



STATUS REPORT

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

Vol. 41, No. 2, Feb. 25, 2006

FEDERAL PROPOSAL WOULD

UNLINK

FUEL ECONOMY REQUIREMENTS FROM
THEIR SAFETY CONSEQUENCES

Ever since Congress imposed corporate average fuel economy requirements in the 1970s, automakers have been complying by downsizing their vehicles so they use less fuel and/or by using sales of smaller, lighter,



SAFETY VERSUS FUEL ECONOMY

Reducing fuel consumption is good conservation policy, good environmental policy, and in these times of rising gas prices it's also good economic policy. The key is to find and apply methods that conserve fuel without putting people at greater risk in collisions because their more fuel-efficient vehicles aren't as crashworthy.

and more fuel-efficient vehicles to offset what's consumed by their bigger vehicles.

The problem is that these choices have compromised safety. Smaller, lighter vehicles generally are less protective of their occupants in crashes.

This built-in contradiction between safety and fuel economy may be on the verge of disappearing, or at least diminishing. The National Highway Traffic Safety Administration (NHTSA) is proposing a standard for SUVs, vans, and pickup trucks that, besides imposing somewhat tougher fuel economy requirements, would restructure the way fuel economy is calculated for compliance purposes. The effect would be that manufacturers would have to improve the fuel efficiency of all of their vehicles.

"Both conserving fuel and enhancing occupant safety are worthy goals," says Institute president Adrian Lund. "The problem is only when they work against each other. What NHTSA is saying in its proposal is that automakers will have to meet increasingly tougher fuel economy requirements without

compromising safety by downsizing their vehicles. Instead they'll have to consider a compliance strategy they've largely resisted in the past — applying technologies to improve fuel economy."

Human costs of downsizing: The safety disadvantages of small vehicles are inherent. Because they're lighter, they're at a disadvantage in collisions with larger vehicles and even in many single-vehicle crashes. There's less structure to absorb crash energy before it can harm occupants, so deaths and injuries are more likely to occur.

Study after study confirms that when vehicles are made smaller and lighter the risks for their occupants go up. For example, the National Academy of Sciences reported in 2001 that "the downweighting and downsizing that occurred in the late 1970s and early 1980s, some of which was due to [fuel economy] standards, probably resulted in an additional 1,300 to 2,600 traffic fatalities in 1993."

An earlier study by researchers at Harvard University and the Brookings Institution estimated that downsizing vehicles was "as-

sociated with a 14 to 27 percent increase in occupant fatality risk." These researchers projected that federal fuel economy standards are "responsible for 2,200 to 3,900 excess occupant fatalities over the 10 years of a given model year's use."

More studies, including NHTSA's own, address the safety consequences of regulatory actions that increase sales of small, light vehicles. The agency's current regulatory proposal is designed to unhook such consequences from ongoing efforts to improve fuel economy.

How the system would work: Federal fuel economy requirements in place for 30 years have applied to each automaker's entire fleet. It's the average economy across a fleet that counts, so manufacturers can offset sales of heavier, less efficient vehicles by increasing sales of lighter ones that use less fuel.

Under the proposed standard, NHTSA would continue to set overall fuel economy requirements for each manufacturer's fleet of SUVs, vans, and pickup trucks in each model year, just as the agency has for years. The big change under the proposal is that these targets wouldn't be applied uniformly across a manufacturer's fleet. Nor would all manufacturers meet the same targets. Instead the fuel economy of each manufacturer's fleet would depend on the size of the vehicles that are sold.

SUVs, vans, and pickups would be sorted into six categories, based on size, and the vehicles in these categories would be sub-

ject to different targets. Until the 2011 model year, manufacturers could choose whether to comply with this option or meet fuel economy requirements the way they have in the past, by ensuring that their fleets meet an overall target. For the 2008 model year, the target would be 22.5 miles per gallon, up from the current 22.2. Then the requirement would rise to 23.1 (2009)

