



April 9, 2004

Dr. Jeffrey Runge, Administrator  
National Highway Traffic Safety Administration  
U.S. Department of Transportation  
400 7<sup>th</sup> Street, S.W.  
Washington, D.C. 20590

**Comments on NHTSA Technical Report,  
*Vehicle Weight, Fatality Risk and Crash Compatibility of Model Year 1991-99  
Passenger Cars and Light Trucks (DOT HS 809 662), Docket NHTSA-2003-16318***

Dear Dr. Runge:

Public Citizen welcomes the opportunity to comment on the recent technical report by National Highway Traffic Safety Administration (“NHTSA”) researcher Charles Kahane, *Vehicle Weight, Fatality Risk and Crash Compatibility of Model Year 1991-99 Passenger and Light Trucks*, a revision of an earlier 1997 NHTSA report also by Kahane. The new study, like the former one, examines the effects of hypothetical changes in vehicle weight upon fatalities. While we applaud the agency’s increased investigation of vehicle compatibility — not just in this report but in other NHTSA studies as well — we are very concerned about this study’s methodological flaws, problematic assumptions, and unexplained, implausible results.

The key flaws in the new study:

- 1) Kahane’s study confounds vehicle size and weight, making no attempt to model the influence of weight changes independent of size despite the fact that other researchers continue to demonstrate the feasibility of such modeling.
- 2) The study looks at the wrong issue: size and design, not weight, actually matter most for safety. Moreover, new high-strength materials could change the relationship of size and weight in the future, altering both safety and fuel economy outcomes.
- 3) There is no connection between the assumptions in the study and the historical record on manufacturer decisions regarding how to improve fuel economy, which was achieved 85 percent through the use of technology.
- 4) The study’s conclusions steer us in the wrong direction: Weight can actually harm both safety and fuel economy. Lax fuel economy standards — which currently only apply to vehicles weighing under 8,500 lbs. — have allowed automakers to increase vehicle weight and acceleration over the past decade, with devastating effects for both safety and the environment.

This latest study is of particular concern given that the original 1997 study was given political weight far outstripping its utility or value, and it appears from the agency's ANPRM that its successor will be at least a partial basis for new agency rulemaking. Kahane's 1997 study was heavily promoted by the auto industry and was badly misused in the National Academy of Sciences' (NAS) 2002 report on passenger vehicle fuel economy. The NAS Report was, in turn, often quoted by the auto industry and members of Congress as a reason to oppose improvements in fuel economy standards, even though the NAS specifically acknowledged that the Kahane study was not a good tool for predicting future outcomes.

### **Study Confuses Weight with Size**

The most critical flaw of the new Kahane study is its confusion of size and weight, a confusion embedded in the study's design and methodology. Throughout, the report uses size terminology to describe vehicles of varying weights, and no attempt is made to analyze the influence of weight changes *independent* of vehicle size. Yet, widely available recent research indicates that vehicle size, not weight, is a strong indicator of vehicle risk.

Research by Dynamic Research, Inc. (DRI), using data and logistic regression methods similar to those in Kahane's most recent study, shows that when vehicle weight is reduced while vehicle size is kept constant, *fatalities decline* — just the opposite of Kahane's conclusions about the effects of vehicle weight. DRI demonstrates that reductions in wheel-base and track-width — both metrics of vehicle *size* — have the overall effect of increasing fatalities. DRI concludes that while a fleet-wide, 100-lb. average reduction in vehicle weight would reduce annual fatalities by about 800, the corresponding track-width and wheel-base reductions that accompany weight reductions, in the Kahane study results in an increase in fatalities of 839.<sup>1</sup>

Vehicle size, for which wheel-base and track-width are metrics, has historically correlated with vehicle weight; in general, lighter vehicles have tended to also be shorter and narrower than heavier vehicles. But, as DRI proves, *this correlation is not inherent*. The advent of improved vehicle designs, including smaller engines; light, high strength steel and composites, and other innovations, is redefining the relationship between vehicle weight and size.

