Alliance OF AUTOMOBILE MANUFACTURERS

125001

NHTSA-00-8572-16

March 23, 2001

Mr. Stephen R. Kratzke
Associate Administrator for Rulemaking
National Highway Traffic Safety Administration
401 7th Street, SW
Washington, DC

SUBJECT: Low Tire Pressure Warning – Alliance Recommendations

Dear Mr. Kratzke,

Enclosed with this letter is a copy of the Alliance of Automobile Manufacturers (hereafter, the Alliance) proposal concerning warning thresholds for tire pressure monitoring systems (TPMS). Our recommendations reflect our understanding of the purpose of TPMS. The purpose of TPMS is to provide timely indication of significant tire under-inflation to drivers, who nevertheless remain primarily responsible for tire maintenance, including proper inflation. We believe our proposal meets the intent of the Transportation Recall, Enhancement, Accountability and Documentation (TREAD) Act, as expressed by Representative Markey (see enclosed transcript) as he introduced this section of TREAD. It also avoids potential unintended consequences, especially the incidence of nuisance warnings that might otherwise cause drivers to ignore the warnings.

The Alliance believes that both wheel-speed based and pressure-sensor based TPMS have merit, and should be permitted under pending requirements. Our proposal will allow the further development of both types of systems.

We believe that our recommended lower warning threshold of 20% below T&RA minimum pressure at maximum design load is a reasonable description of "significantly under-inflated" consistent with the Congressional mandate. To further assure that the vehicle operator will be warned of a lost of tire pressure, the Alliance recommends a minimum threshold warning level of 20 PSI. We base our recommendations on the evidence of the amount of tire under-inflation in the real world (see proposal attachment #1), and on tire test data under equivalent conditions (see proposal attachment #2). Of course, the ability of the manufacturer to comply with these requirements will necessitate the concurrent development of the specific test procedures. The test procedures developed should comprehend both the wheel-speed based and pressure-sensor based TPMS and our proposal is contingent on development of an acceptable test protocol.

BMW Group • DaimlerChrysler • Fiat • Ford Motor Company • General Motors
Isuzu • Mazda • Mitsubishi Motors • Nissan • Porsche • Toyota • Volkswagen • Volvo

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The Alliance would be pleased to meet with agency staff to further elaborate on the details and rationale for our proposed performance measures for TPMS.

Sincerely,

Vann H. Wilber
Director, Vehicle Safety and Harmonization

Cc: Docket Management, PL-401

Enclosure

Unofficial Transcript from
the Hearing Introducing an Amendment to H.R. 5164
Regarding Low Tire Pressure Warning

The following text is a copy of an unofficial transcript made by the Alliance from an audiotape of the above noted Hearing at which Representative Markey introduced an amendment to H.R. 5164 to require tire pressure warning systems. The audiotape was prepared by a commercial enterprise, Hearings.Com

Markey re tire pressure:

Voice: Mr. Markey is recognized.

Markey: Thank you Mr. Chairman. On tire pressure points.

Voice: Clerk will report the amendment.

Voice: Amendment to the amendment in the nature of substitute to H.R. 5164 offered by Mr. Markey.

Voice: Without objection _____, the amendment is dispensed with and gentleman from Massachusetts is recognized for five minutes in support of his amendment.

Markey: Thank you Mr. Chairman very much. Mr. Chairman, this is a very simple amendment. It would require tire pressure warning systems to become standard features in automobiles. The tire pressure technology itself has been around for some two decades, but what we've learned from our hearings is that there is an equal combination of SUV and tire pressure in tires that is causing, the fault of these accidents. We also have learned that rollovers are the single, largest cause of fatalities for those that own SUV's. So, this is the issue part. If a tire fails right now, we don't really have any way after the fact, after the accident, of going in and finding out whether or not is was under-inflated. We just don't have the capacity to do that. The problem is that Mom and Dad are driving around all over this country with children in their car, and they're very busy people - very busy people. _____ driving around. Sometimes they can be a little forgetful at a particular age, but they keep their driver's licenses.

What we're saying, in this Amendment, that there should be some way for them to know that they have a tire inflation problem, in the same way that they would learn that they had a problem with their brakes, or with their windshield fluid, or with their oil. Now, after all that we've learned in the last month, I don't think that there is any question that we know how critical it is that every American know their tire inflation. They might not have understood it in fact before this set of hearings that we've had here and over in the Senate, but they understand it now. It's essential.