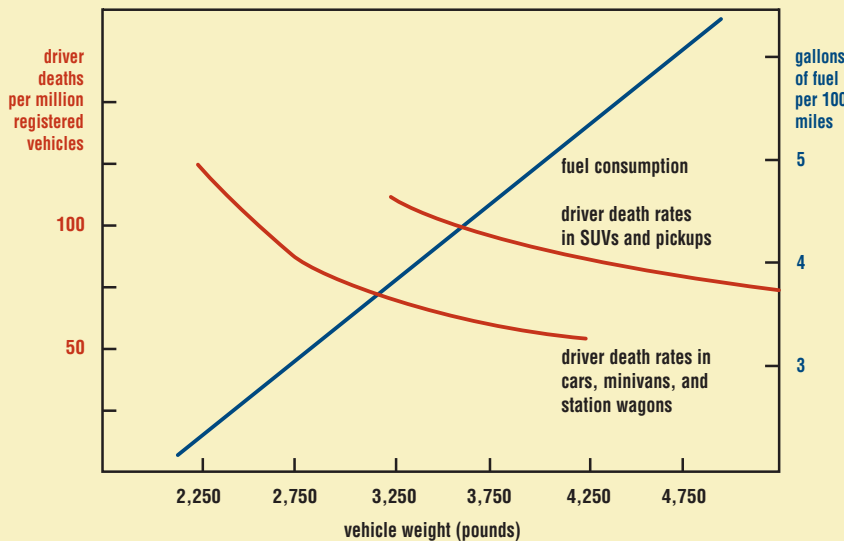
and 23.5 (2010) miles per gallon. In the 2011 model year all manufacturers would have to meet the size-based variable requirements NHTSA is proposing.

The agency estimates that this proposal would save at least 6 billion gallons of fuel over the life of 2008-10 SUV, van, and pickup models, compared with an absence of federal fuel economy

standards. Meeting the 2011 requirement would save an estimated 4.1 billion gallons.

“These savings would be achieved without the safety downsides of the past,” Lund says. “There still could be room for automakers to tinker with the sizes and weights of their vehicles, but this would be a much less attractive option than it has been.”

RELATIONSHIPS BETWEEN VEHICLE WEIGHT AND DRIVER DEATHS AND FUEL CONSUMPTION



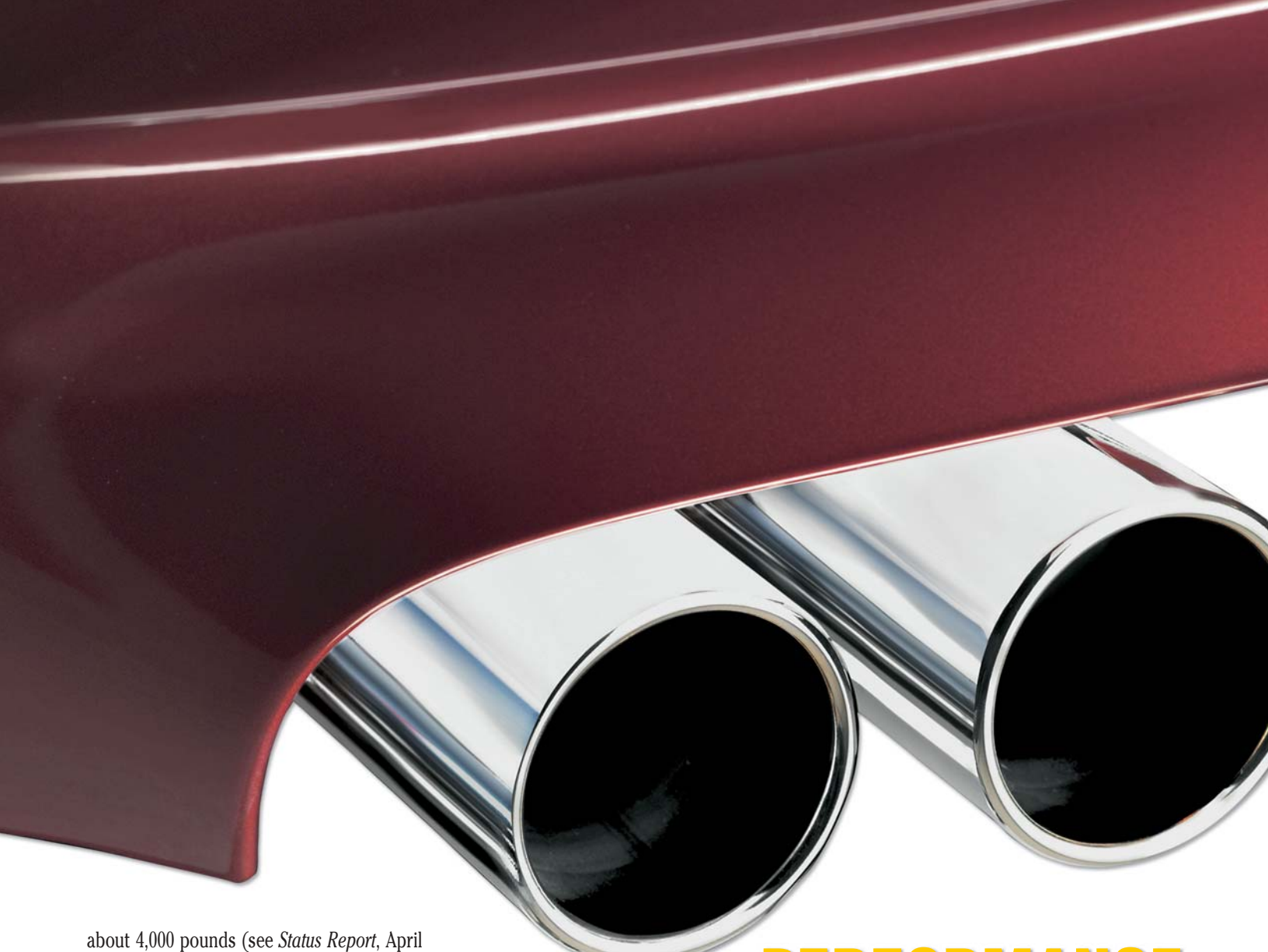
The highest death rates and lowest fuel consumption are for the lightest vehicles. Heavier vehicles have lower death rates and consume more fuel per mile, but the safety benefits of the added weight diminish as vehicles get heavier and heavier (meanwhile fuel consumption continues to increase). The optimum fleet mix to enhance safety would include fewer of the heaviest vehicles as well as the lightest ones. Note: The relationships between death rates and vehicle weights shown above reflect fatal crashes of 1999-2003 models during 2000-04. The rates are adjusted to account for some differences in driver age and sex within and between vehicle types. Remaining differences in vehicle use patterns and driver demographics may account for some of the death rate differences.

