions are present, use the inflation pressures specified for such conditions in lieu of the placard pressure. (Porsche and VW/Audi provided similar comments.) Schrader commented that TPMSs should accommodate drivers' needs to change inflation pressures to match the load on the tires.

We are not adopting the commenters' recommendations regarding testing at pressures other than placard pressure, because we do not believe that any of the above-described "special conditions" are likely to occur during compliance testing.

(f) System Reset

As reflected in the NPRM, the agency recognizes that many TPMSs are equipped with a system reset feature that must be used in appropriate circumstances. This understanding is reflected in the NPRM's test procedures, which refer to reset at S6(c), (i), (j), and (l).

Several commenters discussed what they perceived to be an error in paragraph S6(i) of the test procedures, which discusses action to be taken at the end of the system detection phase (*i.e.*, after point at which the low pressure telltale should have illuminated but prior to re-inflation of the tires). As proposed, that provision provided, "If the vehicle's TPMS has a manual reset feature, attempt to reset the system in accordance with instructions specified in the vehicle owner's manual prior to re-inflating the vehicle's tires. If the low tire pressure telltale illuminates, discontinue the test."

The Alliance recommended elimination of S6(i) because it seems to imply that an owner may extinguish the TPMS low pressure telltale without correcting the under-inflation condition. According to the Alliance, manufacturers' recommended procedures for TPMS reset require that the manual reset procedure be performed only after correcting the inflation pressure. Continental Teves, Schrader, Sumitomo, and VW/Audi also raised this issue.

Paragraph S6(c) of the NPRM proposed the following language, "If applicable, reset the tire pressure monitoring system in accordance with the instructions in the vehicle owner's manual. The Alliance recommended modifying S6(c) to specify that the system will be "set or reset."

BMW raised a more substantive argument regarding system reset, stating that a manufacturer should be permitted to incorporate a TPMS reset feature to accommodate situations such as a consumer switching between summer and winter tires. According to BMW, the reset would allow the system to calibrate immediately after the tire change. BMW commented that if the agency is seriously concerned about driver misuse of a reset, NHTSA should consider a requirement that would prevent TPMS reset from the driver's seat.

After further consideration on the issue of system reset, we have decided to delete the provision contained at S6(i) of the NPRM. Because some TPMSs cannot determine tire pressure in individual tires, these systems cannot detect correction of the under-inflation situation (and extinguish the low tire pressure telltale) without resetting the system. In light of the information presented by the commenters, we have decided not to test whether the TPMS telltale will extinguish after the system is reset. We expect that,

for vehicles equipped with a reset, the owner's manual would have instructions for the proper use of the reset feature (*e.g.*, stating that the driver should re-inflate the tires to the proper level before resetting the system).

Regarding BMW's comment on the permissibility of a TPMS that may be reprogrammed or reset to accommodate different tires, we leave that decision to the vehicle manufacturer. As noted previously, NHTSA will conduct compliance testing with the tires installed on the vehicle at the time of initial sale.

Regarding the Alliance's request to modify the language of S6(c), we have decided to adopt the Alliance's recommended language, although we believe that the Alliance's request largely involves semantics.

7. Lead Time and Phase-In

The NPRM proposed the following schedule for compliance with the TPMS standard: 50 percent of a vehicle manufacturer's light vehicles would be required to comply with the standard during the first year (September 1, 2005 to August 31, 2006); 90 percent during the second year (September 1, 2006 to August 31, 2007); all light vehicles thereafter (see S7). The proposal stated that carry-forward credits would be provided for vehicles certified as complying with the standard that are produced after the effective date of the final rule.

The NPRM's proposed schedule for lead time and phase-in was based upon information that the agency obtained from September 2003 Special Orders to 14 vehicle manufacturers (regarding their production plans for TPMS at the time of the Second Circuit's decision) and to 13 TPMS manufacturers (regarding their production capacity). From the responses to these Special Orders, NHTSA learned that, in anticipation of the

start of the phase-in under the June 2002 final rule, most vehicle manufacturers were moving aggressively toward installation of TPMSs capable of meeting the four-tire, 25-percent under-inflation detection requirement, but some were not. The information provided by TPMS suppliers indicated sufficient capacity to supply TPMSs with a four-tire, 25-percent detection capability in quantities that would easily meet the newly proposed phase-in requirements.

In general, most of the vehicle manufacturers that commented on the NPRM, as well as the Alliance, requested additional lead time and a modified phase-in schedule. Public interest groups, such as the Advocates, expressed support for the NPRM's compliance schedule, as proposed. Specific comments and recommendations regarding lead time and the phase-in are discussed immediately below.

(a) Lead Time

The Alliance recommended that the final rule include a two-year phase-in for compliance beginning on September 1, 2006. It stated that the agency could encourage early compliance by making phase-in credits available for compliant vehicles built after publication of the final rule. However, the Alliance made its lead time and phase-in recommendations contingent upon its assumption that the agency would defer the proposed MIL and related owner's manual provisions until September 1, 2007.

The Alliance stated that the NPRM's prohibition against a telltale that changes color from yellow to red at increasingly low tire pressure levels will require manufacturers to add an additional telltale to the instrument panel. According to the Alliance, instrument panel redesign requires one to four years of lead time, so this change could not be accomplished before September 1, 2007.

Similar comments about lead time were provided by AIAM, DaimlerChrysler, Fuji, GM, Hyundai, Porsche, Suzuki, VW/Audi, and Sumitomo. For example, the AIAM stated that the proposed MIL requirements could dictate redesign of vehicle dashboards and necessitate new software and hardware. AIAM also argued that changes to the owner's manual cannot be accomplished quickly, and that the owner's manuals for some MY 2006 vehicles have already gone to print. As a further example, Fuji argued that the proposed MIL requirements would necessitate substantial changes in ECM logic and circuitry, which will require additional design, calibration, testing, and incorporation by suppliers.

The Alliance commented that, because of the need to lock in production-related decisions for MY 2006, if a final rule were issued later than December 2004, a phase-in beginning in September 2005 would only be feasible if the technical provisions of the new final rule would allow compliance certification for all systems currently in production that were designed in accordance with the carryover provisions of the June 5, 2002 final rule for TPMS, without any revision. (GM and the AIAM each made a similar comment.)

The Alliance also stated that under the Safety Act, a Federal motor vehicle safety standard may not become effective in less than 180 days.[50] (The Alliance stated that its member companies will require the full 180 days in order to complete certification testing and documentation after the new standard is promulgated.) Therefore, the Alliance argued that, as a legal matter, March 1, 2005 is the latest date that the agency can issue a final rule and have it be effective on September 1, 2005. Once again, the Alliance commented that its statements regarding a September 2005 date for the start of

[50] 49 U.S.C. 30111(d).

compliance assumes deferral of compliance with the MIL provisions and related owner's manual language until September 1, 2007. (AIAM, BMW, Honda, Mitsubishi, Nissan, and Suzuki provided similar comments.)

The Alliance also commented that the agency should make FMVSS No. 138 a test case for the proposed revisions to 49 CFR Part 568 that would allow final stage manufacturers and alterers, many of which are small businesses, an extra year for compliance.

DaimlerChrysler commented that even if the agency were to publish a final rule in Spring 2005 that was identical to the September 2004 NPRM, the company could not implement the MIL provisions in time for MY 2006. DaimlerChrysler stated that close to two years is needed to convert an assembly plant in order to accommodate a TPMS component into the assembly line, and 9-12 months is needed to accommodate the newly proposed MIL requirement.

In its comments, General Motors stated that it would require 24 months from publication of a final rule to the effective date in order to meet the requirements of the new proposal. GM stated that this time period includes 18 months to engineer, prototype, tool, and validate the system, and six months to go from vehicle validation test completion to production.

Hyundai stated that NHTSA should extend the compliance date in the final rule to September 1, 2007, but dispense with the phase-in and instead require full compliance by that date.

After careful consideration of the public comments related to lead time, we have decided to begin mandatory compliance (with a modified phase-in discussed below) on

October 5, 2005, but to defer compliance with the standard's MIL requirements until September 1, 2007. The reasons for this decision are as follows.

The proposed requirements for the TPMS to detect low tire pressure (*i.e.*, a four-tire, 25-percent under-inflation detection capability) should have come as no surprise to vehicle manufacturers, because the Second Circuit's opinion in Public Citizen v. Mineta made clear that the standard would require a system with a four-tire detection capability, and the NPRM's proposed four-tire, 25-percent requirement harkened all the way back to the June 2002 final rule.

The September 2004 NPRM also clearly indicated to the industry that NHTSA intended to specify requirements for TPMSs beginning with MY 2006. Furthermore, vehicle manufacturers' own production data, as contained in the September 2003 Special Orders, demonstrated that at that time, the industry was well on its way in terms of planning for incorporation of TPMSs with a four-tire, 25-percent under-inflation detection capability.

In addition, we do not agree with the Alliance's argument that additional lead time should be provided because manufacturers may wish to incorporate a second red lamp to indicate extremely low tire pressure; such a lamp is not required under the standard.

However, we recognize that vehicle manufacturers could not be certain of the exact details of the final rule until publication of this notice. Therefore, in consideration of the changes made to this final rule (as described below, including deferral of the TPMS MIL requirements and associated owner's manual requirements), we have made

adjustments to the percentages specified for light vehicle compliance with the phase-in in order to maintain Fall 2005 compliance date proposed in the NPRM. In an additional effort to maintain a Fall 2005 compliance date, as further described below, we have decided to permit vehicle manufacturers to earn carry-forward credits and carry-backward credits (*i.e.*, reduce compliance during the first year of the phase-in and increase compliance by a corresponding amount during the second year of the phase-in). We believe that these changes in the final rule effectively resolve manufacturers' lead time concerns. Consequently, we see no reason to delay implementation of the standard for an additional year in response to the arguments raised by the commenters.

Regarding the TPMS MIL, we understand that the TPMS malfunction indicator represents a new requirement that was not present prior to the September 2004 NPRM, and that implementation of the MIL requirements may necessitate significant design and production changes (*e.g.*, redesign of vehicle dashboards, new software and hardware). Therefore, it may not be practicable for vehicle manufacturers to comply with the TPMS MIL requirements by the start of the phase-in. We believe that the recommendation of at least 24 months lead time for the TPMS MIL is reasonable.

In addition, as reflected in the Final Regulatory Impact Analysis for this rulemaking, the incremental benefits associated with the MIL are expected to be small in comparison to those provided by the system's low tire pressure warning. The TPMS MIL is expected to account for 0.677 percent of the final rule's estimated benefits, which equates to 1 fatality and 57 injuries prevented per year (see page VII-12 of the FRIA). Extrapolating from the figures provided in the FRIA, we believe that delaying the final rule until vehicle manufacturers could have a compliant TPMS MIL in place (*i.e.*,

delaying the 20-percent phase-in in MY 2006 and the 70-percent phase-in in MY 2007) would lead to an estimated 107 fatalities and 7,536 injuries that could have been prevented if TPMSs without an MIL were provided in vehicles under the final rule's phase-in (with benefits accruing over the life of vehicles so equipped). Accordingly, we believe that it would be more advantageous to have TPMSs (without an MIL) to begin being incorporated in new light vehicles sooner, rather than defer implementation of the entire standard. For these reasons, we believe that a compliance date of September 1, 2007 for the standard's MIL requirements (including associated owner's manual requirements) would be both practicable and maximize safety benefits under the standard.

In response to the Alliance's comment that, by statute, a safety standard may not become effective less than 180 days after the standard is prescribed (see 49 U.S.C. 30111(d)), we have decided to postpone the start of compliance until 180 days after publication of this final rule. In order to better coincide with manufacturer production schedules, we have scheduled the second part of the phase-in to begin on September 1, 2006. However, if the agency is forced to postpone this compliance date for an additional year (*i.e.*, eliminate the 20-percent compliance requirement for MY 2006), we would expect to lose 24 lives, a result that could be prevented if the vehicles subject to a phase-in commencing in Fall 2005 were equipped with a TPMS that could provide a low tire pressure warning to the driver. Such delay would also be expected to result in 1,675 more injuries than otherwise would have occurred.

We believe that other changes between the June 2002 final rule and today's final rule for TPMS are relatively minor, and do not constitute major new and unexpected structural requirements. However, after considering public comments, we have sought to

accommodate these changes through modifications in the phase-in schedule, as discussed in the next section below. Specifically, we have modified the compliance percentages of the phase-in, which should ease implementation.

Furthermore, manufacturers have known since at least August 2003 that a TPMS with a four-tire detection capability would be required and that there would likely be a requirement for 25-percent under-inflation detection. These expectations were confirmed in the September 2004 NPRM, which included a proposed phase-in beginning September 1, 2005; manufacturers have not suggested that TPMS technologies are unavailable to meet those requirements. And once again we note that vehicle manufacturers' own production data, as contained their responses to the September 2003 Special Orders, demonstrated that at that time, most of the industry was moving aggressively in terms of planning for incorporation of TPMSs with a four-tire, 25-percent under-inflation detection capability. The Alliance's argument suggests that vehicle manufacturers have disregarded all of the knowledge they have gained about the eventual TPMS standard since the time of the Second Circuit's decision, including their own production plans.