These findings by DRI add to a record of research going back thirty years or more that consistently demonstrates that weight and size, while closely associated in the data, actually have a divergent effect on safety. For example, two of the major themes of the 1974 Third International Congress on Automotive Safety were “Big Car/Small Car Interactions,” and “Future Vehicle Mix and Automotive Safety.” At the conference, several researchers — including first Administrator of NHTSA William Haddon Jr., M.D., and future Insurance Institute for Highway Safety president Brian O'Neill — noted in the paper “Relationship Between Car Size, Car Weight, and Crash Injuries in Car-to-Car Crashes” that:

For vehicles using the same roads these relationships suggest a crashworthiness design concept for intervehicular crashes that regards increases in vehicle *size* as *primarily protective*, and increases in vehicle *weight* as *primarily hostile*, indicating the desirability of relatively sizeable but not heavy vehicles (emphasis added).<sup>2</sup>

Because Kahane does not distinguish between vehicle weight and size, Kahane's conclusions regarding vehicle weight reductions and increased highway fatalities show only correlation, and not causation, as the study claims in several places. Kahane's continued failure to analyze vehicle weight independent of vehicle size makes this study's results dubious at best, and is scientifically irresponsible given the political impact of his similarly flawed 1997 study.

NHTSA itself demonstrated the compatibility of high fuel economy and superior vehicle safety in the Research Safety Vehicle (RSV) program of the 1970s. After investing many millions of dollars into the program, NHTSA successfully produced in 1977 vehicles that achieved the 1985 fuel economy standard of 27.5 mpg while also offering 50 mph crash protection<sup>3</sup> — better than any vehicle on the road today. The current NHTSA rhetoric and flawed research, like the Kahane studies, completely ignore the documented achievements of the RSV program.

### **The Kahane Study Ignores Highly Significant Differences in Vehicle Design**

Auto industry defenders often argue that fuel economy standards' impact on safety is a matter of "simple physics."<sup>4</sup> The Kahane study echoes these misleading and simplistic characterizations. For example, Kahane exaggerates the role of the principle of conservation of momentum in determining occupant safety.<sup>5</sup> Momentum conservation requires that, in crashes with a more massive vehicle, a less massive vehicle experiences greater deceleration than the more massive vehicle. Employing simply momentum conservation to extrapolate occupant safety in crashes, however, ignores critical issues such as structural interaction between the vehicles including height differences, relative vehicle rigidity or "crushability," the maintenance of occupant safety space in respective vehicles, the performance of safety technology such as air bags, etc. Kahane baldly claims that a heavier vehicle is "physically, intrinsically safer than the light vehicle."<sup>6</sup> Yet in fact, heavier vehicles are by no means "intrinsically" superior in safety to light vehicles. In addition to confusing weight and size, the study also fails to adequately consider highly significant differences in vehicle manufacturing quality and design.

For example, Kahane's study examines the influence of vehicle manufacturer ("nameplate") and new vehicle price on the fatality rates of pedestrians, bicyclists and motorcyclists. Kahane found many of the nameplate variables were statistically significant, "indicating large differences between nameplates in pedestrian fatality rates."<sup>7</sup> These variables, however, did not appear to be dependent on vehicle weight, at least for crashes with pedestrians, bicyclists, and motorcycles, because factoring in these variables did not change the coefficient on weight.<sup>8</sup>

However, Kahane inexplicably fails to analyze the influence of the vehicle nameplate on fatality rates in crashes with other vehicles, immobile objects, etc. Such an omission casts doubts on the credibility of the study's results. If Kahane found statistically significant nameplate variables for certain types of crashes, *why did he not include these variables in the analyses of all crash types?* Why did he not use these variables in the analyses of vehicle-to-vehicle crashes, vehicle-to-immobile object crashes, etc.? Perhaps the reason is that the

influence of these variables, which do not appear to depend on vehicle weight, would seriously undermine the study's positive correlation between weight and safety.