Downsizing vehicles to meet the new standard would be discouraged because smaller vehicles would have to meet tougher requirements. Instead of downsizing, the manufacturers would be forced to apply fuel-saving technologies to meet the targets NHTSA has laid out for 2008 and later models. For example, a manufacturer could turbocharge small, more fuel-efficient vehicle engines to achieve adequate performance instead of using turbochargers, as many automakers do today, mostly to boost the power of bigger engines even higher.

Potential to thwart the proposed system:

Manufacturers who want to avoid using technologies like turbocharging to improve fuel economy might try to reduce the weights of their vehicles while maintaining size to avoid pushing the vehicles into new categories that have tougher fuel economy requirements. This would compromise safety because reducing vehicle weight reduces, on average, how well a vehicle protects its occupants in crashes.

The consequences would be worse if the weight reductions were taken among the smallest and lightest SUVs, vans, and pickups. This is because the safety benefits of size and weight diminish among vehicles weighing more than



about 4,000 pounds (see *Status Report*, April 6, 2002; on the web at www.iihs.org).

Another option would be to downsize a vehicle within a category — that is, make it smaller to use less fuel but only to the extent that the downsizing wouldn't push it into another size-based category with a tougher fuel economy target.

"These options wouldn't be good from a safety standpoint, but at least there's a built-in limit to how much downweighting or downsizing a manufacturer could pursue," Lund points out.

Some thwarting of the intent of NHTSA's proposed standard could even enhance safety. If a vehicle were redesigned to make it bigger so it could meet an easier fuel economy target, the occupants would reap the protection afforded by the extra size (and probably extra weight) in a crash.

Most opportunities for getting around what NHTSA intends stem from the plan to categorize vehicles by size for compliance

purposes. The six categories are what give automakers room to change the sizes and weights of vehicles without changing their fuel economy targets. To discourage this, the Institute advises NHTSA to replace the categories with a continuous system under which each vehicle size increment would trigger an incremental change in the fuel economy requirement. Such a system could be adopted with a minimum of additional research.

PERFORMANCE VERSUS FUEL ECONOMY

Automakers could use technologies to meet fuel economy requirements without downsizing vehicles and, thus, putting people at more risk in crashes. But so far manufacturers have chosen to apply the technologies largely to boost engine power, not to conserve fuel.