In addition, the Alliance has not provided any evidence to demonstrate that their members could not meet a Fall 2005 compliance date, other than to assert that they will require the full 180 days. The Alliance's comments also intimate that a September 1, 2005 phase-in would be feasible "if the technical provisions of the new Final Rule allow compliance certification by all systems currently in production that were designed in accordance with the carryover provisions of the 2002 Final Rule, without any revision" (which included a four-tire, 25-percent under-inflation detection option). Furthermore, we believe that concerns related to lead time are either rendered moot or significantly

mitigated by the final rule's allowance of both carry-forward and carry-backward credits. For these reasons, we have decided to require compliance with the requirements of the standard beginning on October 5, 2005.

In order to ease implementation, NHTSA has decided to permit vehicle manufacturers to earn carry-forward credits for compliant vehicles, produced in excess of the phase-in requirements, that are manufactured between the effective date of this rule and the conclusion of the phase-in.[51] These carry-forward credits could be used during the phase-in, but they could not be used to delay compliance certification for vehicles produced at the conclusion of the phase-in. Except for vehicles produced by final-stage manufacturers and alterers (who receive an additional year for compliance), all covered vehicles must comply with FMVSS No. 138 on September 1, 2007, without use of any carry-forward credits.

Furthermore, we have determined that there is good cause to make this final rule effective upon publication so that vehicle manufacturers would have a standard in effect to which they may certify vehicles for purposes of early, voluntary compliance and to maximize the time for earning carry-forward credits. Providing this earlier effective date may cause some vehicles to be equipped with TPMSs that otherwise might not have been, thereby advancing the safety goals of the standard. We explicitly note that vehicle manufacturers have no mandatory compliance responsibilities under the standard until the start of the phase-in.

To further ease implementation and to maintain a Fall 2005 compliance date, we have decided also to provide carry-backward credits, whereby vehicle manufacturers may

[51] Any such certification of compliance with the standard is irrevocable.

defer compliance with a part or all of the certification requirements for the first period of the phase-in, provided that they certify a correspondingly increased number of vehicles under the standard during the second period of the phase-in. Stated another way, carry-backward credits allow for under-compliance in the first period of the phase-in, provided that there is corresponding, compensating over-compliance in the second period of the phase-in. For example, if a vehicle manufacturer anticipated production problems in terms of incorporating compliant TPMSs into vehicles produced from October 5, 2005, through August 31, 2006 (*i.e.*, MY 2006), it could choose to certify 10 percent of its light vehicles to the standard during that period and commit to certifying 80 percent of its light vehicles manufactured from September 1, 2006 through August 31, 2007 (*i.e.*, MY 2007). We believe that permitting carry-backward credits would not impact the overall safety benefits of the final rule, because the same number of vehicles would be subject to compliance certification, although the distribution may vary over the model years of the phase-in. Corresponding changes have been added to the regulatory text of both FMVSS No. 138, as well as the TPMS phase-in requirements contained in 49 CFR Part 585.

In addition, since the NPRM was published, NHTSA has issued a final rule pertaining to certification requirements for vehicles built in two or more stages and altered vehicles (see 70 FR 7414 (Feb. 14, 2005)). The amendments made in that final rule become effective September 1, 2006. In relevant part, the multi-stage certification final rule amended 49 CFR 571.8, Effective Date, and it added a new subparagraph (b) providing as follows:

> (b) Vehicles built in two or more stages vehicles and altered vehicles. Unless Congress directs or the agency

> expressly determines that this paragraph does not apply, the date for manufacturer certification of compliance with any standard, or amendment to a standard, that is issued on or after September 1, 2006 is, insofar as its application to intermediate and final-stage manufacturers and alterers is concerned, one year after the last applicable date for manufacturer certification of compliance. Nothing in this provision shall be construed as prohibiting earlier compliance with the standard or amendment or as precluding NHTSA from extending a compliance effective date for intermediate and final-stage manufacturers and alterers by more than one year.

In light of the agency's policy on multi-stage manufacturer certification, as expressed in the February 14, 2005 final rule, we have decided to adopt the Alliance's suggestion and to apply that principle to the compliance certification requirement for final-stage manufacturers and alterers under the TPMS standard. Thus, the final rule for TPMS is requiring final-stage manufacturers and alterers to certify compliance for all covered vehicles manufacturers on or after September 1, 2008. However, final-stage manufacturers and alterers may voluntarily certify compliance with the standard prior to this date (although no carry-forward credits would accrue in this case).

(b) Phase-In Schedule

In their comments, vehicle manufacturers and the Alliance generally favored modification of the phase-in schedule set forth in the NPRM. The following summarizes the commenters' recommendations regarding the phase-in schedule. It should be noted that, unless otherwise indicated, the phase-in percentages specified below are exclusive of requirements related to the malfunction indicator, compliance with which manufacturers argued should be postponed until the end of the phase-in period.

The Alliance recommended that 65 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007. The Alliance stated that this schedule would accommodate its member companies' different stages of readiness in terms of developing and producing large numbers of compliant TPMSs. The Alliance also argued that the agency has based its phase-in schedule on the responses to NHTSA's September 2003 TPMS Special Orders; however, the response to those Special Orders rested on certain vehicle manufacturer assumptions that have not proven true (*e.g.*, that carry-forward credits would be available from the Fall of 2002, that indirect TPMSs could be used to comply with the rule). In addition, the Alliance commented that the MIL provisions are new to the NPRM and will require redesigns by manufacturers.

In addition, Mitsubishi commented that business circumstances since the time of the Special Order have resulted in changes in product plans, which have impacted installation of TPMSs, and Mitsubishi stated that it uses different TPMS technology in each of its models, a factor which contributes to the need for longer lead time.

AIAM recommended that 50 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007.

BMW recommended that 35 percent of covered vehicles should be required to comply in September 2005, that 70 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007.

DaimlerChrysler recommended the following phase-in schedules if the proposed MIL are required at the start of the phase-in. If carry-forward credits are permitted, DaimlerChrysler recommended that 70 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007. If carry-forward credits are not permitted, DaimlerChrysler recommended that 50 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007.

If the MIL requirements are deferred to the end of the phase-in, DaimlerChrysler stated that it could support a recommendation that 30 percent of covered vehicles should be required to comply in September 2005, that 70 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007.

Hyundai recommended that 100 percent of covered vehicles should be required to comply in September 2007, without any phase-in.

Mitsubishi recommended that 50 percent of covered vehicles should be required to comply in September 2005, that 70 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007.

Porsche recommended that 65 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007. Porsche stated that if a three-year phase-in is necessary, it

recommended a 10-50-100% phase-in schedule, which is consistent with the June 2002 final rule.

Fuji offered two recommended options for the phase-in. Under Option 1, Fuji recommended that 50 percent of covered vehicles should be required to comply in September 2006, that 90 percent of covered vehicles should be required to comply in September 2007, and that 100 percent of covered vehicles should be required to comply in September 2008. Under Option 2, Fuji recommended that 100 percent of covered vehicles should be required to comply in September 2007, without any phase-in.

VW/Audi recommended that 40 percent of covered vehicles should be required to comply in September 2006, and that 100 percent of covered vehicles should be required to comply in September 2007. VW/Audi's recommended schedule would include a MIL (consistent with its suggested changes). VW/Audi stated its belief that it would be preferable to postpone the phase-in until 2006 and require TPMSs with a MIL at that time, rather than begin the phase-in in 2005 and allow TPMSs without a MIL.

After carefully considering all available information, we have decided to require a phase-in schedule for FMVSS No. 138 as follows: 20 percent of a vehicle manufacturer's light vehicles must comply with the standard during the period from October 5, 2005, to August 31, 2006; 70 percent during the period from September 1, 2006 to August 31, 2007, and all light vehicles thereafter. However, compliance with the standard's requirements for the TPMS malfunction indicator and related owner's manual language would be deferred until September 1, 2007, at which time those provisions also would be mandatory for all light vehicles.

For the reasons discussed under the Lead Time section immediately above, we believe that this final rule, as modified, provides manufacturers with sufficient lead time to begin a **October 5, 2005,** phase-in of the core requirements of the TPMS standard (*i.e.*, implementing the standard's low pressure detection requirements but briefly deferring implementation of the new requirements for the MIL and related owner's manual language). Once again, the requirements of the final rule are not drastically different from those of the (subsequently vacated) standard established by the June 2002 final rule, except for the deletion of the one-tire, 30-percent detection option and the addition of the MIL requirements. The Special Orders demonstrated that in Fall 2003, most vehicle manufacturers were moving aggressively towards TPMSs with a four-tire, 25-percent under-inflation detection capability and suppliers had sufficient capacity to meet demand. The direction of this rulemaking, in terms of a system with a four-tire, 25-percent detection capability, was again expressed in the September 2004 NPRM. In addition, some manufacturers (*e.g.,* BMW, Mitsubishi) stated in their comments that they could begin certification to the standard in September 2005, provided that the MIL requirements and related owner's manual language requirements are deferred.

However, based upon the information provided by the manufacturers and the rapidly approaching start of the 2006 Model Year, we have decided to modify the phase-in percentages from those contained in the NPRM. Particularly at this stage in a vehicle manufacturer's normal production cycle, a phase-in starting at 50 percent of production may not be practicable, so we have lowered that percentage to 20 percent. For similar

reasons, we have also decided to modify the second year's phase-in percentage to 70 percent from 90 percent.

Regarding the MIL requirements, vehicle manufacturers have commented that it would be possible to implement the necessary software and hardware changes fully by the conclusion of the phase-in on September 1, 2007. (No additional phase-in is being provided for the MIL requirements.) We believe that that timeframe is reasonable, in light of the technical and production challenges associated with incorporating the MIL. As a related matter, it would make little sense to include owner's manual language for the MIL until that feature is actually incorporated into the vehicle; therefore, the requirements for owner's manual language related to the MIL are similarly deferred until the conclusion of the phase-in.

As a technical matter, we note that on December 8, 2004, NHTSA published a final rule that, among other things, consolidated the phase-in reporting requirements for various standards by revising 49 CFR Part 585 (69 FR 70904). The amendments in that final rule become effective on September 1, 2005. Accordingly, we have decided to make the TPMS final rule's amendments to Part 585 for the TPMS phase-in reporting requirements effective that same day (*i.e.*, September 1, 2005). We do not anticipate that this delay in the effective date for the Part 585 amendments will cause any problems, because not only does it coincide with the start of the TPMS phase-in, but also vehicle manufacturers are not expected to do any actual phase-in reporting until 2006. However, the details of the reporting requirements are available for recordkeeping purposes in the interim, something that may be of interest to manufacturers seeking carry forward credits for early, voluntary compliance.

8. Small Business Impacts

In the NPRM, the agency tentatively concluded that the proposal would not have a significant economic impact upon a substantial number of small entities.

SEMA's comments expressed disagreement with the NPRM's preliminary conclusion that the TPMS proposal would not have a significant economic impact upon a substantial number of small businesses. SEMA represents over 550 companies that manufacture, distribute, retail, and install tire, wheel, and tire/wheel accessories, most of which are defined as "small businesses."

Specifically, SEMA challenged the NPRM's contention that the proposal would not have a significant impact upon aftermarket wheel and rim manufacturers because the proposal does not contain requirements for spare tires and rims. SEMA argued that the proposal would indeed have an impact upon these manufacturers, because: (1) the NPRM would cover replacement tires and wheels installed by dealerships prior to first sale, and (2) the service industry would need to make sure that the malfunction telltale does not illuminate when one or more tires are replaced.

According to SEMA, for replacement tires and wheels to work in conjunction with the OEM-installed TPMS, these aftermarket manufacturers may need to institute numerous and potentially costly changes, including equipment redesign, production retooling, and recall of noncompliant equipment. Furthermore, SEMA argued that the proposed TPMS standard could force small business installers of aftermarket wheel/tire combinations (*e.g.*, automobile dealerships, tire shops, repair shops) to invest in computer diagnostic equipment and employee training in order to access, service, repair, install, and calibrate these TPMSs. Failure to take these steps could cause these businesses to

violate the relevant statutory provisions prohibiting the manufacture/sale/importation of noncomplying motor vehicles[52] and prohibiting actions that knowingly make inoperative safety devices and elements inoperative.[53]

In addition, SEMA stated that consumers would have legitimate expectations that the TPMS will continue to operate properly with replacement tires and wheels, and the aftermarket industry would be faced with product liability exposure.

SEMA recommended that NHTSA consider alternative approaches, as outlined in its comments, in order to limit the impacts of the TPMS rule on the small business community. As discussed previously, SEMA recommended that vehicle manufacturers should be required to share with retailers, installers, and consumers, in a timely and affordable manner, all servicing information needed to operate a compliant TPMS. SEMA suggested that NHTSA consult with the Environmental Protection Agency (EPA) for guidance, because, according to SEMA, EPA has required vehicle manufacturers to share on-board diagnostic system (OBD) information with the service and repair industry in a timely and cost-effective manner.

SEMA's recommendations sought to ensure that manufacturers develop transparent and minimally burdensome processes for TPMS maintenance and repair. Specifically, SEMA commented that vehicle manufacturers should be required to comply

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[52] Under 49 U.S.C. 30112(a), "… a person may not manufacture for sale, sell, offer for sale, introduce or deliver for introduction into interstate commerce, or import into the United States, any motor vehicle or motor vehicle equipment manufactured on or after the date an applicable motor vehicle safety standard prescribed under this chapter [49 USC §§ 30101 *et seq*.] takes effect unless the vehicle or equipment complies with the standard and is covered by a certification issued under section 30115 of this title."