Kahane claims that the differences between the pedestrian fatality rates of different nameplate vehicles “undoubtedly have much more to do with the ‘image’ of the nameplates than any intrinsic quality of the cars,” that more prudent drivers purchase “brands with a reputation for prudent drivers.”<sup>9</sup> However, a significant population of “prudent” drivers are the elderly, and they are more susceptible to injury. Moreover, many researchers like Marc Ross, of the University of Michigan, and Tom Wenzel, of Lawrence Berkeley National Laboratory, believe that differences in vehicle nameplate are not just the result of “self selection,” but that vehicle manufacturing, and hence differences in vehicle “quality” or design, are essential factors that profoundly influence vehicle fatality rates. The key concept is that high “quality” vehicles also contain better crash prevention and crashworthiness design, meaning that nameplate is not a mere “self-selection” correlation, but is causal in that it influences crash likelihood and occupant survival.

Make-model specific studies of vehicle fatality trends have shown that, historically, similarly weighted vehicles have had highly disparate safety effects for both their own occupants and the occupants of other vehicles on the road.<sup>10</sup> For example, driver death rates in some smaller passenger cars are lower than driver death rates in some heavier SUVs and other light trucks.<sup>11</sup>

Ross and Wenzel recently found that, while some vehicle classes are, overall, more risky than others, there were also statistically significant differences in risk among vehicles in the same class. Their research strongly suggests that vehicle quality and safety design, which vary throughout each vehicle class, play a large role in overall risk. The range of risk within each vehicle type indicates that a vehicle's overall safety is not dictated by mere weight, and that manufacturers determine safety through sound or inadequate engineering choices. Moreover, Ross and Wenzel conclude that, in terms of Corporate Average Fuel Economy (CAFE)-related weight decreases, the “argument that the low weight of cars with high fuel economy has resulted in many excess deaths is unfounded.”<sup>12</sup>

Kahane's approach of arbitrarily categorizing vehicles along a 100-lbs.-difference axis washes out the effect of safety design. For example, if the Honda Civic, an extremely popular and safe car, is part of the sample in the initial category, but the comparison group is comprised of another, inferior make/model that weighs 100 lbs. less, safety outcomes would be dramatically downgraded. Yet the change in outcomes is far more the result of better safety design in the Civic than the 100-lb. reduction in weight in the comparison class of vehicles.

## **Weight Kills**

Although the myth that a heavy vehicle offers better occupant protection is rhetorically reinforced by the Kahane study, vehicle weight is actually a poor predictor of occupant safety. The recent DRI study, which isolates changes in vehicle size from changes in vehicle weight, indicates that as vehicle weight increases, so do fatalities, contradicting the Kahane study's

conclusions. In the DRI analysis, each fleet-wide, 100-lb. increase in vehicle weight induces an increase of about 800 annual fatalities.<sup>13</sup>

These findings by DRI support decades of NHTSA research on aggressivity showing that weight can raise the level of violence in crashes between two large, heavy vehicles. Because heaviness is often correlated positively with stiffness and negatively with rollover propensity for light trucks, the overall effect is that large, heavy vehicles offer little or no safety advantage to their occupants and are far more dangerous to others on the highway. Kahane's assertion that "heavier vehicles tend to be more crashworthy and less crash-prone" is inaccurate.<sup>14</sup> For example, the subcompact Volkswagen Jetta has just as low a driver death rate as a massive Chevrolet Suburban, indicating that the Jetta makes up at least partially for its small size with superior agility and crash avoidance.<sup>15</sup>

Despite the risks associated with greater vehicle weight, the vehicle fleet continues to get heavier year after year. Detailed EPA data on vehicle trends and weight changes, covering more than a decade, show a considerable up-weighting in vehicles, particularly in the light truck fleet. This up-weighting is possible because annual fuel and engine efficiency gains from regular technological improvements to vehicles (a gain of approximately 1.9 mpg each year) have not been used, or required to be used, to meet federal fuel economy standards. Even without fancier technological advances, automakers experience a steady increase in their fuel efficiency, yet the absence of meaningful federal rules allows them to funnel such advances into bulking up weight, acceleration and horsepower, inflicting new harm on both safety and the environment.<sup>16</sup>

### **Study's Compatibility Section Contradicts Conclusions on Vehicle Weight**

The most striking section of Kahane's new study addresses vehicle compatibility. Its conclusions and methods significantly contradict the other findings in the report. Kahane finds a "statistically significant association between the driver's fatality risk in the struck car and the difference in the heights-of-force of the striking and struck vehicles."<sup>17</sup> The study's support for weight-independent metrics such as "height-of-force" and "frontal rigidity" is crucial because it completely undercuts Kahane's other contentions that vehicle weight is the predominant factor in vehicle safety. Moreover, these findings support the establishment of a federal regulation regarding a vehicle aggressivity metric.