Now back in 1979 and '80, NHTSA looked at this issue in '79 and '80 and decided not to adopt this because it was too expensive. But, in the last 20 years, there has been significant development in this technology and the cost is much less; rather than $15 per vehicle it is now, on average, $2.50 per vehicles to have this kind of warning for all _____. The new technology allows _____ to the anti-lock brake system to measure the spin rate of the wheel, and this is the

technology that has now become a standard feature in the 2000 Toyota Sienna vans. So I sent one of my staffers out today, out to a Toyota dealership, and here it is. You know? They just _____ built right into the deal for you. You get an airbag, seat belts, anti-brake systems, low fuel level, door ajar, that's always helpful for the family, they don't want their child slipping out the back, low window washer, will tell if your battery's down, oil pressure, and low pressure, low tire pressure. So, it's already being done, but not being done by everybody and not being done by most people, most of these manufacturers.

So we asked Sue Daily there at NHTSA if she supported it, she said she did. We had Firestone here, they said they did not object to it. We had Ford, thank you gentlemen. So, this is a life-saving technology, there's no way two ways about it. It will lead to fewer accidents, it will lead to fewer fatalities, it will lead to fewer tragedies for families across this country. So, I just hope that this Committee could take this and ensure that there would be no vehicle that goes on road in years ahead that will give families, after what has happened in the past year, a kind of warning which will help them protect every family member. I yield back to Mr. Chairman.

Voice: Gentleman from Louisiana.

Voice: Mr. Chairman, we're going to accept this amendment. I want to make a point, however - two points. One that the government is absolutely correct. I think before oversight hearings were conducted, I don't think people were aware of how seriously tire inflation pressure can create danger for families on American highways. The Automobile Dealers Association of Louisiana visited with me, and they're preparing an affidavit for our record that will indicate that the Firestone tires being turned in to automobile dealers in Louisiana average 15 to 20 lbs. pressure in them when they're turned in. So we've got a motor company, Ford Motor Company, who is recommending 26 lbs. per square inch for tires that were generally recommended by Firestone to be 30-32 lbs., tested by NHTSA at 32 lbs. And Americans were driving them as low as 15-20 lbs. And you can imagine how much more heat was building up in those tires because American families simply didn't realize perhaps how critical the margins of safety were when you drop recommendations down as low as 26. Keep in mind, both Ford and Firestone have now changed the recommendations. They're both now recommending to American families to please listen, if you're still on those tires, they're recommending that you inflate them to 30 lbs. per square inch. It's a new Ford recommendation, and that you check them to make sure that they're at or around 30 lbs. per square inch. I hope people will listen, I hope they pay attention to those recommendations. The Markey Amendment will help move the industry and NHTSA to a program where we will all know, without the necessity of checking our tires, that our tires are failing in pressure and it will tell us and our

families on the highway. This is an important amendment. I want to make one caution though. It's a shame that we have to have this amendment. I wish that NHTSA had done this, or would have been doing this without the amendment. We ended up making an amendment like this for airbags, you remember, because Congress sent it up adding a time periods and effective dates for selling airbags. We ended up with airbags rules and regulations and then they ended up _____ killing a lot of young people and small-statured people because, until the airbag regulations were changed, and we knew an airbag could be dangerous to a child or to a short-statured person. We had a lot of fatalities on the highway. We tested an airbag in front of this building and blew the windows out of the car, they're so powerful. And understanding that power of an airbag to kill while it protects was an important lesson we had to learn, and now we have safer airbags and have safer rules for children, people of shorter stature, and they drive American cars. So mandating that this be done in a two-year fashion is not the best way to legislate. I hope NHTSA will proceed very carefully and work with the industry. And let me assure my friend, Mr. Markey, that every indication that we had from the auto manufacturers in this country is that they intend to do this. They don't have any objection this amendment because they believe this is the right thing to do, and they're going to go about doing this hopefully very soon we'll see this in every automobile in America. I yield to my friend Mr. Markey.

Markey: Thank you and I appreciate the cooperation.

Voice: We will accept the amendment.

Voice: Are we ready to put a question? All in favor will say Aye.

Voices: Ayes.

Voice: Opposed, no.

Voice: It's the opinion of the Chair that the "Ayes" have it. The "Ayes" have it and the amendment is agreed to. Are their further amendments to this substitute? Gentleman from Tennessee, Mr. Bryant.