[53] Under 49 U.S.C. 30122(b), "A manufacturer, distributor, dealer, or motor vehicle repair business may not knowingly make inoperative any part of a device or element of design installed on or in a motor vehicle or motor vehicle equipment in compliance with an applicable motor vehicle safety standard prescribed under this chapter [49 USC §§ 30101 *et seq.*] unless the manufacturer, distributor, dealer, or repair business reasonably believes the vehicle or equipment will not be used (except for testing or a similar purpose during maintenance or repair) when the device or element is inoperative."

with applicable Society of Automotive Engineers and European Union (EU) standards governing the design of wheel mounting pockets in order to facilitate transferal of sensors from the OE tires/wheels to replacement tires/wheels (no references provided). SEMA stated that communications protocols should be standardized so as to facilitate the use of aftermarket sensors, and that recalibration processes should be straightforward. SEMA also recommended that manufacturers should be prohibited from requiring special tools for TPMS reprogramming or utilizing encrypted systems that would prevent installation of aftermarket products.

According to SEMA, if these changes are not adopted, the potential result would be to restrict aftermarket manufacturers from offering a full range of wheel and tire combinations to consumers, leaving such manufacturers with an unenviable choice between not selling these aftermarket products or accepting the associated product liability exposure.

In contrast, VW/Audi stated that the test procedures in the final rule should recognize that some malfunctions may require action on the part of the dealer in order to extinguish the TPMS MIL.

In the NPRM, the agency's rationale for its tentative conclusion that the proposal would not have a significant economic impact upon a substantial number of small entities was based upon several considerations. First, the agency understands that there are currently only four small motor vehicle manufacturers in the U.S. that would have to comply with the standard and that those manufacturers would rely on TPMS suppliers to provide the requisite system hardware to be integrated into their vehicles. There are a few small manufacturers of recreational vehicles, but the agency expressed its belief that

most of these manufacturers could use the TPMSs supplied with the van chassis supplied by other large vehicle manufacturers and rely upon the chassis manufacturer's incomplete vehicle certification. We believe that the circumstances for these entities remain essentially unchanged.

In the NPRM, the agency also sought to eliminate the concerns of small businesses that make and sell custom wheels and aftermarket rims by proposing to exempt spare tires and aftermarket rims (that do not match the original equipment rims) from the requirements of the standard on a practicability basis.

For the following reasons, we continue to believe that the requirements of the standard, as contained in this final rule, will not have a significant economic impact upon a substantial number of small entities.

We do not believe that the final rule will have a significant impact upon the service industry in terms of aftermarket sales or repair. First, the agency has already stated that we do not consider installation of an aftermarket or replacement tire or rim that is not compatible with the TPMS to be a "make inoperative" situation under 49 U.S.C. 30122, provided that the business entity does not disable the TPMS MIL (see section IV.C.4(a)). In such situations, once the TPMS MIL illuminates, the consumer is put on notice that the aftermarket motor vehicle equipment in question is not compatible with the TPMS. From that point, it is within the consumer's power to substitute other tires or rims that permit continued proper TPMS functionality.

In addition, SEMA has not provided any evidence to demonstrate that vehicle manufacturers would not make necessary repair and servicing information available to the aftermarket sales industry and to the service industry. We have not received any

consumer complaints regarding the serviceability of existing TPMSs. Vehicles currently include many complex systems, and, although dealer involvement may be necessitated in some cases, the marketplace has generally made available sufficient information to permit convenient maintenance and repair of such systems. We do not believe that TPMS technologies will prove any different in this regard. Accordingly, we believe that it is unnecessary to further consider SEMA's suggestion to compel vehicle manufacturers to share service information with the service and repair industry.

We note that we are permitting, but not requiring, TPMSs to be reprogrammable. Although we are uncertain as to the exact details of system reprogrammability, we assume that it will be fairly easy for the service industry to reprogram TPMSs to accommodate different tires and rims. We do not have any reason to believe that such information would be withheld from automotive service providers.

Regarding SEMA's suggestion that NHTSA require vehicle manufacturers to comply with SAE and EU standards governing the design of the wheel mounting pockets in order to facilitate transferal of sensors from the OE tires/wheels to replacement tires/wheels, we do not see a reason to impose such design restrictions on manufacturers.

In addition, we believe that there are other available options for replacement of TPMS sensors without imposing such design restrictions. As we understand, there are two primary methods of mounting a direct TPMS sensor on a rim. The first option is to produce a mold for the rim that includes a small cut-out area for the TPMS sensor. The other option is to utilize a strap to hold the sensor to the rim. If aftermarket manufacturers do not receive specific information on the cut-out area or if they wish to produce a more generic mold that could be used on any vehicle with the same size tires,

they could choose to use a strap to secure the TPMS sensor. We estimate that four straps might cost approximately $4, which is not very expensive as compared to the cost for replacement rims, so we believe that aftermarket rim suppliers could readily apply the strap method without a significant economic impact.

9. Environmental Impacts

ETV commented that the final rule should include an expanded discussion of the rule's anticipated impacts on the environment. According to ETV, both positive and negative impacts would be expected to result from establishment of an FMVSS for TPMS. ETV stated that two important positive environmental benefits would be lower levels of air pollution and reduced tire disposal rates, both resulting from operating tires at their proper pressures. In its comments, ETV stated that correct tire pressure improves fuel economy, with less fuel burned and correspondingly less pollutants produced. Correct pressure also extends tire life, thereby decreasing tire disposal rates at waste depots.

On the negative side, ETV stated that a significant environmental impact may result from the use of batteries to power wheel module pressure sensors in many TPMSs. The following summarizes ETV's view of these purported negative environmental impacts. According to ETV, there are approximately 16 million new vehicle produced annually that ultimately will be required to be equipped with a TPMS under the standard. If each vehicle has five tires (including the spare) fitted with battery-powered sensors, then there will be approximately 80 million batteries introduced annually into the U.S. environment. Eventually, these batteries will lose their charge, and they (and the

chemicals contained therein) will be discarded. ETV expressed concern that toxic and corrosive chemicals in those batteries could be released into the environment.

According to ETV, in developing the final rule, NHTSA should carefully consider the impacts of requiring systems that will use chemical power sources, particularly given the standard's broad applicability. Instead, ETV argued in favor of a requirement for a batteryless TPMS, which ETV believes is practical, safe and economically viable.

In the preamble to the NPRM, the agency certified that it has analyzed the TPMS rulemaking for the purposes of the National Environmental Policy Act (NEPA) and that the agency has determined that implementation of this action would not have any significant impact on the quality of the human environment. Even after having considered ETV's comments regarding the environmental impacts of our proposal, for the reasons that follow, we stand by our tentative conclusion that this action would not have any significant impact on the quality of the human environment.

NHTSA has implemented the requirements of NEPA through our regulations at 49 CFR Part 520, Procedures for Considering Environmental Impacts. Our regulations require preparation of an environmental impact statement for "major Federal actions significantly affecting the quality of the human environment." 49 CFR 520.5(a). The regulations also provide specific examples of situations that should ordinarily be considered as significantly affecting the quality of the human environment. The relevant situations that might apply to the present rulemaking include:

> (8) Any action that may directly or indirectly result in a significant increase in the energy or fuel necessary to operate a motor vehicle, including but not limited to the following: (i) Actions which may directly or indirectly result in a significant increase in the weight of a motor vehicle; and (ii) actions which may directly or indirectly

> result in a significant adverse effect upon the aerodynamic drag of a motor vehicle;
>
> (9) Any action that may directly or indirectly result in a significant increase in the amount of harmful emissions resulting from the operation of a motor vehicle;
>
> (10) Any action that may directly or indirectly result in a significant increase in either the use of or the exposure to toxic or hazardous materials in the manufacture, operation, or disposal of motor vehicles or motor vehicle equipment;
>
> (11) Any action that may directly or indirectly result in a significant increase in the problem of solid waste, as in the disposal of motor vehicles or motor vehicle equipment;

49 CFR 520.5(b)(8), (9), (10), and (11).

We believe that none of the purported impacts cited by ETV rise to the level of "significantly affecting the quality of the human environment." According to ETV, a requirement for a TPMS would result in tires operating at proper pressures, thereby leading to lower levels of air pollution (through improved fuel economy) and reduced tire disposal rates (through increased tread life). As discussed in the FRIA, we believe that installation of a TPMS in light vehicles will result in an average savings of 22-27 gallons of gasoline over the life of the vehicle, depending upon the type installed. This equated to roughly two fill-ups, which would be expected to result in an average annual emissions reduction of 0.90-1.10 million metric cubic tons of carbon equivalent (see p. V-60 of the FRIA). While these benefits in terms of reduced emissions are welcome, they would not significantly change the overall level of emissions from automotive point sources. In addition, such positive impacts would not necessitate preparation of an environmental impact statement under our regulations pursuant to NEPA.

Regarding increased tread life, we believe that installation of a TPMS will result in average tire tread life being increased by 740-900 miles per tire, depending upon the type installed (see pp. V-61 to 67 of the FRIA). The average lifespan of tires, at current inflation levels, is 45,000 miles. Consequently, although installation of a TPMS may increase the life of tires, it is unlikely to significantly impact the number of tires required over the life of the fleet or the number of tires ultimately reaching their final resting place in a landfill. However, any increases in tire life would be positive impacts that would not necessitate preparation of an environmental impact statement under our regulations pursuant to NEPA.

Finally, we turn to the issue of the incorporation of chemical batteries in direct TPMSs that will eventually require disposal. NHTSA's current information suggests that most vehicle manufacturers will comply with the requirements of the TPMS standard by installing a direct TPMS that utilizes batteries in sensors mounted in each of the vehicle's wheels. If we expect, upon completion of the phase-in, 17 million light vehicles would be certified to the standard each year, that would mean that 68 million batteries would be used. If manufacturers choose to also equip full-size spare tires with a TPMS sensor (15 percent anticipated), the number of batteries used would rise to 71 million.

However, we do not believe that requiring TPMSs, which may be equipped with batteries, would have a significant impact on the quality of the human environment, as ETV suggests. To start, the number of batteries attributable to TPMSs would result in only a modest increase in the number of batteries sold. In 1998, the U.S. EPA estimated that approximately 3 billion[54] industrial and household batteries were sold. NHTSA believes that battery usage is a function of population. Given that the population was

[54] See http://www.epa.gov/epaoswer/non-hw/reduce/epr/products/batteries.html.

roughly 270,248,000[55] in 1998 and 293,028,000[56] in 2004, to arrive at a more current estimate, we proportionately increased the batteries sold by multiplying the 1998 figure by the fractional increase in population or 3,000,000,000 x [293,028,000 ÷ 270,248,000], which results in a 2004 estimate of 3.25 billion batteries.

Adding the estimate of 71 million additional batteries as a result of a battery-powered TPMS to the estimated 3.25 billion batteries already in use, yields an increase of 2.18 percent. We believe that this increase is not significant in terms of total battery use and will not have a significant impact upon the quality of the human environment.

In addition, we believe that other considerations further diminish these impacts. First, TPMS sensor batteries tend to be extremely small in size, a mere fraction of the size of the main engine battery present in every vehicle. Thus, from a volume standpoint, these batteries would be expected to add very little to existing landfills, either in terms of their volume or chemical content.

Furthermore, we believe that the number of batteries used in TPMSs is likely to decrease over time. We understand that new, batteryless TPMS technologies have been developed, and manufacturers will have strong incentives to migrate to such systems both in terms of decreasing costs and minimizing maintenance issues for customers. We also understand that indirect TPMSs are becoming available which can meet the requirements of the standard without the need for batteries. Furthermore, if hybrid systems are developed, the number of batteries for a given TPMS could be cut in half.

For these reasons, we continue to believe that the TPMS rulemaking will not have any significant impact on the quality of the human environment.

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[55] See http://www.census.gov/population/estimates/nation/intfile3-1.txt.
[56] See http://www.cia.gov/cia/publications/factbook/geos/us.html.

10. Maintenance Issues

(a) TPMS Maintenance

Aviation Upgrade Technologies commented that most consumers will not spend money to maintain the functionality of the TPMS, and it argued that because the system is unlikely to last the life of the vehicle without needing maintenance or repair, the safety benefits associated with the TPMS may be lost at some point. The commenter asserted that indirect TPMSs would need to be recalibrated each time tires are changed or rotated and that recalibration would cost the consumer $100 per episode.

This comment does not comport with our understanding of how indirect TPMSs operate, and Aviation Upgrade Technologies was alone in making this point. It is our understanding from our review of indirect TPMSs that recalibration is a normal part of the system's operations after tires are changed or rotated, although it may be necessary to reset the system in accordance with instructions in the vehicle's owners manual. Furthermore, Aviation Upgrade Technologies did not provide any evidence, beyond its assertion, to demonstrate that the consumer would encounter such recalibration costs, nor did it provide any evidence to demonstrate the consumers would not be willing to incur routine maintenance costs associated with their vehicle's TPMS. We encourage consumers to keep their TPMS properly maintained in order to receive ongoing benefits in terms of low tire pressure warnings.

(b) Tire Maintenance

In its comments, ETRTO expressed concern that installation of a TPMS in a vehicle may result in *less* preventive tire maintenance (*e.g.*, regular pressure and wear checks) because drivers may rely upon the TPMS to inform them when tire service is

necessary. (Similar comments were provided by NADA and SEMA.) According to the commenters, such a result would be contrary to the agency's goals related to tire safety.