In collisions between light trucks and passenger cars, Kahane finds that 80 percent of the fatalities are the car occupants.<sup>18</sup> In collisions between vehicles of *the same weight*, the study indicates that when a pickup strikes a passenger car on the left side, the fatality risk of the car driver is about 80 percent higher than if the striking vehicle were another car.<sup>19</sup> "In other words," Kahane writes, "it was almost twice as dangerous, on a per-mile basis, to be hit on the left side by a pickup truck as by a car of the same weight as that pickup truck."<sup>20</sup> Furthermore, if the striking vehicle is an SUV, the fatality risk rises *130 percent*.<sup>21</sup>

On average, in all two-vehicle crashes involving vehicles of equal weight, Kahane finds the pickup trucks are much more aggressive than passenger cars, increasing the fatality risk of the car occupant by about 40 percent, while SUVs are even more aggressive, increasing the fatality risk by almost 70 percent.<sup>22</sup>

These results are roughly consistent with other aggressivity and compatibility research by American and foreign researchers. Ross and Wenzel recently completed a study for the Department of Energy of driver death rates grouped by both vehicle type and model. They found that while the safest mid-size cars were as safe as the safest SUVs, “SUVs impose a greater risk on drivers of other vehicles than do all types of cars.” Pickup trucks, a vehicle category that is on average larger, heavier and stiffer than passenger cars, have a *combined* risk to their drivers and the occupants of other vehicles that “is much higher than that for other vehicle types.”

Research by European researchers points to factors other than mass as the keys to understanding vehicle compatibility. In reporting on a 2001 study of frontal impact compatibility, researchers from Britain’s Transportation Research Laboratory wrote that “it is clear that although mass has an effect on stiffness, which affects intrusion, the most important factor is structural interaction.”<sup>23</sup> Australian researchers recently reported that “good vehicle geometry is the key factor in developing a heavy vehicle that is crash compatible with the average car fleet.”<sup>24</sup> And the International Harmonization Side Impact Working Group recently reported that “research data shows that mass has a lesser effect on injury measures than geometry.”<sup>25</sup>

The Kahane study’s compatibility findings — in agreement with a large body of compatibility research — suggest that the overwhelming influence on fatality risks are factors in vehicle design besides weight, and that the significance of these factors dwarfs the influence of weight, by itself, on the results. In fact, fatality risks associated with light trucks can be reduced significantly *without changing the weight of the light trucks*. Using Kahane’s own regression coefficients to estimate the effect of replacing pickup trucks and SUVs with mid-sized or large cars and minivans of comparable weight shows that such a change would save approximately *3,400 lives*.<sup>26</sup>

It is worth noting that the compatibility section is the only part of the study which divides vehicles by design “class” rather than weight class — and does so with considerable overbreadth (*e.g.*, it does not distinguish between truck-based SUVs and car-based, or crossover SUVs).

With such an important discrepancy in his findings, it is incomprehensible why Kahane still gives vehicle weight such an excessive status in the report. His choice to do so suggests an unfortunate programmatic schizophrenia in the agency’s positions on safety and weight.

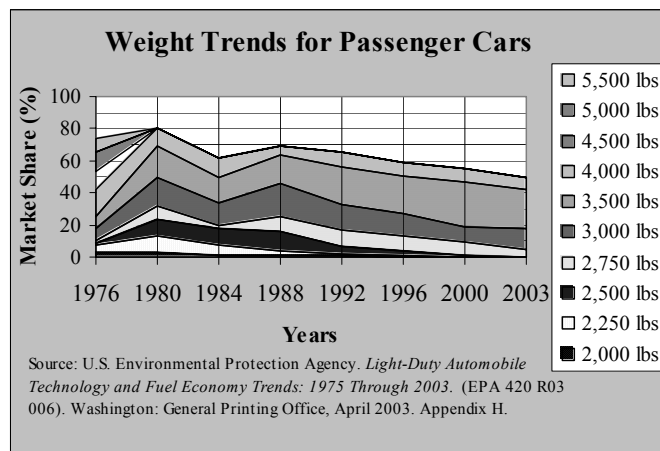
### **Kahane’s Study Fails to Reflect Historical Record on Impact of Fuel Economy Standards**