Whole vehicle fleet could be affected: NHTSA's proposal addresses the fuel economy of SUVs, vans, and pickup trucks, not cars, but there could be some effects for cars too. In some cases, smaller cars have been adapted to meet the classification requirements — and the less stringent fuel economy requirements — that have prevailed for SUVs, vans, and pickups. This has allowed manufacturers to sell more big vehicles while still

Use of incomplete data distorts conclusions about effectiveness of frontal airbags

NASS data are useful for research purposes, but excluding too many records distorts airbag findings

meeting average fuel economy targets set by the federal government. However, the incentive to do this would be greatly reduced under NHTSA's proposed standard.

Agency doesn't set car targets: Fuel economy requirements for cars always have been set separately from those for SUVs, vans, and pickups. Congress, not NHTSA, sets the targets for cars and establishes how the agency will calculate compliance. NHTSA sets the targets for the other vehicles, and this target has been less stringent than the one for cars — 22.2 miles per gallon compared with 27.5 for cars this year. However, by the 2010 model year NHTSA's proposed target of 27.8 miles per gallon for small SUVs, vans, and pickups would be tougher than the current standard for cars.

"The agency's plan represents the federal government's first thoughtful effort to enact energy policy that also takes into account the safety of millions of motorists on U.S. roads," Lund concludes. "When this plan goes into effect and members of Congress begin to see how it works for SUVs and pickup trucks, we hope they'll apply the same regulatory approach to cars. Then we can maintain safety even as we achieve enhanced fuel economy across the vehicle fleet."

NHTSA says it expects to issue a final standard on fuel economy for SUVs, vans, and pickup trucks sometime later this year.

Are you safer in a vehicle with or without a frontal airbag? With the airbag, of course, despite a study by Mary Meyer and Tremika Finney of the University of Georgia. The main finding — that airbags cause more deaths than they prevent — is contradicted by years of published research establishing that airbags save lives.

It's true that deploying airbags have caused some deaths in low-speed collisions. But most of these occupants died in 1997 and earlier models, and the problem has been dramatically reduced. Only one death from an inflating airbag has been confirmed in 2001 and later models (see *Status Report*, Aug. 6, 2005; on the web at www.iihs.org). In contrast, the National Highway Traffic Safety Administration estimates more than 10,000 lives have been saved by airbags since 1994.

"Meyer and Finney violated two basic tenets of scientific research, and this is what led to their erroneous finding," says Susan Ferguson, Institute senior vice president for research. "The first violation was using incomplete data without checking whether the remaining data were unbiased. Then when Meyer and Finney arrived at a conclusion that was out of line with a wealth of published research on the same subject, they didn't question their own work as scientists routinely do."

Using a weighted sample from the National Automotive Sampling System/Crashworthiness Data System (NASS) of more than 20,000 people involved in crashes, Meyer and Finney concluded that death rates were higher for occupants of vehicles with airbags than for those without. But an analysis by the Institute's chief statistician, Charles Farmer, indicates a fundamental flaw — eliminating 50 percent of the data because of missing information. Most of these records were excluded because the impact speeds of the crashes were unknown. However, speed was a major

factor in Meyer and Finney's results. In fact, their principal explanation for their finding was that airbags were a problem in collisions occurring at lower speeds.

Farmer took advantage of additional information in NASS to add back more than 10 percent of the crash records Meyer and Finney had excluded. These data plus corrections of some misclassifications by Meyer and Finney dramatically shifted the results, even though Farmer used the same analytical techniques. Taking into account other factors such as crash type shifted the results more, finding airbags beneficial.

Even this larger sample was incomplete and probably biased. Farmer found that including still other variables in the analysis could shift the results back to finding airbags harmful.

"Meyer and Finney's work along with Farmer's analyses should serve as a warning to others about the limitations of using NASS data for some purposes," Ferguson says. "NASS is a carefully designed, nationally representative sample of crashes. We use these data all the time for details about injuries and vehicle damage sustained in crashes. But NASS isn't right for this study because the sample was grossly limited."



For a copy of "Another look at Meyer and Finney's 'Who wants airbags?'" by C.M. Farmer, write: Publications, Insurance Institute for Highway Safety, 1005 North Glebe Road, Arlington, VA 22201, or email publications@iihs.org. M.C. Meyer and T. Finney's report, "Who wants airbags?" is on the web at <http://www.amstat.org/publications/chance/182.feature.pdf>.

Buckle-up rate lags at night, but program in Pennsylvania leads to modest increase

Belt use on U.S. roads climbed to 82 percent in 2005, the second straight year the national rate has topped 80 percent. In fact, belt use has been trending upward for years, and much of the increase has resulted from stepped up publicity and enforcement of safety belt laws (see *Status Report*, Jan. 11, 2003; on the web at www.iihs.org).