Alliance of Automobile Manufacturers

Tire Pressure Warning System - Recommendations

Background: TREAD Act

- ⌘TREAD Act: require a "warning system…to indicate when a tire is significantly under inflated"
- ⌘Publish rule within 1 year of TREAD Act (11/01)
- ⌘To be effective not more than 2 years after completion of rulemaking ('04 MY)

Background: Regulatory Concerns

- Standard should be performance-based (i.e., technology enabling or at least neutral)
- Should not cause unintended consequences (e.g., complaints of nuisance warnings)
- How to cover the full range of vehicles
- Realistic about level of safety improvement feasible
- Provide for reasonable cost/benefit

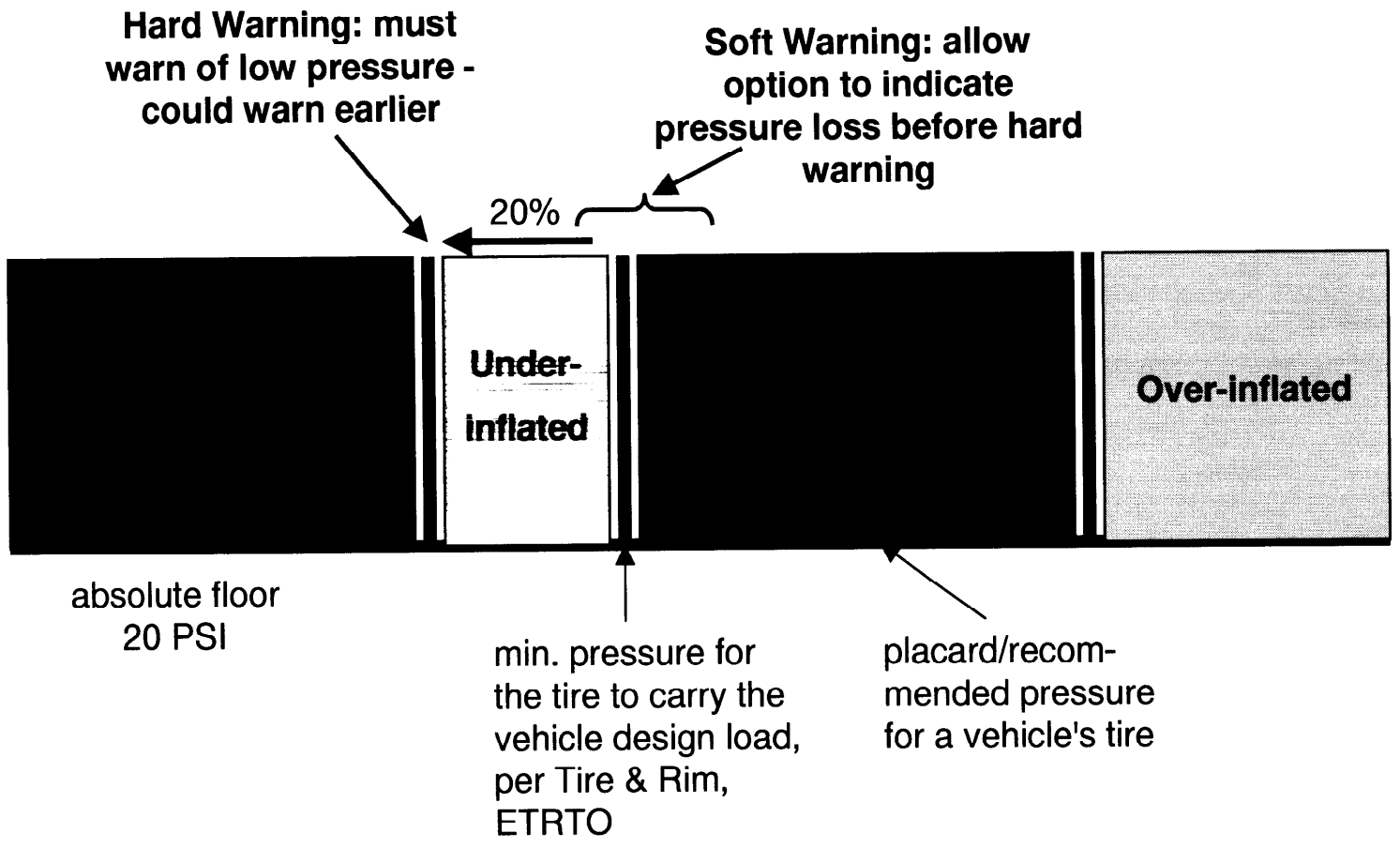
Background:
Current Experience - US

- Up to 20% of tires are under-inflated by > 20% [see attachment 1 for field experience]
- No evidence that current tire pressure profile in the field is causing a safety concern
- ~ 2 million vehicles equipped with wheel speed sensing tire pressure monitoring systems are in use.
- Multiple vehicles optionally equipped equipped with direct pressure sensor systems are also in use.
- Minimum pressure drop needed (recommended for warning) to avoid "nuisance warnings" due to:
  - ambient temperature fluctuation
  - inaccuracy of tire pressure gauges
- "Nuisance warnings" (false alarms) result in an ineffective system which the operator will ignore/turn-off