Not only does the new Kahane study, like the first, falsely imply significant adverse safety impacts from vehicle weight reductions, but the study erroneously suggests that fuel economy standards have resulted in significant across-the-board vehicle weight reductions. The 100-lb. weight reductions that Kahane tries to study in his hypothetical formula are *completely arbitrary and in no way reflect real-world data about the impacts of CAFE. There are no data showing that fuel economy standards in fact caused across-the-board reductions of 100 lbs., or any other amount.*

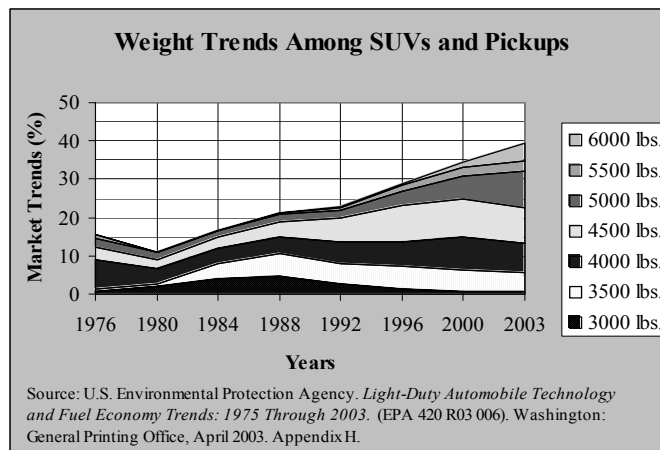
Citing the Kahane study as proof that CAFE standards hurt safety, as the NAS report did with the first Kahane study, is profoundly misleading: No link between Kahane’s assumptions and the actual historical impacts of CAFE on vehicle weight was ever asserted or established by the studies. Kahane did not even try to make a connection — the original study used 1993 data and the updated study uses data from 1991 through 1999, years in which there was *no increase in federal fuel economy standards*. In fact, the 1985 standard of 27.5 mpg for cars was in effect throughout the period, and did not change from 1990 to 1999. In addition, the light truck standard of 20.7 mpg did not change during this same period.

EPA data show that the weight of the car vehicle fleet has not uniformly shifted downward under CAFE. There has also been no “explosion” of tiny cars, as opponents of CAFE predicted that there would be. Instead, there has been consolidation in the weight of the car fleet, with the smallest vehicles — those generally below 2250 lbs. — discontinued, and the largest cars — those above 4500 lbs. — reduced in weight by 1000 lbs. or more. However, as the car fleet consolidated in weight, SUVs and pickups have increased both their market presence and average weight.

**The Market Share of the Smallest New Passenger Cars Dwindled Away as Passenger Cars Consolidated around the 3,000-3,500 lbs. Weight**