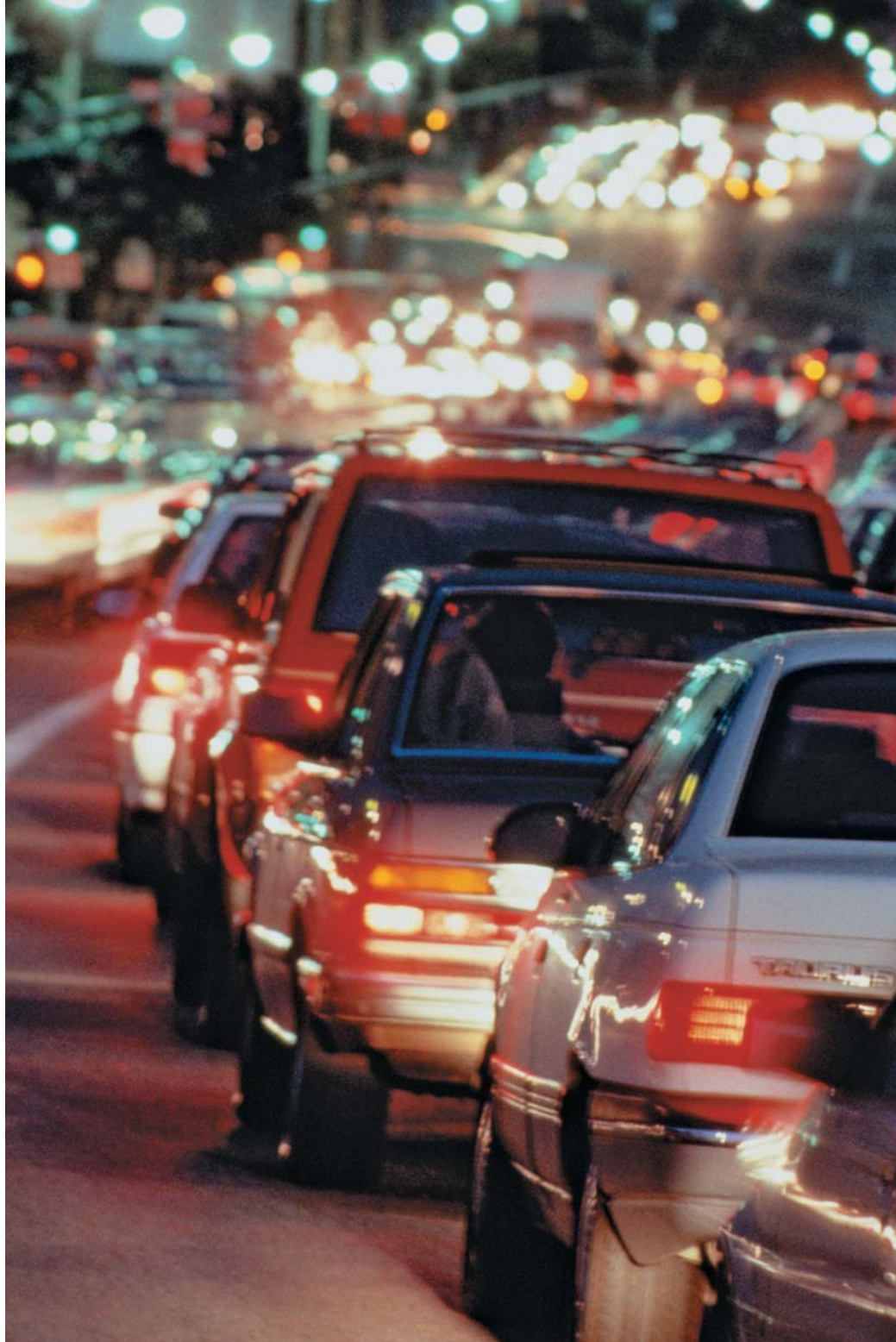
But the trend doesn't reflect the actual use rate around the clock. Rates are tracked by the National Highway Traffic Safety Administration, which surveys belt use from 8 a.m. to 4 p.m. — and use is known to be lower at night than during the day.

Fatal crash risk also is much higher per mile driven at night. Connecticut provides a good example. About 40 percent of all fatal passenger vehicle crashes in 2003 occurred at night. Yet only 10 percent of all driving on Connecticut roads occurred between 9 p.m. and 4 a.m.