NADA argued that the NPRM did not adequately address the issue of whether TPMSs will necessitate tire installers/rotators to maintain existing rim positions and that it failed to analyze the nature and extent to which TPMS functions may be impacted when rims are replaced. NADA expressed concern that having to rotate tires off the rims could significantly increase the cost of tire rotations (which presumably could impact the regularity of rotations).

Under the TREAD Act, Congress directed the Secretary of Transportation to promulgate a regulation to require installation of TPMSs in new motor vehicles, a responsibility that was subsequently delegated to NHTSA. As a result, NHTSA does not have discretion vis-à-vis this TPMS mandate. However, NHTSA has stated many times that the TPMS is not a substitute for regular tire maintenance, and as part of this final rule, we have reiterated such a statement in the required owner's manual language.

Although the presence of a TPMS in the vehicle may cause some drivers to become more complacent and to check their tire pressure less regularly, we believe that this potential, negative consequence would be outweighed by the positive impact of having the system provide a warning to all drivers, particularly those who seldom or never checked their tire pressure.

Regarding NADA's comments on the potential consequences of allowing vehicle manufacturers to specify in the owner's manual that original rim positions must be maintained, we do not believe that this situation is likely to occur with significant frequency or that it would impose significant burdens when it does arise. For example,

indirect TPMSs would not be expected to experience any problems associated with tire rotation.

Several types of direct TPMSs have radio frequency receivers that identify sensors by their location on the vehicle. If the location of a particular sensor is changed, the sensor still will provide low tire pressure or TPMS malfunction data as designed when there is a general TPMS warning telltale. However, if the vehicle is equipped with a TPMS telltale that identifies the vehicle location of the tire with low pressure, tire and rim relocation (*i.e.*, rotation) may result in the TPMS receiver not knowing the proper location of the tire/rim combination. However, for many systems, the sensors can be "retrained" to their new positions on the vehicle after being rotated, and the telltale will identify the proper tire/rim position. Therefore, the tires on most TPMSs will not need to be separated from the rim for normal tire rotation as a result of this retraining capability.

For these reasons, we have decided to adopt the proposed requirement for rim position under S5.3.3. Therefore, in conducting compliance testing, the vehicle rims may be positioned at any wheel position, consistent with any related instructions or limitations in the vehicle owner's manual.

11. Markings for Vehicles with Direct TPMSs

SEMA recommended that NHTSA require a means of identifying vehicles equipped with a direct TPMS, so that individuals working in the service and repair industry will be able to tell whether a direct TPMS sensor is in place in or around the tires. According to SEMA, its suggestion may prevent damage to the TPMS sensors when the tires are dismounted or mounted. SEMA stated that such marking should be implemented in a manner that does not impose unnecessary burdens and costs on the tire

and wheel industry, such as through permanent markings that would require retooling or new molds. Instead, SEMA suggested that one low-cost option might be to require that vehicles equipped with a direct TPMS must have a unique, standardized valve stem retaining nut that is distinctive by special color or design.

In its comments, TIA made similar arguments regarding the need to require coding of the wheels or tires to let automotive professionals know that a direct TPMS sensor is in place. TIA expressed support for the recommended approach contained in SEMA's comments. TIA also stated that TPMS sensor location should be standardized.

We have decided not to adopt SEMA's and TIA's recommendations to require a specialized design feature to alert service and repair personnel when a direct TPMS sensor is in place in or around the tires, because we believe that such a requirement is unnecessary and would provide no safety benefit. The commenters did not provide any evidence to demonstrate that technicians have been unable to locate and service direct TPMSs currently installed on vehicles or that they would be unable to do so in the future. In contrast, we believe that as such systems become more prevalent in the vehicle fleet, service providers will become increasingly aware of the potential presence of TPMS sensors and will exercise due care when servicing the vehicle.

We are not adopting TIA's recommendation that we mandate a specific location for TPMS sensors. We believe that such an approach would be unnecessarily design restrictive, could increase costs, and would provide no appreciable benefit.

12. Definitions

(a) "Tires"

Sumitomo commented that although the NPRM expressed the agency's intention to require vehicle manufacturers to assure compliance with FMVSS No. 138 only with the tires installed on the vehicle at the time of initial vehicle sale, there is no corresponding provision in the regulatory text of the standard. To address this matter, Sumitomo recommended that the final rule should incorporate this limitation under S1, Purpose and Scope, and also define the term "tires" as "the tires installed on the vehicle at the time of initial sale" under S3, Definitions.

Consistent with the preamble of the NPRM, this final rule provides that the TPMS must function properly with the tires installed on the vehicle at the time of initial sale, and that the TPMS is not required to function with the spare tire. We agree with Sumitomo that these topics should be addressed in the regulatory text. Therefore, we are adding a new paragraph to S5.3, Vehicle Conditions, related to tires. In that new paragraph, S5.3.7, Tires, we are clarifying that testing under S6 will be conducted with the tires installed at the time of initial vehicle sale, excluding the spare tire (if provided). However, a spare tire could be installed for TPMS malfunction testing purposes.

(b) "Manual Reset"

Sumitomo asked the agency to define the term "manual reset" as "an operation to extinguish the warning lamp or warning messages." According to Sumitomo, manual reset should not include the start of calibration.

We do not believe that it is necessary to define the operation of a manual reset feature. In the final rule, we recognize that manual reset, where applicable, may be relevant to system calibration and extinguishment of the low tire pressure telltale, but we

will leave the details of the operation of reset for individual systems to the discretion of vehicle manufacturers.

13. Educational Efforts

A number of commenters (AAA, DaimlerChrysler, EnTire, VW/Audi) raised the issue of consumer education regarding the importance of proper tire maintenance and the role of the TPMS. For example, AAA recommended that NHTSA, manufacturers, and the traffic safety community must continue to aggressively educate motorists as to the importance of proper tire maintenance, in order to ensure that the presence of a TPMS does not lull motorists into a false sense of security.

DaimlerChrysler commented that it is important for NHTSA, automobile manufacturers, and tire manufacturers to work together to educate the public about how TPMSs work and about such systems' limitations. DaimlerChrysler requested that the agency help improve consumer understanding of the importance of regular tire inspections and maintenance, and it suggested that NHTSA may be able to work with the vehicle supply and maintenance industries to improve the availability and convenience of facilities for checking and correcting tire inflation pressure levels.

NADA stated that outreach efforts should be extended to tire installers as well.

As noted in the NPRM, NHTSA supports industry efforts to make the public aware of the importance proper tire maintenance, including maintaining adequate tire inflation pressure. The agency has produced a tire safety brochure in conjunction with tire manufacturers and tire dealers that is titled, "Tire Safety, Everything Rides On It." This brochure is part of a public campaign to provide information on tire pressure

monitoring, tire inspection, and the selection of replacement tires. The brochure also stresses the importance of tires to overall vehicle performance.

14. Alternative Systems

Aviation Upgrade Technologies requested that NHTSA reconsider its tentative decision not to permit TPMS systems with indicators on a vehicle's tire valve stems. The NPRM declined to accommodate such systems because they cannot provide a low pressure warning to the driver while the vehicle is in motion.

Aviation Upgrade Technologies argued that its valve cap system meets the letter and intent of the TREAD Act and actually outperforms other types of TPMSs by measuring actual tire pressure and functions before the vehicle begins moving. Aviation Upgrade Technologies also stated that as proposed, the TPMS standard would only benefit the wealthy, because the TPMSs that can meet the proposed requirements are expensive. The company's comments essentially repeat its earlier arguments raised in its petition for reconsideration of the June 2002 final rule for TPMS.

For the reasons expressed in the NPRM, we have decided not to permit TPMS systems with indicators on a vehicle's tire valve stems. We will briefly restate our reasoning, which is as follows. First, we believe that the language of and the safety need addressed by section 13 of the TREAD Act would be best satisfied by requiring that the TPMS warning display be inside the motor vehicle in order to indicate to the driver when a tire is significantly under-inflated. We believe that external TPMS warning indicators do not provide a clear, timely, and effective safety warning, as compared to TPMS indicators in the vehicle's occupant compartment.

Specifically, TPMSs with external indicators cannot provide a warning to the driver about low tire inflation pressure with the vehicle is in operation, which is the most critical time period from a safety perspective. If a vehicle developed a significant pressure loss while it is being driven, the driver would not receive a prompt warning from a valve stem system and is unlikely to be aware of the under-inflation problem.

Even in cases in which the vehicle is stopped, we believe that external TPMS warning indicators would not provide as effective a warning as a TPMS telltale inside the occupant compartment. People routinely do not walk around their vehicle prior to driving, so it is likely that many drivers would miss the message provided when there is an under-inflated tire. Therefore, we believe that valve cap devices would not provide an adequate warning to the driver.

Second, NHTSA also finds benefit to the centralization of warning indicators in a single, highly visible location, where they can provide important safety-related information to the driver. Historically, NHTSA has required safety warnings to be provided to the vehicle operator inside the vehicle.

Therefore, we have decided not to accommodate TPMSs that do not include an on-board telltale as part of the final rule.

15. Over-Inflation Detection

ETV commented that, although requiring the TPMS to monitor high pressure is as important as monitoring low pressure, the NPRM did not consider or address this issue. ETV stated that manufacturers specify a safe maximum tire pressure, and that the final rule should address this aspect of vehicle safety. ETV's comments recommended an intermittently flashing yellow telltale warning when the vehicle's tires are within five

percent of their maximum inflation pressure and an intermittently flashing red telltale when the vehicle's tires have exceeded the maximum inflation pressure.

We have decided not to adopt a requirement for over-inflation detection for the following reasons. First, the TREAD required a rulemaking to detect a significantly *under*-inflated tire, not over-inflated tires, so such a requirement is arguably outside the scope of this rulemaking. Furthermore, we are not aware of vehicle safety data reporting over-inflated tires as a significant safety hazard. In addition, available information does not suggest that over-inflation has the same safety implications as under-inflation, which causes heat buildup in a tire, potentially leading to permanent tire damage and sudden failure.

16. Temperature and Altitude Compensation

ETV requested that the agency reconsider its tentative decision in the NPRM to not include a requirement for temperature compensation as part of the TPMS standard. ETV argued that the standard must provide temperature compensation when the TPMS calculates tire pressure in order to determine the need for activation of the low pressure warning. According to ETV, temperature compensation is needed to account for the rise in pressure (4 psi) from the cold-start, ambient temperature to the normal running temperature.

ETV also stated that the TPMS should be required to account for changes in atmospheric pressure that accompany changing altitudes. ETV commented that such atmospheric pressure changes could change tire pressure by as much as 10 psi.

ETV argued that the TPMS should make the necessary adjustments to account for temperature, altitude, and load prior to vehicle motion in order to prevent nuisance

warnings that may result from daily and seasonal variations in those factors and which eventually might cause the driver to ignore TPMS warnings. Alternatively, ETV argued that those factors could cause the TPMS low pressure telltale to fail to illuminate, thereby resulting in a false sense of security on the part of the driver.

We have decided not to adopt requirements for temperature and altitude compensation because we believe that such requirements would introduce unnecessary complexity to the standard. Regarding temperature correction, the test procedures for low tire pressure detection in the final rule have been amended to compensate for tire pressure fluctuation. Tires will be deflated to testing pressure within five minutes after a 20-minute period of driving, which will ensure that the tire pressure will not rise above the telltale activation pressure during the remainder of the test.

Regarding altitude correction, we do not believe that altitude will be a significant factor in tire pressure fluctuation. We expect that the effect of atmospheric pressure on tire pressure will not result in more than a 5-percent change in tire pressure over the atmospheric pressure extremes encountered during normal driving.

We note further that ETV did not provide any data to demonstrate the need for either temperature or atmospheric compensation.

17. System Longevity

ETV commented that the TPMS safety system should be required to last for the life of the vehicle, which ETV stated is usually about ten years. ETV's comments expressed particular skepticism toward battery-dependent TPMSs, which it suggests are likely to fail in under ten years, and it argued that consumers may decide not to replace

the batteries or otherwise repair the system late in the life of the vehicle. ETV argued that operation of the vehicle in that state would frustrate the purpose of the rule.

We are not adopting ETV's suggestion for what amounts to a longevity requirement for the vehicle's TPMS, because we believe that such a requirement is both impracticable and unnecessary. Vehicle systems and components routinely wear out over the life of a vehicle, although the frequency may vary. For example, drivers may need to replace their wiper blades several times over the life of the vehicle, to replace their timing belt once, but perhaps never need to replace their transmission. It is simply not reasonable to expect vehicle manufacturers to certify that a system, such as the TPMS, will function for the life of the vehicle. Instead, we believe that consumer expectations and market competition will ensure that manufacturers provide TPMSs that are reasonably robust.

Furthermore, ETV has provided no evidence to demonstrate that consumers would not take the necessary steps to keep their TPMS functioning (even for systems with battery-powered sensors) or that the service industry would be unable to provide adequate TPMS repair.

18. Harmonization

The EC commented that the United Nations (UN) World Forum on Harmonization of Motor Vehicle Regulations has begun a global technical regulation (GTR) on tires. Accordingly, the EC requested that the United States adapt TPMS requirements in the future to reflect the work of this international body.