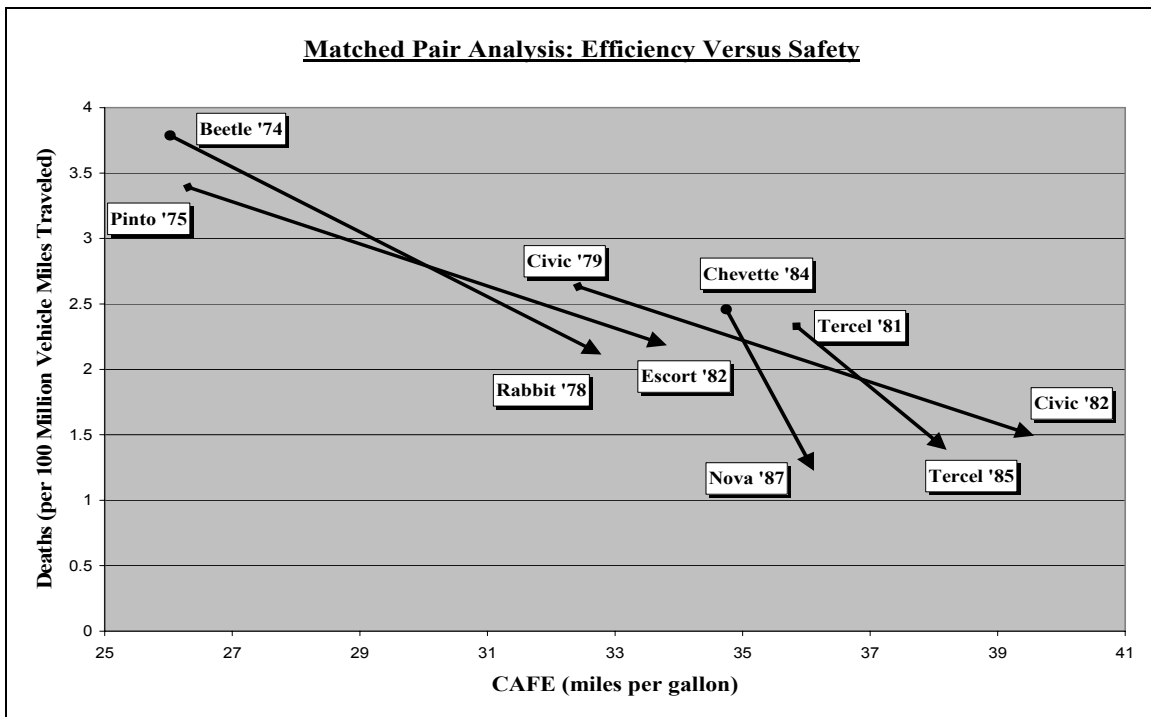


**SUVs and Pickups, in Comparison, Have Become both More Numerous and Heavier<sup>27</sup>**



As the above graphs shows, since 1976, the market share for new cars weighing 3,000-3,500 lbs. nearly doubled, rising from a 15-percent to a 37-percent share of the total market in 2003. Meanwhile, at just over 10 percent in 2003, the market share of new cars weighing 2,000-2,750 lbs. is half of what it was in 1976.<sup>28</sup> However, the market share of new SUVs and pickup trucks has almost tripled since 1976, and the market share of the largest SUVs and pickups (5,000-6,000 lbs.) has increased by 552 percent. The average light truck weight has increased from 4118 lbs. to 4511 lbs., and the average passenger car weight has increased from 3192 lbs. to 3433 lbs.<sup>29</sup>