"Is the higher death rate at night due in part to lower belt use? Or do unbelted drivers take more risks and get into more serious crashes? Research suggests that both are the case, which is why it's so important to pay attention to belt use at night as well as during the day," says Susan Ferguson, Institute senior vice president for research.

Studies in Connecticut and Pennsylvania:

Two new studies from the Preusser Research Group, one conducted in Connecticut and the other in Pennsylvania, confirm the differences in belt use rates by time of day. The Connecticut study found nighttime use was 6 percentage points lower than the daytime rate, 77 versus 83 percent. This finding is based on observations of belt use at 100 sites during 2004. The researchers followed nearly identical procedures for the day and night observations, except that they used night vision goggles and hand-held infrared spotlights to collect the data between 9 p.m. and 4 a.m.



The researchers went a step further in Pennsylvania, working with police in Reading to step up enforcement of the safety belt law during nighttime hours. Numerous programs have used publicity and enforcement of such laws to boost daytime buckle-up rates. North Carolina set the example with "Click It or Ticket" (see *Status Report*, Nov. 15, 2001; on the web at www.iihs.org), but Reading's program is one of the first to target unbelted motorists at night.

Officers in Reading used various enforcement methods including checkpoints, where night vision equipment helped the police observe belt use and ticket unbelted motorists. Radio and newspaper coverage plus other publicity warned of this enforcement program, which ran during September 2004.

A complication involved the Pennsylvania belt law itself, which allows for enforcement only if a driver is stopped first for another violation. Still, Reading police issued 42 tick-



Challenge of nighttime enforcement: Observing whether motorists are using their belts at night is difficult except where there's bright overhead lighting. Police in Reading used near-military grade night vision goggles to overcome this problem, but using such equipment to enforce traffic laws has sparked some controversy.

Last summer complaints about police spying on motorists in Maryland cut short the use of goggles to monitor belt use rates at night. Governor Robert Ehrlich ordered discontinuation of the goggles after only a three-hour test.

"Still it's important to find ways to boost belt use at night, and one way is to combine enforcement of belt laws with nighttime enforcement of DWI laws," Ferguson says. For example, Institute researchers worked with police in Binghamton, New York, to conduct safety belt and DWI checkpoints. The result was a reduction in the proportion of

Two more states upgrade belt laws to allow primary enforcement

One reason the belt use rate in Pennsylvania is lower than the U.S. average (see story, facing page) is that the state's belt law is one of the weaker ones. It allows for secondary enforcement, under which police may not ticket motorists for this violation alone.

Legislators in Alaska and Mississippi recently upgraded their belt laws from secondary to primary enforcement. The new laws take effect in May. Then police may ticket motorists solely for belt violations. This brings to 25 the number of states that allow primary enforcement of safety belt laws.



NIGHTTIME VERSUS DAY

The challenge of enforcing belt laws at night is being able to see whether motorists are buckled up. Police in a few communities have used night vision goggles to meet this challenge, but the practice sparks controversy. The governor of Maryland ordered police to stop using the goggles.

ets for not buckling up during the program plus another 225 warnings.

Belt use generally is lower in Reading than the United States at large, but the city's enforcement program made a difference. Belt use during the day went from 56 percent before the program to 59 percent after, while the nighttime rate increased from 50 to 56 percent. Meanwhile, enforcement wasn't beefed up in Bethlehem, Pennsylvania, where use rates didn't change.

drinking drivers and an increase in the belt use rate, especially the nighttime rate (see *Status Report*, Oct. 19, 1991).

"Connecticut's day and night safety belt use" by N.K. Chaudhary et al. is on the web at www.nhtsa.dot.gov/people/injury/airbags/CTsDandNSBUse. "Evaluation of the Reading, Pennsylvania, nighttime safety belt enforcement campaign: September 2004" by N.K. Chaudhary et al. is in the *Journal of Safety Research* 36:321-26(2005).

The National Highway Traffic Safety Administration reports that buckle-up rates were 10 percentage points higher during 2005 — 85 versus 75 percent — in states with primary laws. An Institute study estimates the lifesaving effects. Death rates declined an estimated 7 percent after belt laws in 9 states and the District of Columbia were changed during 1989-2003 to allow primary enforcement (see *Status Report*, Jan. 31, 2005; on the web at www.iihs.org).

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1005 N. Glebe Rd., Arlington, VA 22201
Phone 703/247-1500 Fax 247-1588
Internet: www.iihs.org
Vol. 41, No. 2, Feb. 25, 2006

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