NHTSA will follow closely international efforts related to tires and TPMSs, including the activities of the UN World Forum on Harmonization of Motor Vehicle

Regulations. To the extent that a GTR or a consensus standard related to TPMS becomes available, the agency will carefully consider what actions, if any, are necessary to amend FMVSS No. 138.

V. Benefits

In preparing its June 5, 2002 final rule, NHTSA prepared a Final Economic Analysis (FEA), which was placed in the docket.[57] In that document, we discussed the costs and benefits of both the four-tire, 25-percent option and the one-tire, 30-percent option incorporated in that final rule. However, in Public Citizen, Inc. v. Mineta, the Second Circuit determined that the TREAD Act requires TPMSs to be four-tire systems and invalidated the one-tire, 30-percent option. Accordingly, that option has not been included in this final rule.

Although the FEA included analyses related to TPMSs with a four-tire, 25-percent under-inflation detection capability (the same performance standard required in this final rule), circumstances have changed to a certain extent since the June 2002 final rule. New technologies are emerging (*e.g.,* batteryless direct TPMSs that could greatly reduce maintenance costs for such systems), and new requirements have been adopted (*e.g.*, requirement for a TPMS malfunction indicator). Accordingly, the agency has prepared a new Final Regulatory Impact Analysis to accompany this final rule for tire pressure monitoring systems. The FRIA has been submitted to the Docket under the docket number for this notice.

The purpose of the FRIA is to reassess the costs and benefits of TPMS requirements, particularly in light of our resolution of the replacement tire issue and the requirement for a TPMS malfunction indicator. (The FRIA states that incorporation of a

[57] Docket No. NHTSA-2000-8572-216.

TPMS malfunction indicator may save an additional two equivalent lives, assuming a one-percent malfunction rate for replacement tires.) In addition, the FRIA examines various technologies suitable for compliance with the standard, as well as additional regulatory alternatives considered by the agency. It also discusses the uncertainties analyses and sensitivities analyses conducted by the agency as part of the FRIA, as required by OMB Circular A-4, Regulatory Analysis, which was issued in September 2003.

The following discussion summarizes the benefits associated with this final rule and its four-tire, 25-percent under-inflation detection requirement. Estimates of monetary impact (both in the section V. Benefits and section VI. Costs) are presented using a 3-percent discount rate; however, the FRIA also presents these impacts using a 7-percent discount rate.

The agency notes that the FRIA estimates 90-percent confidence bounds for many of the benefit and cost statistics. Those bounds reflect a 90-percent certainty level that the value is within that range (both for a 3-percent and a 7-percent discount rate). However, to simplify the discussion here, we are presenting the mean values for the benefit estimates in this section and the cost estimates in the next section, with the ranges below reflecting differences in the mean values based upon manufacturers' technology selection. The mean values are our best estimates. Please consult the FRIA for a more complete discussion of benefits and costs. The full ranges of benefits and costs, as well as their 90-percent confidence bounds, can be found in the FRIA's uncertainty analysis (Chapter X).

Under-inflation of tires affects the likelihood of many different types of crashes. These include crashes which result from: (1) skidding and/or losing control of the vehicle in a curve, such as a highway off-ramp, or in a lane-change maneuver; (2) hydroplaning on a wet surface, which can cause increases in stopping distance and skidding or loss of control; (3) increases in stopping distance; (4) flat tires and blowouts, and (5) overloading the vehicle. In assessing the impact of this final rule on those crashes, the agency assumes that 90 percent of drivers will respond to a low tire pressure warning by re-inflating their tires to the recommended placard pressure.

Based upon this assumption and depending upon the specific technology chosen for compliance, the agency estimates that the total quantified safety benefits from reductions in crashes due to skidding/loss of control, stopping distance, and flat tires and blowouts will be 119-121 fatalities prevented and 8,373-8,568 injuries prevented or reduced in severity each year, if all light vehicles meet the TPMS requirement.

Further, NHTSA anticipates additional economic benefits from the standard due to improved fuel economy, longer tread life, property damage savings, and travel delay savings. Correct tire pressure improves a vehicle's fuel economy. Based upon data provided by Goodyear, we have determined that a vehicle's fuel efficiency is reduced by one percent for every 2.96 psi that its tires are below the placard pressure. The agency estimates that if all light vehicles meet the TPMS requirement, vehicles' higher fuel economy would translate into an average discounted value of $19.07 - $23.08 per vehicle over the lifetime of the vehicle, depending upon the specific technology chosen for compliance.

Correct tire pressure also increases a tire's tread life. Data from Goodyear indicate that, for every 1-psi drop in tire pressure, tread life decreases by 1.78 percent. NHTSA estimates that if all light vehicles meet the four-tire, 25-percent compliance requirement, average tread life would increase by 740 to 900 miles. The agency estimates that the average discounted value of resulting delays in new tire purchases would be $3.42 - $4.24 per vehicle, depending upon the specific technology chosen for compliance.

To the extent that TPMSs provide improvements related to stopping distance, blowouts, and loss of control in skidding, we expect that some crashes would be prevented and that in others, the severity of the impacts and the injuries that result would be reduced. As a related matter, we expect that property damage and travel delays would also be mitigated by these improvements. To the extent that crashes are avoided, both property damage and travel delay would be completely eliminated. Crashes that still occur, but do so at less serious impact speeds, would still cause property damage and delay other motorists, but to a lesser extent than they otherwise would have. The value of property damage and travel delay savings is estimated to be from $7.70-$7.79 per vehicle.

VI. Costs

The FRIA also contains an in-depth analysis of the costs associated with the TPMS standard. It analyzes the cost of different TPMS technologies, overall vehicle costs, maintenance costs, testing costs, and opportunity costs. The FRIA also analyzes the cost impact of the requirement for a TPMS malfunction warning and its effectiveness

in resolving the replacement tire issue.[58] Again, please consult the FRIA for a more complete discussion of costs.[59] The following points summarize the key determinations related to costs.

The agency examined three types of technology that manufacturers could use to meet the TPMS requirements. Assuming that manufacturers will seek to minimize compliance costs, the agency expects that manufacturers would install hybrid TPMSs on the 67 percent of vehicles that are currently equipped with an ABS and direct TPMSs on the 33 percent of vehicles that are not so equipped. The highest costs for compliance would result if a manufacturer installed direct TPMSs with an interactive readout of individual tire pressures that included sensors on all vehicle wheels.

In the near term, the agency believes that a direct system with a generic warning lamp (Option 2) is the most likely option to be selected by automobile manufacturers. To date, no one has produced a hybrid system (Option 3) and responses to requests for information from the manufacturers resulted in most indicating that they were planning on using direct systems. Individual tire pressure displays (Option 1) are more costly than a warning light and are not required by the final rule, but some manufacturers may choose them for their higher priced models. In the long run, the agency suspects that price pressure and further development of tire pressure monitoring systems could result in hybrid or indirect systems meeting the final rule and being introduced.

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[58] As noted in the discussion of benefits in the section immediately above, the following discussion of costs estimates monetary impacts using a 3-percent discount rate and provides the mean values for cost statistics based upon manufacturers' technology selection. The mean values are our best estimates. However, the FRIA provides a full range of costs, as well as their 90-percent confidence bounds, and it also presents these impacts using a 7-percent discount rate.

[59] With future technological development, it may become possible for indirect TPMSs and other types of systems to meet the four-tire, 25-percent requirement. However, until such new, compliant TPMSs are developed, it is impossible to accurately estimate their costs.

Thus, the agency estimates that the average incremental cost for all vehicles to meet the standard's requirements would range from $48.44 - $69.89 per vehicle, depending upon the specific technology chosen for compliance. Since approximately 17 million vehicles are produced for sale in the U.S. each year, the total annual vehicle cost is expected to range from approximately $823 - $1,188 million per year.

The agency estimates that the net cost per vehicle [vehicle cost + maintenance costs + opportunity costs - (fuel savings + tread life savings + property damage and travel delay savings)] would be $26.63 - $100.25, assuming a one-percent TPMS malfunction rate for replacement tires. (Maintenance costs would be variable, depending upon whether the TPMS has batteries or is batteryless.) As noted above, the agency estimates the total annual vehicle cost for the fleet would be about $823 - $1,188 million. Thus, using the same equation, the agency estimates the total annual net cost would be about $453 - $1,704 million.

NHTSA estimates that the net cost per equivalent life saved would be approximately $2.3 - $8.5 million, depending upon the specific technology chosen for compliance. Placing 90-percent confidence bounds around the cost per equivalent life saved results in a range of $1.5-$14.5 million.

Net benefits-costs (*i.e.*, benefits, including fatalities and injuries, valued in dollars minus costs) were also calculated per OMB Circular A-4. The value of a statistical life is uncertain, and a wide range of values has been established in the literature. (In general, the statistical value of a life is valued in the range of $1 million to $10 million per life, with a midpoint of $5.5 million.) For this analysis, we have examined values of $3.5 million and $5.5 million, both of which fall within the range of accepted values. The

mean value for net benefits-costs ranges of the TPMS standard from a net cost of $597 million to a net benefit of $655 million, depending upon the specific technology chosen for compliance. A 90-percent confidence bound around the net benefits-costs results in a range from a net cost of $1,156 million to a net benefit of $1,302 million.

VII. Regulatory Alternatives

The performance requirements specified in this final rule contain two key variables: (1) the number of tires monitored and (2) the threshold level for providing tire pressure warnings. As noted elsewhere in this preamble, the Second Circuit determined in Public Citizen, Inc. v. Mineta that the TREAD Act unambiguously mandates TPMSs capable of monitoring each tire up to a total of four tires, effectively precluding any option with less than a four-tire detection capability. Further, the Court found that the agency had justification for adopting a four-tire, 25-percent option instead of the four-tire, 20-percent option proposed at an earlier stage of the rulemaking.

Although NHTSA is requiring a 25 percent below placard threshold for under-inflation detection, technically, other threshold levels could also be established. Selecting an appropriate notification threshold level is a matter of balancing the safety benefits achieved by alerting consumers to low tire pressure against over-alerting them to the point of becoming a nuisance and causing consumers to ignore the warning, thus negating the potential of the standard to produce safety benefits. Degradation in vehicle braking and handling performance does not become a significant safety issue at small pressure losses. There does not appear to be a specific threshold level at which benefits are maximized by a combination of minimum reduction in placard pressure and maximum

response by drivers. NHTSA is confident that existing technology can meet the 25 percent threshold.

Setting a lower threshold might have resulted in the opportunity for more savings if drivers' response levels were maintained; however, we are concerned that setting a lower threshold could result in a higher rate of non-response by drivers who regard the more frequent notifications as a nuisance. Current direct TPMS systems have a margin of error of 1-2 psi. That means, for example, that for a 30-psi tire, manufacturers would have to set the system to provide a warning when tires are 4 psi below placard if we had decided to require a 20 percent threshold. We have concluded that this may be approaching a level at which a portion of the driving public would begin to regard the warning as a nuisance. We have not examined lower threshold levels in this analysis because we believe that the net impact of these offsetting factors (quicker notification, but lower frequency of driver response) is unknown and unlikely to produce a significant difference in safety benefits. We note that a four-tire, 20-percent option was examined in our March 2002 analysis, and that the total benefit for the 20 percent threshold was about 15 percent higher than from the 25 percent threshold. However, that calculation assumed the same level of driver response for both thresholds. It is also possible that lower thresholds might limit technology and discourage innovation.

Overall, we have concluded that the 25 percent threshold adequately captures the circumstances at which low tire pressure becomes a safety issue. We also believe that this level would be acceptable to most drivers and would not be considered a nuisance to the point that it would be ignored by large numbers of drivers. We also believe there is

no reason to examine higher thresholds (*e.g.*, a 30 percent threshold), since they would provide fewer benefits for similar costs.

VIII. Rulemaking Analyses and Notices

A. Vehicle Safety Act

Under 49 U.S.C. Chapter 301, Motor Vehicle Safety (49 U.S.C. 30101 *et seq.*), the Secretary of Transportation is responsible for prescribing motor vehicle safety standards that are practicable, meet the need for motor vehicle safety, and are stated in objective terms.[60] These motor vehicle safety standards set a minimum standard for motor vehicle or motor vehicle equipment performance.[61] When prescribing such standards, the Secretary must consider all relevant, available motor vehicle safety information.[62] The Secretary also must consider whether a proposed standard is reasonable, practicable, and appropriate for the type of motor vehicle or motor vehicle equipment for which it is prescribed and the extent to which the standard will further the statutory purpose of reducing traffic accidents and associated deaths.[63] The responsibility for promulgation of Federal motor vehicle safety standards has been delegated to NHTSA.[64]

As noted previously, section 13 of the TREAD Act mandated a regulation to require a tire pressure monitoring system in new vehicles. In developing this final rule for TPMS, the agency carefully considered the statutory requirements of both the TREAD Act and 49 U.S.C. Chapter 301.

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[60] 49 U.S.C. 30111(a).
[61] 49 U.S.C. 30102(a)(9).
[62] 49 U.S.C. 30111(b).
[63] *Id*.
[64] 49 U.S.C. 105 and 322; delegation of authority at 49 CFR 1.50.