Background:
Current Experience - Europe

- Some German automakers have provided direct tire pressure-based monitoring systems:
  - More than 100,000 vehicles sold in EU with tire pressure monitors since 10/98
  - System is designed as a comfort system
  - Driver stores the pressures to be monitored
  - 2-phase warning provided at 3PSI and 6PSI loss
  - Customers often complain about the “soft” warning at 3 PSI loss

Alliance Recommendation: Definition of "Significantly Underinflated" for NHTSA Rulemaking



Alliance Recommendation: Definition of "Significantly Underinflated" for NHTSA Rulemaking

- ⌘ Define the beginning of "underinflated" as the load carrying limit (per the tire industry standardizing body - TRA, ETRTO, etc.) of the tire
- ⌘ Define "significantly underinflated" as 20% below this limit [see attachment 2 for rationale]
- ⌘ Require a hard warning no lower than the significantly underinflated level and allow at manufacturer option a soft warning at a higher pressure (e.g., the load carrying limit)
- ⌘ Set an absolute lower warning level at 20 PSI [see attachment 3]
- ⌘ *Allow* the use of speed, temperature or load to dynamically adjust the warning threshold in real time (could reduce nuisance warnings in certain circumstances)
- ⌘ *Allow* customer adjusted pressure limit to encompass vehicles with wide range of loading, such as pick-up trucks

Alliance Recommendation: Scope of the Requirement

- We believe the intent is:
  - to encourage consumers to maintain their tire pressure.
  - reduce the incidence of tire failures that might result from long term under-inflation.
  - is NOT to require a system that provides absolute warnings under every condition the vehicle may encounter
- Warning needs to be provided under a reasonable range of operating conditions:
  - load
  - speed
  - temperature

Alliance Recommendation: Phase-In

- Need implementation flexibility to keep cost and benefits in balance
- Phase-in justified by:
  - supplier capability limitations
  - tooling lead-times
  - product lifecycle
  - need to maximize opportunity for technology refinement

Range of Technical Solutions Envisioned by Alliance Recommendations

- Sensors:
  - pressure sensor
  - wheel speed based systems
- Algorithms:
  - static based on preset pressure
  - customer ability to reset
  - dynamic algorithms that adjust warning threshold based on temperature, speed or actual load
- Warning indicators:
  - single lamp (one color [amber/yellow] and allow additional display options)
  - reconfigurable display (optional)
  - display of actual pressure (optional)