First, this proposal is preceded by an initial NPRM, a final rule, and a second NPRM, all of which facilitated the efforts of the agency to obtain and consider relevant motor vehicle safety information, as well as public comments. Further, in preparing this document, the agency carefully evaluated available research, testing results, and other information related to various TPMS technologies. We have also updated our cost and benefit analyses to account for new technologies emerging since issuance of our prior notices in the ongoing TPMS rulemaking (*e.g.*, batteryless direct TPMSs). In sum, this document reflects our consideration of all relevant, available motor vehicle safety information.

Second, to ensure that the TPMS requirements are practicable, the agency considered the cost, availability, and suitability of various TPMSs, consistent with our safety objectives and the requirements of the TREAD Act. We note that TPMSs are already installed on many light vehicles, so we believe that it will be practicable to extend a TPMS requirement to all light vehicles. In light of the steady advances made in TPMS technologies over the past few years, we expect that vehicle manufacturers soon will have a number of technological choices available for meeting the requirements of the final rule for TPMS. In sum, we believe that this final rule is practicable and will provide several benefits, including prevention of deaths and injuries associated with significantly under-inflated tires, increased tread life, fuel economy savings, and savings associated with avoidance of property damage and travel delays (*i.e.*, from crashes prevented by the TPMS).

Third, the regulatory text following this preamble is stated in objective terms in order to specify precisely what performance is required and how performance will be

tested to ensure compliance with the standard. Specifically, the final rule sets forth performance requirements for operation of the TPMS, both in terms of detecting and providing warnings related to low tire pressure and system malfunction.

The final rule also includes test requirements for TPMS calibration, low tire pressure detection, and TPMS malfunction. This test involves driving the vehicle under a defined set of test conditions (*e.g.*, ambient temperature, road test surface, test weight, vehicle speed, rim position, brake pedal application) on a designated road course in San Angelo, Texas. The test course has been used for several years by NHTSA and the tire industry for uniform tire quality grading testing. The standard's test procedures carefully delineate how testing will be conducted. Thus, the agency believes that this test procedure is sufficiently objective and would not result in any uncertainty as to whether a given vehicle satisfies the requirements of the TPMS standard.

Fourth, we believe that this final rule will meet the need for motor vehicle safety because the TPMS standard will provide a warning to the driver when one or more tires become significantly under-inflated, thereby permitting the driver to take corrective action in a timely fashion and potentially averting crash-related injuries. Furthermore, by including a requirement for a TPMS malfunction indicator, we expect that the TPMS will be able to continue to provide low tire pressure warnings even after the vehicle's original tires are replaced. The TPMS malfunction indicator will also alert the consumer as to when the system is unavailable to detect low tire pressure and is potentially in need of repair.

Finally, we believe that this final rule is reasonable and appropriate for motor vehicles subject to the applicable requirements. As discussed elsewhere in this notice,

the agency is addressing Congress' concern that significantly under-inflated tires could lead to tire failures resulting in fatalities and serious injuries. Under the TREAD Act, Congress mandated installation of a system in new vehicles to alert the driver when a tire is significantly under-inflated, and NHTSA has determined that TPMSs meeting the requirements of this final rule offer an effective countermeasure in these situations. Accordingly, we believe that this final rule is appropriate for covered vehicles that are or would become subject to these provisions of FMVSS No. 138 because it furthers the agency's objective of preventing deaths and serious injuries associated with significantly under-inflated tires.

B. Executive Order 12866 and DOT Regulatory Policies and Procedures

Executive Order 12866, "Regulatory Planning and Review" (58 FR 51735, October 4, 1993), provides for making determinations whether a regulatory action is "significant" and therefore subject to OMB review and to the requirements of the Executive Order. The Order defines a "significant regulatory action" as one that is likely to result in a rule that may:

(1) 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;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Since the June 5, 2002 final rule, to which this final rule is directly related, was determined to be economically significant, the agency prepared and placed in the docket a Final Economic Analysis. This final rule likewise was determined to be economically significant. As a significant notice, it was reviewed under Executive Order 12866. The rule is also significant within the meaning of the Department of Transportation's Regulatory Policies and Procedures. The agency has estimated that compliance with this final rule will cost $823 - $1,188 million per year, since approximately 17 million vehicles are produced for the United States market each year. Thus, this rule would have greater than a $100 million effect.

As noted above, this final rule was necessitated by the August 6, 2003 opinion of the Court of Appeals for the Second Circuit in Public Citizen, Inc. v. Mineta. In that case, the court determined that the TREAD Act requires TPMSs to be four-tire systems, invalidated the one-tire, 30-percent option contained in the June 5, 2002 final rule, and vacated the standard. As part of the final rule, NHTSA also has responded substantively to public comments in response to the September 16, 2004 NPRM. Accordingly, the agency has prepared and placed in the docket a Final Regulatory Impact Analysis for this final rule.

C. Regulatory Flexibility Act

Pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it

must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (*i.e.*, small businesses, small organizations, and small governmental jurisdictions). The Small Business Administration's regulations at 13 CFR Part 121 define a small business, in part, as a business entity "which operates primarily within the United States." (13 CFR 121.105(a)). No regulatory flexibility analysis is required if the head of an agency certifies the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

NHTSA has considered the effects of this final rule under the Regulatory Flexibility Act. I certify that this final rule would not have a significant economic impact on a substantial number of small entities. The rationale for this certification is that currently there are only four small motor vehicle manufacturers (*i.e.*, only four with fewer than 1,000 employees) in the United States that will have to comply with this final rule. These manufacturers are expected to rely on suppliers to provide the TPMS hardware, and then they would integrate the TPMS into their vehicles.

There are a few small manufacturers of recreational vehicles that will have to comply with this final rule. However, most of these manufacturers use van chassis supplied by the larger manufacturers (*e.g.*, GM, Ford, or DaimlerChrysler) and could use the TPMSs supplied with the chassis. These manufacturers should not have to test the TPMS for compliance with this final rule since they should be able to rely upon the chassis manufacturer's incomplete vehicle documentation.

Under the June 5, 2002 final rule, commenters expressed concerns about the impact upon aftermarket wheel and rim manufacturers, many of which are small businesses. These manufacturers were concerned that certain provisions of that final rule would have had the effect of restricting their ability to provide a full range of wheel and tire combinations to consumers, thereby negatively impacting their business. However, we believe that these concerns have largely been resolved by the final rule, which does not contain requirements for spare tires and aftermarket rims.

We likewise do not believe that the final rule will have a significant impact upon small businesses within the automotive service industry, either for aftermarket sales or repair. As previously discussed, the agency does not consider installation of an aftermarket or replacement tire or rim that is not compatible with the TPMS to be a "make inoperative" situation under 49 U.S.C. 30122, provided that the entity does not disable the TPMS malfunction indicator. As with other vehicle systems, we expect that vehicle manufacturers will make available sufficient information to permit routine maintenance and repair of such systems. We note also that we are permitting TPMSs to be reprogrammable, which we expect would further accommodate installation of different tires and rims. In addition, we believe that there are other low-cost options for maintenance and repair of TPMS sensors, such as strap mounting direct TPMS sensors to the vehicle's rims. For all these reasons, we believe that the final rule will not result in a significant economic impact upon aftermarket sellers of tires and rims or the vehicle service industry. (For further discussion related to these entities, see section IV.C.8 of this notice.)

We also analyzed the impact of this proposal on 14 identified suppliers of TPMS systems. However, of these companies, only three have fewer than 750 employees. Of these three companies, one (SmarTire) has its headquarters located outside of the United States, and another (Cycloid) has only ten employees and outsources the manufacturing of its products.

In conclusion, the agency believes that this final rule will not have a significant economic impact upon a substantial number of small businesses.

D. Executive Order 13132 (Federalism)

Executive Order 13132, "Federalism" (64 FR 43255, August 10, 1999), requires NHTSA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" are defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government." Under Executive Order 13132, the agency may not issue a regulation with Federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, the agency consults with State and local governments, or the agency consults with State and local officials early in the process of developing the proposed regulation. NHTSA also may not issue a regulation with Federalism implications and that preempts a State law unless the agency consults with State and local officials early in the process of developing the regulation.

Although statutorily mandated, this final rule for TPMS was analyzed in accordance with the principles and criteria set forth in Executive Order 13132, and the agency determined that the rule would not have sufficient Federalism implications to warrant consultations with State and local officials or the preparation of a Federalism summary impact statement. This final rule is not expected to have any substantial effects on the States, or on the current distribution of power and responsibilities among the various local officials.

E. Executive Order 12988 (Civil Justice Reform)

Pursuant to Executive Order 12988, "Civil Justice Reform" (61 FR 4729, February 7, 1996), the agency has considered whether this rulemaking would have any retroactive effect. This final rule does not have any retroactive effect. Under 49 U.S.C. 30103, whenever a Federal motor vehicle safety standard is in effect, a State may not adopt or maintain a safety standard applicable to the same aspect of performance which is not identical to the Federal standard, except to the extent that the State requirement imposes a higher level of performance and applies only to vehicles procured for the State's use. 49 U.S.C. 30161 sets forth a procedure for judicial review of final rules establishing, amending, or revoking Federal motor vehicle safety standards. That section does not require submission of a petition for reconsideration or other administrative proceedings before parties may file a suit in court.

F. Executive Order 13045 (Protection of Children from Environmental Health and Safety Risks)

Executive Order 13045, "Protection of Children from Environmental Health and Safety Risks" (62 FR 19855, April 23, 1997), applies to any rule that: (1) is determined to

be "economically significant" as defined under Executive Order 12866, and (2) concerns an environmental, health, or safety risk that the agency has reason to believe may have 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.

Although the TPMS final rule has been determined to be an economically significant regulatory action under Executive Order 12866, the problems associated with under-inflated tires equally impact all persons riding in a vehicle, regardless of age. Consequently, this final rule does not involve decisions based upon health and safety risks that disproportionately affect children, as would necessitate further analysis under Executive Order 13045.

G. Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (PRA), a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid OMB control number. As part of this final rule, each of the estimated 21 affected vehicle manufacturers is required to provide one phase-in report for each of two years, beginning in the fall of 2006.

Pursuant to the June 5, 2002 TPMS final rule, the OMB has approved the collection of information "Phase-In Production Reporting Requirements for Tire Pressure Monitoring Systems," assigning it Control No. 2127-0631 (expires 6/30/06). NHTSA has been given OMB clearance to collect a total of 42 hours a year (2 hours per

respondent) for the TPMS phase-in reporting. At an appropriate point, NHTSA may ask OMB for an extension of this clearance for an additional period of time.

H. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104-113, (15 U.S.C. 272) directs the agency to evaluate and use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or is otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as the Society of Automotive Engineers. The NTTAA directs us to provide Congress (through OMB) with explanations when we decide not to use available and applicable voluntary consensus standards. The NTTAA does not apply to symbols.

There are no voluntary consensus standards related to TPMS available at this time. However, NHTSA will consider any such standards as they become available.

I. Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires federal agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of more than $100 million annually (adjusted for inflation with base year of 1995 (so currently about $112 million in 2001 dollars)). Before promulgating a NHTSA rule for which a written statement is needed, section 205 of the UMRA generally requires the agency to

identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows the agency to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the agency publishes with the final rule an explanation of why that alternative was not adopted.

This final rule is not expected to result in the expenditure by State, local, or tribal governments, in the aggregate, or more than $112 million annually, but it is expected to result in an expenditure of that magnitude by vehicle manufacturers and/or their suppliers. In the June 5, 2002 final rule, the precursor to the current final rule, the agency chose two compliance options (i.e., four-tire, 25-percent and one-tire, 30-percent) in order to minimize compliance costs with the standard during the phase-in period.

However, the Second Circuit in Public Citizen, Inc. v. Mineta struck down the one-tire, 30-percent option. Thus, in this final rule, NHTSA is adopting a four-tire, 25-percent requirement, which we believe is consistent with safety and the mandate in the TREAD Act. We note that in promulgating a performance standard, NHTSA has left the door open for an array of technologies that may be used to meet the standard's requirements. With further TPMS development, we expect that vehicle manufacturers will have a number of technological choices that will provide broad flexibility to minimize their costs of compliance with the standard.

J. National Environmental Policy Act

NHTSA has analyzed this rulemaking action for the purposes of the National Environmental Policy Act. The agency has determined that implementation of this action

will not have any significant impact on the quality of the human environment. (See section IV.C.9 of this notice for further discussion of the environmental impacts of this final rule, in response to a related public comment.)

K. Regulatory Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) 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. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

L. Privacy Act

Please note that anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the Federal Register published on April 11, 2000 (Volume 65, Number 70; Pages 19477-78), or you may visit http://dms.dot.gov.

List of Subjects in 49 CFR Parts 571 and 585

Imports, Motor vehicle safety, Reporting and recordkeeping requirements, Tires.

In consideration of the foregoing, NHTSA is amending 49 CFR Parts 571 and 585 as follows:

PART 571 – FEDERAL MOTOR VEHICLE SAFETY STANDARDS

1. The authority citation for Part 571 of Title 49 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117, and 30166; delegation of authority at 49 CFR 1.50.

2. Section 571.101 is amended by revising paragraph S5.2.3 and Table 2 to read as follows:

§571.101 Standard No. 101; Controls and displays.