Attachment #1

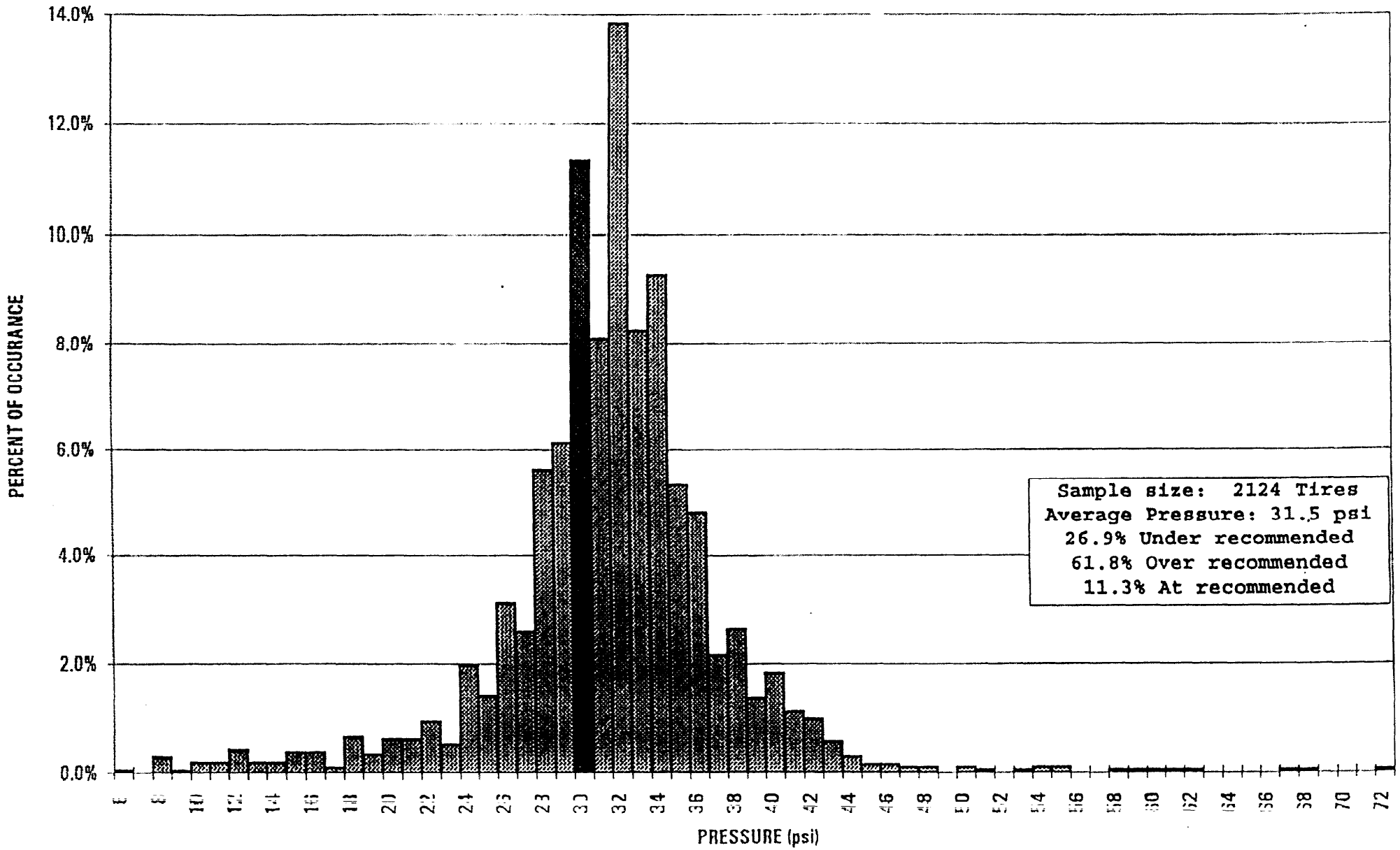
Tire Pressure Field Experience

- A high percentage of tires are under inflated on customer vehicles today. Based on survey data detailed below, we estimate that up to 20% of tires are under recommended placard inflation pressure by 20% or more. It should be noted that this is relative to recommended (placard) pressure, but this proportion is several orders of magnitude higher than the proportion of tires that fail due to structural degradation. It is expected that warning customers at a level no lower than 20% below the pressure required to carry the load will result in warnings with sufficient time to service the tire prior to damage due to low inflation. Data supporting this estimate is:
  - One Alliance member conducted an inflation pressure survey at their service centers in 1995. Three plots based on the survey are attached. The results indicated that approximately 8 to 20% of passenger car tires are more than 20% under recommended placard inflation pressure. This survey was done at the member company service centers. The company service centers are likely to see relatively newer vehicles. It is very likely that these vehicles' tire pressures are better maintained than the overall population of the vehicles. That means the percentage of vehicles on the road having under inflated tires could be higher than what this survey indicated. However, the incident rate of tire failures in the field is a very small percentage of the overall population.
  - Tire Business, 11/6/2000: 48% of cars with one tire 5 psi or more below recommended. 64% of light trucks and 41% of SUVs with similar condition.