* * * * *

S5.2.3 Except for the Low Tire Pressure Telltale, any display located within the passenger compartment and listed in column 1 of Table 2 that has a symbol designated in column 4 of that table shall be identified by either the symbol designated in column 4 (or symbol substantially similar in form to that shown in column 4) or the word or abbreviation shown in column 3. The Low Tire Pressure Telltale (either the display identifying which tire has low pressure or the display which does not identify which tire has low pressure) shall be identified by the appropriate symbol designated in column 4, or both the symbol in column 4 and the words in column 3. Additional words or symbols may be used at the manufacturer's discretion for the purpose of clarity. Any telltales used in conjunction with a gauge need not be identified. The identification required or permitted by this section shall be placed on or adjacent to the display that it identifies. The identification of any display shall, under the conditions of S6, be visible to the driver and appear to the driver perceptually upright.

* * * * *

Table 2
Identification and Illustration of Displays

Column 1	Column 2	Column 3	Column 4	Column 5
Display	*Telltale Color*	*Identifying Words or Abbreviation*	*Identifying Symbol*	*Illumination*
Turn Signal Telltale	Green	Also See FMVSS 108	 1,5	_____
Hazard Warning Telltale		Also See FMVSS 108	 2,5	_____
Seat Belt Telltale	_____4	Fasten Belts or Fasten Seat Belts Also See FMVSS 208	 or	_____
Fuel Level Telltale		Fuel	 or	_____
Gauge	_____			Yes
Oil Pressure Telltale		Oil		_____
Gauge	_____			Yes
Coolant Temperature Telltale		Temp		_____
Gauge	_____			Yes
Electrical Charge Telltale		Volts, Charge or Amp		_____
Gauge	_____			Yes
Highbeam Telltale	Blue or Green 3	Also See FMVSS 108	 5	_____
Brake System 8	Red 3	Brake, Also see FMVSS 105 and 135	_____	_____

1. The pair of arrows is a single symbol. When the indicator for left and right turn operate independently, however, the two arrows will be considered separate symbols and may be spaced accordingly.
2. Not required when arrows of turn signal telltales that otherwise operate independently flash simultaneously as hazard warning telltale.
3. Red can be red-orange. Blue can be blue-green.
4. The color of the telltale required by S4.5.3.3 of Standard No. 208 is red; the color of the telltale required by S7.3 of Standard No. 208 is not specified.
5. Framed areas may be filled.
8. In the case where a single telltale indicates more than one brake system condition, the word for Brake System shall be used.

Table 2 (continued)

Column 1	Column 2	Column 3	Column 4	Column 5
Display	*Telltale Color*	*Identifying Words or Abbreviation*	*Identifying Symbol*	*Illumination*
Malfunction in Anti-lock or	Yellow	Antilock, Anti-lock or ABS. Also see FMVSS 105 and 135	———	———
Variable Brake Proportioning System 8	Yellow	Brake Proportioning, Also see FMVSS 135	———	———
Parking Brake Applied 8	Red 3	Park or Parking Brake, Also see FMVSS 105 and 135	———	———
Malfunction in Anti-lock	Yellow	ABS, or Antilock; Trailer ABS, or Trailer Antilock, Also see FMVSS 121	———	———
Brake Air Pressure Position Telltale	———	Brake Air, Also see FMVSS 121	———	———
Speedometer	———	MPH, or MPH and km/h 7	———	Yes
Odometer	———	——— 6	———	———
Automatic Gear Position	———	Also see FMVSS 102	———	Yes
Low Tire Pressure Telltale (that does not identify which tire has low pressure)	Yellow	Low Tire. Also see FMVSS 138		———
Low Tire Pressure Telltale (that identifies which tire has low pressure)	Yellow	Low Tire. Also see FMVSS 138		———
Tire Pressure Monitoring System Malfunction Telltale 9	Yellow	TPMS	———	———

3. Red can be red-orange. Blue can be blue-green.
6. If the odometer indicates kilometers, then "KILOMETERS" or "km" shall appear, otherwise, no identification is required.
7. If the speedometer is graduated in miles per hour and in kilometers per hour, the identifying words or abbreviations shall be "MPH and km/h" in any combination of upper or lower case letters.
8. In the case where a single telltale indicates more than one brake system condition, the word for Brake System shall be used.
9. Alternatively, either Low T ire Pressure Telltale may be used to indicate a TPMS malfunction. See FMVSS No. 138.

3. Section 571.138 is added to read as follows:

§571.138 Standard No. 138; Tire pressure monitoring systems.

S1 Purpose and scope. This standard specifies performance requirements for tire pressure monitoring systems (TPMSs) to warn drivers of significant under-inflation of tires and the resulting safety problems.

S2 Application. This standard applies to passenger cars, multipurpose passenger vehicles, trucks, and buses that have a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less, except those vehicles with dual wheels on an axle, according to the phase-in schedule specified in S7 of this standard.

S3 Definitions. The following definitions apply to this standard:

Lightly loaded vehicle weight means unloaded vehicle weight plus the weight of a mass of 180 kg (396 pounds), including test driver and instrumentation.

Tire pressure monitoring system means a system that detects when one or more of a vehicle's tires is significantly under-inflated and illuminates a low tire pressure warning telltale.

Vehicle Placard and Tire inflation pressure label mean the sources of information for the vehicle manufacturer's recommended cold tire inflation pressure pursuant to section 571.110 of this Part.

S4 Requirements.

S4.1 General. To the extent provided in S7, each vehicle must be equipped with a tire pressure monitoring system that meets the requirements specified in S4 under the test conditions specified in S5 and the test procedures specified in S6 of this standard.

S4.2 TPMS detection requirements. The tire pressure monitoring system must:

(a) Illuminate a low tire pressure warning telltale not more than 20 minutes after the inflation pressure in one or more of the vehicle's tires, up to a total of four tires, is equal to or less than either the pressure 25 percent below the vehicle manufacturer's recommended cold inflation pressure, or the pressure specified in the 3rd column of Table 1 of this standard for the corresponding type of tire, whichever is higher;

(b) Continue to illuminate the low tire pressure warning telltale as long as the pressure in any of the vehicle's tires is equal to or less than the pressure specified in S4.2(a), and the ignition locking system is in the "On" ("Run") position, whether or not the engine is running, or until manually reset in accordance with the vehicle manufacturer's instructions.

S4.3 Low tire pressure warning telltale.

S4.3.1 Each tire pressure monitoring system must include a low tire pressure warning telltale that:

(a) Is mounted inside the occupant compartment in front of and in clear view of the driver;

(b) Is identified by one of the symbols shown for the "Low Tire Pressure Telltale" in Table 2 of Standard No. 101 (49 CFR 571.101); and

(c) Is illuminated under the conditions specified in S4.2.

S4.3.2 In the case of a telltale that identifies which tire(s) is (are) under-inflated, each tire in the symbol for that telltale must illuminate when the tire it represents is under-inflated to the extent specified in S4.2.

S4.3.3 (a) Except as provided in paragraph (b) of this section, each low tire pressure warning telltale must illuminate as a check of lamp function either when the

ignition locking system is activated to the "On" ("Run") position when the engine is not running, or when the ignition locking system is in a position between "On" ("Run") and "Start" that is designated by the manufacturer as a check position.

(b) The low tire pressure warning telltale need not illuminate when a starter interlock is in operation.

S4.4 TPMS malfunction.

(a) The vehicle shall be equipped with a tire pressure monitoring system that includes a telltale that provides a warning to the driver not more than 20 minutes after the occurrence of a malfunction that affects the generation or transmission of control or response signals in the vehicle's tire pressure monitoring system. The vehicle's TPMS malfunction indicator shall meet the requirements of either S4.4(b) or S4.4(c).

(b) Dedicated TPMS malfunction telltale

The vehicle meets the requirements of S4.4(a) when equipped with a dedicated TPMS malfunction telltale that:

(1) Is mounted inside the occupant compartment in front of and in clear view of the driver;

(2) Is identified by the word "TPMS", as described under "TPMS Malfunction Telltale" in Table 2 of Standard No. 101 (49 CFR 571.101);

(3) Continues to illuminate the TPMS malfunction telltale under the conditions specified in S4.4 for as long as the malfunction exists, whenever the ignition locking system is in the "On" ("Run") position; and

(4) (i) Except as provided in paragraph (ii), each dedicated TPMS malfunction telltale must be activated as a check of lamp function either when the ignition locking

system is activated to the "On" ("Run") position when the engine is not running, or when the ignition locking system is in a position between "On" ("Run") and "Start" that is designated by the manufacturer as a check position.

(ii) The dedicated TPMS malfunction telltale need not be activated when a starter interlock is in operation.

(c) Combination low tire pressure/TPMS malfunction telltale

The vehicle meets the requirements of S4.4(a) when equipped with a combined Low Tire Pressure/TPMS malfunction telltale that:

(1) Meets the requirements of S4.2 and S4.3; and

(2) Flashes for a period of at least 60 seconds but no longer than 90 seconds upon detection of any condition specified in S4.4(a) after the ignition locking system is activated to the “On” (“Run”) position. After this period of prescribed flashing, the telltale must remain continuously illuminated as long as the malfunction exists and the ignition locking system is in the "On" ("Run") position. This flashing and illumination sequence must be repeated each time the ignition locking system is placed in the “On” (“Run”) position until the situation causing the malfunction has been corrected.

S4.5 Written instructions.

(a) The owner’s manual in each vehicle certified as complying with S4 must provide an image of the Low Tire Pressure Telltale symbol (and an image of the TPMS Malfunction Telltale warning (“TPMS”), if a dedicated telltale is utilized for this function) with the following statement in English:

> Each tire, including the spare (if provided), should be checked monthly when cold and inflated to the inflation pressure recommended by the vehicle manufacturer on the vehicle placard or tire inflation pressure label. (If your

vehicle has tires of a different size than the size indicated on the vehicle placard or tire inflation pressure label, you should determine the proper tire inflation pressure for those tires.)

As an added safety feature, your vehicle has been equipped with a tire pressure monitoring system (TPMS) that illuminates a low tire pressure telltale when one or more of your tires is significantly under-inflated. Accordingly, when the low tire pressure telltale illuminates, you should stop and check your tires as soon as possible, and inflate them to the proper pressure. Driving on a significantly under-inflated tire causes the tire to overheat and can lead to tire failure. Under-inflation also reduces fuel efficiency and tire tread life, and may affect the vehicle's handling and stopping ability.

Please note that the TPMS is not a substitute for proper tire maintenance, and it is the driver's responsibility to maintain correct tire pressure, even if under-inflation has not reached the level to trigger illumination of the TPMS low tire pressure telltale.

[*The following paragraph is required for all vehicles certified to the standard starting on September 1, 2007 and for vehicles voluntarily equipped with a compliant TPMS MIL before that time.*] Your vehicle has also been equipped with a TPMS malfunction indicator to indicate when the system is not operating properly. [*For vehicles with a dedicated MIL telltale, add the following statement:* The TPMS malfunction indicator is provided by a separate telltale, which displays the symbol "TPMS" when illuminated.] [*For vehicles with a combined low tire pressure/MIL telltale, add the following statement:* The TPMS malfunction indicator is combined with the low tire pressure telltale. When the system detects a malfunction, the telltale will flash for approximately one minute and then remain continuously illuminated. This sequence will continue upon subsequent vehicle start-ups as long as the malfunction exists.] When the malfunction indicator is illuminated, the system may not be able to detect or signal low tire pressure as intended. TPMS malfunctions may occur for a variety of reasons, including the installation of replacement or alternate tires or wheels on the vehicle that prevent the TPMS from functioning properly. Always check the TPMS malfunction telltale after replacing one or

more tires or wheels on your vehicle to ensure that the replacement or alternate tires and wheels allow the TPMS to continue to function properly.

(b) The owner's manual may include additional information about the time for the TPMS telltale(s) to extinguish once the low tire pressure condition or the malfunction is corrected. It may also include additional information about the significance of the low tire pressure warning telltale illuminating, a description of corrective action to be undertaken, whether the tire pressure monitoring system functions with the vehicle's spare tire (if provided), and how to use a reset button, if one is provided.

(c) If a vehicle does not come with an owner's manual, the required information shall be provided in writing to the first purchaser of the vehicle.

S5. Test conditions.

S5.1 Ambient temperature. The ambient temperature is between 0ºC (32ºF) and 40ºC (104ºF).

S5.2 Road test surface.

Compliance testing is conducted on any portion of the Southern Loop of the Treadwear Test Course defined in Appendix A and Figure 2 of section 575.104 of this chapter. The road surface is dry during testing.

S5.3 Vehicle conditions.

S5.3.1 Test weight. The vehicle may be tested at any weight between its lightly loaded vehicle weight and its gross vehicle weight rating (GVWR) without exceeding any of its gross axle weight ratings.

S5.3.2 Vehicle speed. The vehicle's TPMS is calibrated and tested at speeds between 50 km/h (31.1 mph) and 100 km/h (62.2 mph). For vehicles equipped with cruise control, cruise control is not to be engaged during testing.

S5.3.3 Rim position.

The vehicle rims may be positioned at any wheel position, consistent with any related instructions or limitations in the vehicle owner's manual.

S5.3.4 Stationary location.

The vehicle's tires are shaded from direct sun when the vehicle is parked.

S5.3.5 Brake pedal application. Driving time shall not accumulate during service brake application.

S5.3.6 Range of conditions or test parameters.

Whenever a range of conditions or test parameters is specified in this standard, the vehicle must meet applicable requirements when tested at any point within the range.

S5.3.7 Tires

The vehicle is tested with the tires installed on the vehicle at the time of initial vehicle sale, excluding the spare tire (if provided). However, the spare tire may be utilized for TPMS malfunction testing purposes.

S6 Test procedures.

(a) Inflate the vehicle's tires to the cold tire inflation pressure(s) provided on the vehicle placard or the tire inflation pressure label.

(b) With the vehicle stationary and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" ("Run") position or, where applicable, the appropriate position for the lamp check. The tire pressure

monitoring system must perform a check of lamp function for the low tire pressure telltale as specified in paragraph S4.3.3 of this standard. If the vehicle is equipped with a separate TPMS malfunction telltale, the tire pressure monitoring system also must perform a check of lamp function as specified in paragraph S4.4(b)(4) of this standard.

(c) If applicable, set or reset the tire pressure monitoring system in accordance with the instructions in the vehicle owner's manual.

(d) System calibration/learning phase.

(1) Drive the vehicle for up to 15 minutes of cumulative time (not necessarily continuously) along any portion of the test course.

(2) Reverse direction on the course and drive the vehicle for an additional period of time for a total cumulative time of 20 minutes (including the time in S6(d)(1), and not necessarily continuously).

(e) Stop the vehicle and deflate any combination of one to four tires until the deflated tire(s) is (are) at 14 kPa (2 psi) below the inflation pressure at which the tire pressure monitoring system is required to illuminate the low tire pressure warning telltale.

(f) System detection phase.

(1) Within 5 minutes of reducing the inflation pressure in the tire(s), drive the vehicle for up to 10-15 minutes of cumulative time (not necessarily continuously) along any portion of the test course.

(2) Reverse direction on the course and drive the vehicle for an additional period of time for a total cumulative time of 20 minutes (including the time in S6(f)(1), and not necessarily continuously).

(3) The sum of the total cumulative drive time under paragraphs S6(f)(1) and (2) shall be the lesser of 20 minutes or the time at which the low tire pressure telltale illuminates.

(4) If the low tire pressure telltale did not illuminate, discontinue the test.

(g) If the low tire pressure telltale illuminated during the procedure in paragraph S6(f), deactivate the ignition locking system to the "Off" or "Lock" position. After a 5-minute period, activate the vehicle's ignition locking system to the "On" ("Run") position. The telltale must illuminate and remain illuminated as long as the ignition locking system is in the “On” (“Run”) position.

(h) Keep the vehicle stationary for a period of up to one hour with the engine off.

(i) Inflate all of the vehicle’s tires to the same inflation pressure used in paragraph S6(a). If the vehicle's tire pressure monitoring system has a manual reset feature, reset the system in accordance with the instructions specified in the vehicle owner's manual. Determine whether the telltale has extinguished. If necessary, drive the vehicle until the telltale has been extinguished.

(j) The test may be repeated, using the test procedures in paragraphs S6(a)-(b) and S6(d)-(i), with any one, two, three, or four of the tires on the vehicle under-inflated.

(k) Simulate one or more TPMS malfunction(s) by disconnecting the power source to any TPMS component, disconnecting any electrical connection between TPMS components, or installing a tire or wheel on the vehicle that is incompatible with the TPMS.

(l) <u>TPMS malfunction detection</u>.

(1) Drive the vehicle for up to 15 minutes of cumulative time (not necessarily continuously) along any portion of the test course.

(2) Reverse direction on the course and drive the vehicle for an additional period of time for a total cumulative time of 20 minutes (including the time in S6(l)(1), and not necessarily continuously).

(3) The sum of the total cumulative drive time under paragraphs S6(l)(1) and (2) shall be the lesser of 20 minutes or the time at which the TPMS malfunction telltale illuminates.

(4) If the TPMS malfunction indicator did not illuminate in accordance with paragraph S4.4, as required, discontinue the test.

(m) If the TPMS malfunction indicator illuminated during the procedure in paragraph S6(l), deactivate the ignition locking system to the "Off" or "Lock" position. After a 5-minute period, activate the vehicle's ignition locking system to the "On" ("Run") position. The TPMS malfunction indicator must again signal a malfunction and remain illuminated as long as the ignition locking system is in the “On” (“Run”) position.

(n) Restore the TPMS to normal operation. If necessary, drive the vehicle until the telltale has extinguished.

S7 Phase-in schedule.

S7.1 Vehicles manufactured on or after October 5, 2005, and before September 1, 2006.

For vehicles manufactured on or after October 5, 2005, and before September 1, 2006, the number of vehicles complying with this standard (except for the provisions

of S4.4 unless the manufacturer elects to also certify to those provisions) must not be less than 20 percent of:

(a) The manufacturer's average annual production of vehicles manufactured on or after September 1, 2002, and before **October 5, 2005;** or

(b) The manufacturer's production on or after October 5, 2005, and before September 1, 2006.

S7.2 Vehicles manufactured on or after September 1, 2006, and before September 1, 2007. For vehicles manufactured on or after September 1, 2006, and before September 1, 2007, the number of vehicles complying with this standard (except for the provisions of S4.4 unless the manufacturer elects to also certify to those provisions) must not be less than 70 percent of:

(a) The manufacturer's average annual production of vehicles manufactured on or after September 1, 2003, and before September 1, 2006; or

(b) The manufacturer's production on or after September 1, 2006, and before September 1, 2007.

S7.3 Vehicles manufactured on or after September 1, 2007. Except as provided in S7.7, all vehicles manufactured on or after September 1, 2007 must comply with all requirements of this standard.

S7.4 Calculation of complying vehicles.

(a) Carry-Forward Credits. For purposes of complying with S7.1, a manufacturer may count a vehicle if it is certified as complying with this standard and is manufactured

on or after A**pril 8, 2005,** but before September 1, 2006.

(b) For purposes of complying with S7.2, a manufacturer may count a vehicle if it:

(1) (i) Is certified as complying with this standard and is manufactured on or after April 8, 2005, but before September 1, 2007; and

(ii) Is not counted toward compliance with S7.1; or

(2) Is manufactured on or after September 1, 2006, but before September 1, 2007.

(c) Carry-Backward Credits. At the vehicle manufacturer's option, for purposes of complying with S7.1, a manufacturer may count a vehicle it plans to manufacture and to certify as complying with this standard that will be produced on or after September 1, 2006 but before September 1, 2007. However, a vehicle counted toward compliance with S7.1 may not be counted toward compliance with S7.2. If the vehicle manufacturer decides to exercise the option for carry-backward credits, the manufacturer must indicate this in its report for the production period corresponding to S7.1 filed pursuant to 49 CFR 585.66. The vehicles are counted in fulfillment of the requirements of S7.1, subject to actually being produced in compliance with this standard during the specified time period and not being counted toward the requirements of S7.2.

S7.5 Vehicles produced by more than one manufacturer.

S7.5.1 For the purpose of calculating average annual production of vehicles for each manufacturer and the number of vehicles manufactured by each manufacturer under

S7.1 through S7.3, a vehicle produced by more than one manufacturer must be attributed to a single manufacturer as follows, subject to S7.5.2:

(a) A vehicle that is imported must be attributed to the importer.

(b) A vehicle manufactured in the United States by more than one manufacturer, one of which also markets the vehicle, must be attributed to the manufacturer that markets the vehicle.

S7.5.2 A vehicle produced by more than one manufacturer must be attributed to any one of the vehicle's manufacturers specified by an express written contract, reported to the National Highway Traffic Safety Administration under 49 CFR Part 585, between the manufacturer so specified and the manufacturer to which the vehicle would otherwise be attributed under S7.5.1.

S7.6 Small volume manufacturers.

Vehicles manufactured by a manufacturer that produces fewer than 5,000 vehicles for sale in the United States during the period of September 1, 2005 to August 31, 2006, or the period from September 1, 2006 to August 31, 2007, are not subject to the corresponding requirements of S7.1, S7.2, and S7.4.

S7.7 Final-stage manufacturers and alterers.

Vehicles that are manufactured in two or more stages or that are altered (within the meaning of 49 CFR 567.7) after having previously been certified in accordance with Part 567 of this chapter are not subject to the requirements of S7.1 through S7.4. Instead, vehicles that are manufactured in two or more stages or that are altered must comply with this standard beginning on September 1, 2008.

Tables to § 571.138

Table 1 - Low Tire Pressure Warning Telltale - Minimum Activation Pressure

Column 1 -- Tire Type	Column 2 -- Maximum or Rated Inflation Pressure		Column 3 -- Minimum Activation Pressure	
	(kPa)	(psi)	(kPa)	(psi)
P-metric -- Standard Load	240, 300, or 350	35, 44, or 51	140 140 140	20 20 20
P-metric - Extra Load	280 or 340	41 or 49	160 160	23 23
Load Range C	350	51	200	29
Load Range D	450	65	240	35
Load Range E	550	80	240	35

PART 585 -- PHASE-IN REPORTING REQUIREMENTS

4. The authority citation for Part 585 of Title 49 continues to read as follows:

Authority: 49 U.S.C. 322, 30111, 30115, 30117, and 30166; delegation of authority at 49 CFR 1.50.

5. Part 585 is amended by adding Subpart G as follows:

Subpart G – Tire Pressure Monitoring System Phase-in Reporting Requirements

Subpart G – Tire Pressure Monitoring System Phase-in Reporting Requirements

§ 585.61 Scope.

This subpart establishes requirements for manufacturers of passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less, except those vehicles with dual wheels on an axle, to submit a report, and maintain records related to the report, concerning the number of such vehicles that meet the requirements of Standard No. 138, *Tire pressure monitoring systems* (49 CFR 571.138).

§ 585.62 Purpose.

The purpose of these reporting requirements is to assist the National Highway Traffic Safety Administration in determining whether a manufacturer has complied with Standard No. 138.

§ 585.63 Applicability.

This subpart applies to manufacturers of passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less, except those vehicles with dual wheels on an axle. However, this subpart does not apply to manufacturers whose production consists exclusively of vehicles manufactured in two or more stages, and vehicles that are altered after previously having been certified in accordance with part 567 of the chapter. In addition, this subpart does not apply to manufacturers whose production of motor vehicles for the United States market is less than 5,000 vehicles in a production year.

§ 585.64 Definitions.

Production year means the 12-month period between September 1 of one year and August 31 of the following year, inclusive.

§ **585.65 Response to inquiries.**

At any time prior to August 31, 2007, each manufacturer must, upon request from the Office of Vehicle Safety Compliance, provide information identifying the vehicles (by make, model, and vehicle identification number) that have been certified as complying with Standard No. 138. The manufacturer's designation of a vehicle as a certified vehicle is irrevocable. Upon request, the manufacturer also must specify whether it intends to utilize either carry-forward or carry-backward credits, and the vehicles to which those credits relate.

§ 585.66 Reporting requirements.

(a) *General reporting requirements*. Within 60 days after the end of the production years ending August 31, 2006 and August 31, 2007, each manufacturer must submit a report to the National Highway Traffic Safety Administration concerning its compliance with Standard No. 138 (49 CFR 571.138) for its passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of less than 4,536 kilograms (10,000 pounds) produced in that year. Each report must --

(1) Identify the manufacturer;

(2) State the full name, title, and address of the official responsible for preparing the report;

(3) Identify the production year being reported on;

(4) Contain a statement regarding whether or not the manufacturer complied with the requirements of Standard No. 138 (49 CFR 571.138) for the period covered by the report and the basis for that statement;

(5) Provide the information specified in paragraph (b) of this section;

(6) Be written in the English language; and

(7) Be submitted to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.

(b) *Report content*.

(1) *Basis for statement of compliance*. Each manufacturer must provide the number of passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less, except those vehicles with dual wheels on an axle, manufactured for sale in the United States for each

of the three previous production years, or, at the manufacturer's option, for the current production year. A new manufacturer that has not previously manufactured these vehicles for sale in the United States must report the number of such vehicles manufactured during the current production year.

(2) *Production*. Each manufacturer must report for the production year for which the report is filed: the number of passenger cars, multipurpose passenger vehicles, trucks, and buses with a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less that meet Standard No. 138 (49 CFR 571.138).

(3) *Statement regarding compliance.* Each manufacturer must provide a statement regarding whether or not the manufacturer complied with the TPMS requirements as applicable to the period covered by the report, and the basis for that statement. This statement must include an explanation concerning the use of any carry-forward and/or carry-backward credits.

(4) *Vehicles produced by more than one manufacturer*. Each manufacturer whose reporting of information is affected by one or more of the express written contracts permitted by S7.5.2 of Standard No. 138 (49 CFR 571.138) must:

(i) Report the existence of each contract, including the names of all parties to the contract, and explain how the contract affects the report being submitted.

(ii) Report the actual number of vehicles covered by each contract.

§ 585.67 Records.

Each manufacturer must maintain records of the Vehicle Identification Number for each vehicle for which information is reported under § 585.66(b)(2) until December 31, 2009.

§ 585.68 Petition to extend period to file report.

A manufacturer may petition for extension of time to submit a report under this Part. A petition will be granted only if the petitioner shows good cause for the extension and if the extension is consistent with the public interest. The petition must be received not later than 15 days before expiration of the time stated in § 585.66(a). The filing of a petition does not automatically extend the time for filing a report. The petition must be submitted to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, S.W., Washington, D.C. 20590.

Issued:

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Jeffrey W. Runge, M.D.
Administrator

Billing Code 4910-59-P

[Signature page for RIN 2127-AJ23
Final Rule for Tire Pressure Monitoring Systems]