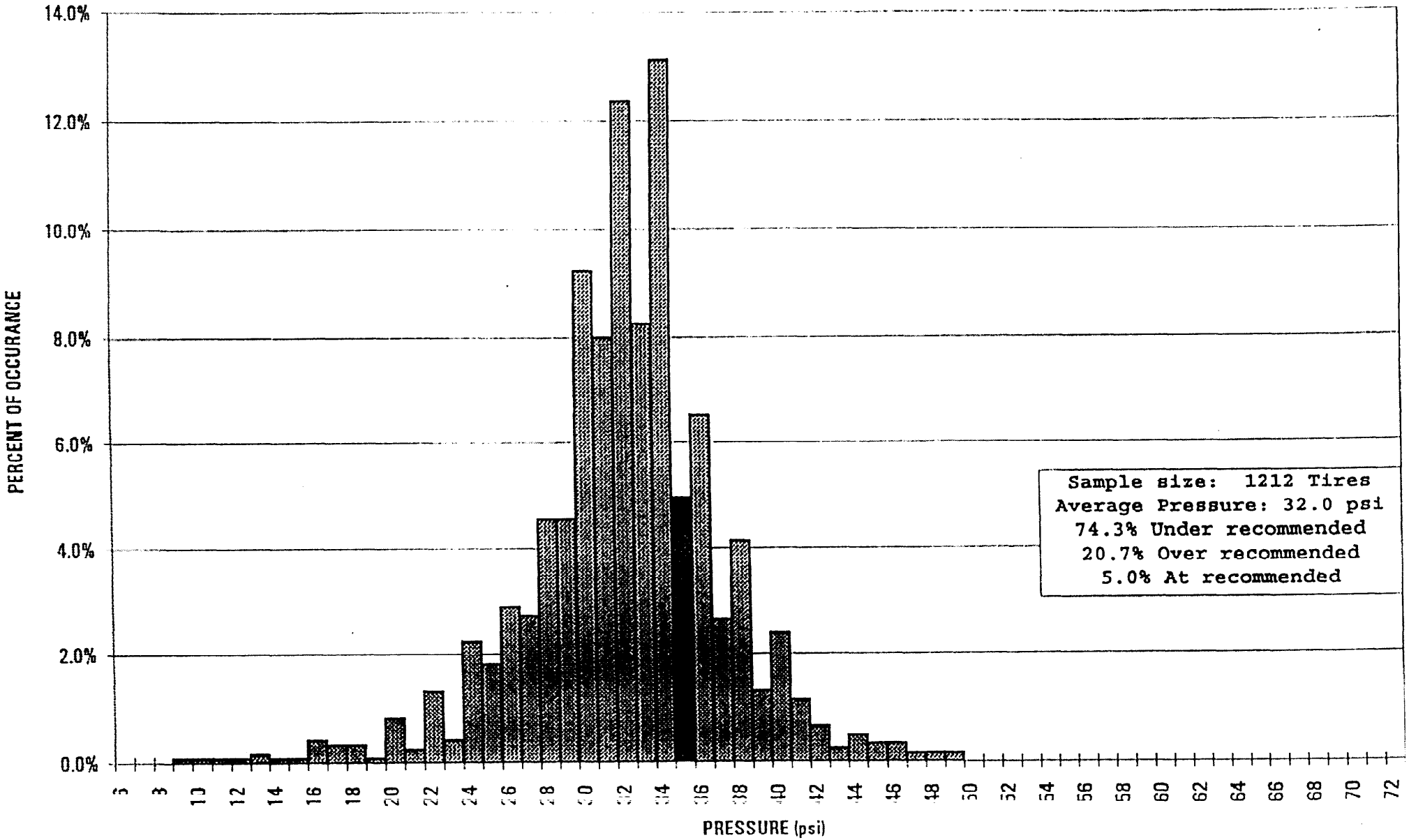
- Based on experience of vehicles in USA, if the warning level is set less than 6 psi below recommended, it generates a significant number of customer complaints. One Alliance member's field experience for a vehicle with TPMS set at a delta of 5 psi shows that 4% of the vehicle sales volume had warranty claims but no part problems. If no parts are replaced on a warranty claim it can be inferred that it was a nuisance item for the customer. If the psi delta was reduced from 5 psi, the percentage of 'labor only' warrant claims and customer dissatisfaction can possibly increase significantly. The following are some possible reasons for nuisance complaints.
  - If the tire pressures were set in the afternoon at a high ambient temperature, and if the ambient temperature is significantly lower the next morning, one may get a warning in the morning.
  - If the warning level is closer to the recommended pressure, the customer's pressure gage could read a different pressure, and create an annoyance situation.

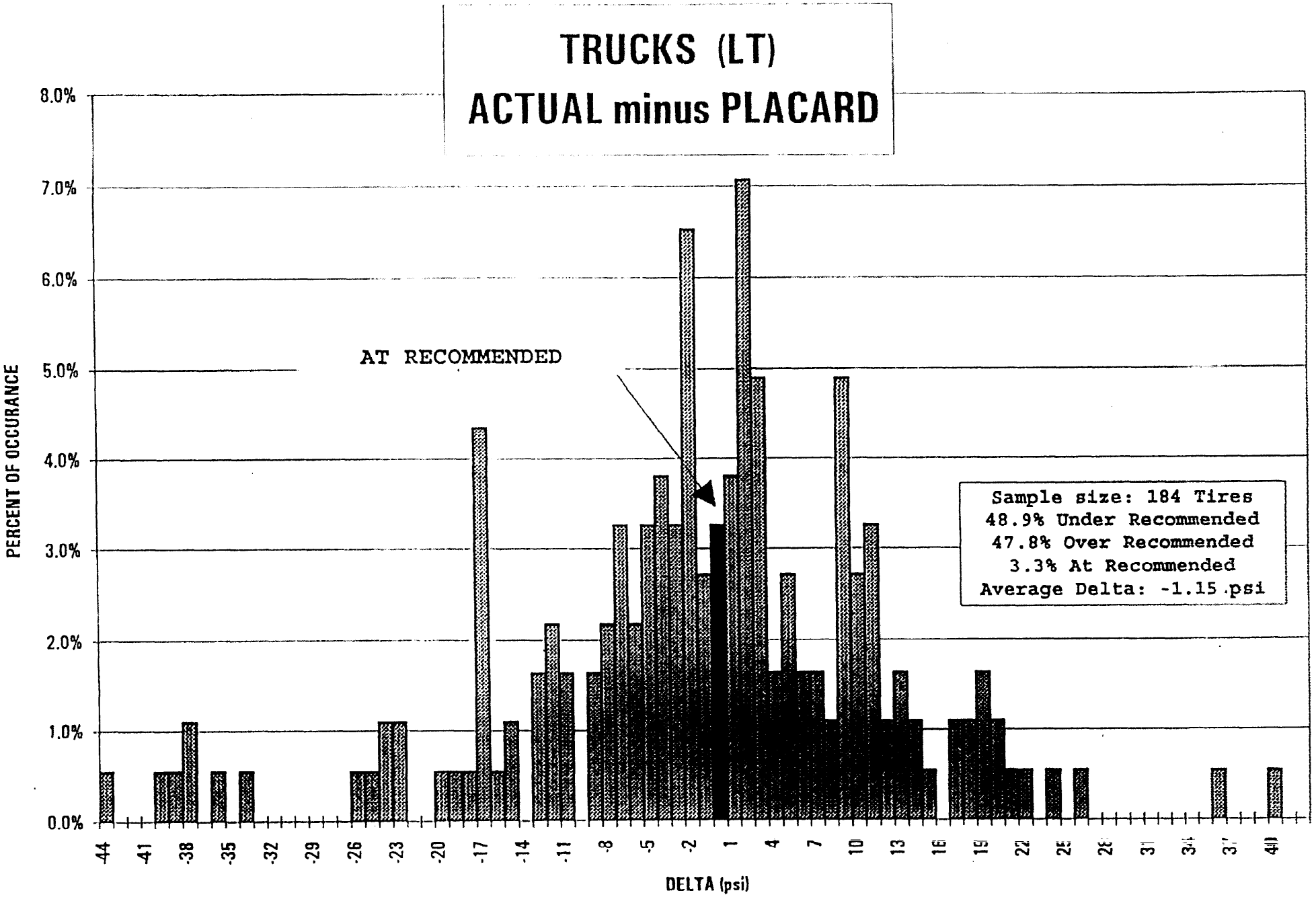
  As a result, the customers are likely to ignore the warnings in the future. The 20% limit does provide allowance for the necessary (avoidance of nuisance warnings) 6 psi drop from recommended for placards of 30 psi or higher.

All Vehicles 30 PSI Recommended



All Vehicles 35 PSI Recommended




TRUCKS (LT)
ACTUAL minus PLACARD
AT RECOMMENDED
Sample size: 184 Tires
48.9% Under Recommended
47.8% Over Recommended
3.3% At Recommended
Average Delta: -1.15 psi
PERCENT OF OCCURANCE
8.0%
7.0%
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
-44
-41
-38
-35
-32
-29
-26
-23
-20
-17
-14
-11
-8
-5
-2
1
4
7
10
13
16
19
22
25
28
31
34
37
40
DELTA (psi)

Attachment #2

Rationale for "Significant Under Inflation" Level

Alliance recommendation of inflation pressure for "significantly under inflated" is based on the following:

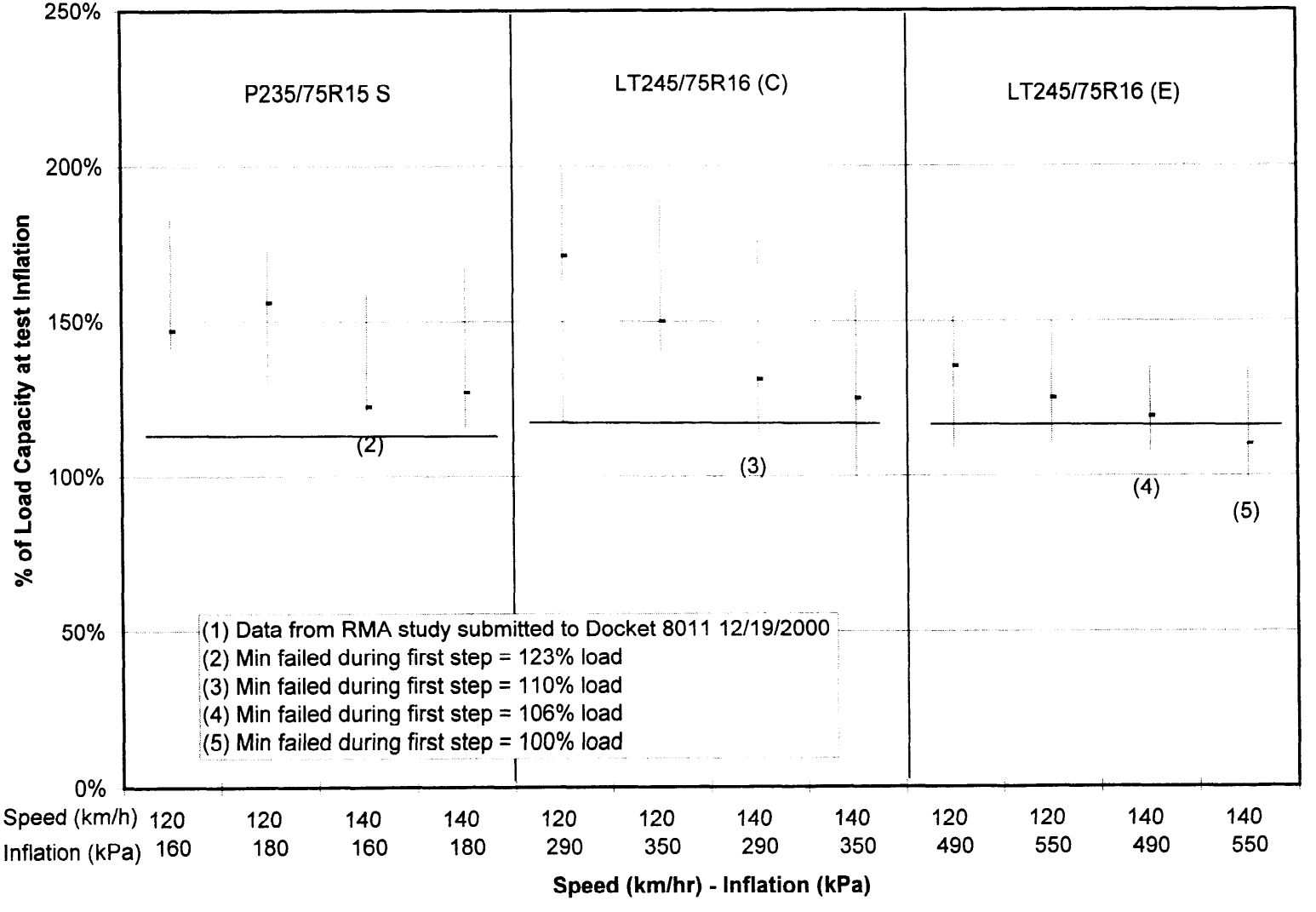
- Rubber Manufacturers Association (RMA) has submitted tire endurance testing results to NHTSA docket no. NHTSA-2000-8011. The attached plot summarizes the results of this testing relative to the Alliance inflation pressure proposal of 20% under the minimum pressure to carry the load. The Alliance proposal is shown as a horizontal line on the attached plot. At this reduced pressure, tires are at the following percentages of The Tire and Rim Association Inc. (T&RA) loads:
  - 111.9% load for P-type tires
  - 116.9% load for LT tires

  The endurance tests run by RMA consisted of running three 8-hour increments at increasing loads (100, 110, 115% of max...regardless of inflation), then continuing to increase load in 5% increments every 4 hours until failure. The plot indicates the increment passed (prior to failure) for the max, min, and average tire in each tire size tested. The value plotted is the % of T&RA load for the given inflation that was passed. Also shown on the plot are the lines corresponding to the Alliance proposal for significant under inflation (20% below the T&RA pressure to carry the load).

  In examining this data, it can be seen that most tires completed steps above the Alliance proposed line, and except for the E-load range LT tires, the average tire at 120 km/h (75 mph) was well above this level. This represents sustained duration at a load-inflation condition more extreme than the worst case the Alliance proposal would allow, and at constant high speeds of 120 and 140 km/h.

  It is also important to note that this test is more extreme than actual use for multiple reasons.
  - Tests were run on 1.7-meter diameter curved surfaces, which creates more deflection and heat generation than on a flat road surface.
  - Tests were run continuously to failure without interruption. With three eight hour intervals, then additional 4-hour intervals, the tire continues to generate heat with no opportunity to cool. In actual use, customers operating passenger cars and light trucks will not operate continuously for these durations. At a minimum, they will require stops to refuel their vehicles, and speeds are likely to fluctuate somewhat, going below the max highway speeds being run in this test.
  - Tires will not remain indefinitely at pressures that are below recommended but above the warning level, as all tires have a natural leak rate, so even in the absence of a puncture, the warning level will eventually be reached. Therefore, a tire that is at pressure that is below recommended inflation, but above the warning level, will not run in that condition for an indefinite period of time

Tire Endurance Testing (1)



Attachment #3
Absolute Minimum

Rationale for 140 kPa Minimum

- Alliance believes 140 kPa (20 psi) is a reasonable lower limit for tires to perform even in the case where the calculated minimum pressures to carry the load is actually lower than 140 kPa (20 psi).

- We have minimal experience with tire behavior at pressures lower than 140 kPa (20 psi), and performance may be compromised.

- It should be noted that 140 kPa (20 psi) is the minimum pressure listed in the tables of the 2000 T&RA Yearbook, and has been for a number of years.