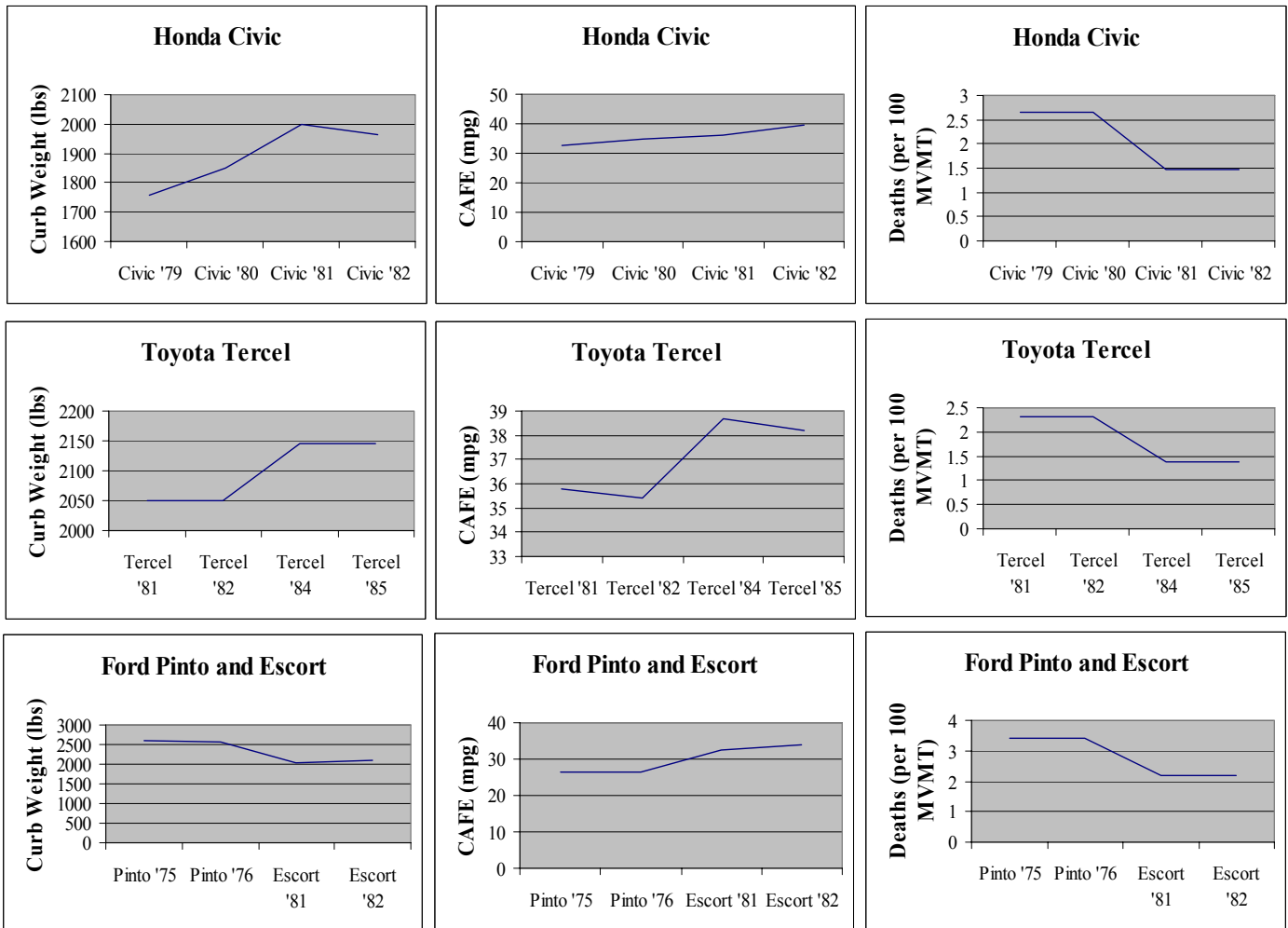
Scare tactics by CAFE-hostile groups like the Competitive Enterprise Institute (CEI) do not stand up to the facts: Examination of fleet weight trends demonstrate that there has been no long-term increase in small, light vehicles; in fact, quite the opposite has occurred. A Department of Energy study found that 85 percent of fuel economy improvements since the 1975 CAFE law was passed have been made through technology, not vehicle weight reductions.<sup>30</sup> Moreover, overall fleet fuel economy is at a 20-year low.<sup>31</sup>



Despite the implications the Kahane study attempts to make, in reality improvements in vehicle safety have often come hand-in-hand with improvements in fuel economy. Data prepared by Clarence Ditlow of the Center for Auto Safety compares matched pairs of the same model, showing simultaneous improvements in both fuel economy and safety, when compared to the pre-CAFE vehicle, for a selection of popular smaller vehicles.

Real-world examples demonstrate that the interaction between vehicle weight and safety is far more complex than Kahane's study attempts to suggest. Many of the vehicles actually increased in weight in comparison to pre-CAFE levels, as in the three popular models depicted

below. Under CAFE, vehicles such as the Honda Civic went from failing government crash tests to having best-in-class crash ratings *while improving fuel economy and gaining 800 lbs.*:



It is profoundly fraudulent to treat the Kahane studies as the NAS did, as an annual, cumulative accounting of the lives lost from CAFE. The historical picture tells us that as technology for fuel economy advanced, there was no steady loss of weight or size among cars. The effect of CAFE on vehicle weight, is not, in fact, cumulative from year to year, but shifts along a technology horizon that controls the cost-effectiveness of technological versus weight-related options for improving fuel economy.

Because there are literally dozens of on-the-shelf, yet unused, technologies that have been developed to improve fuel economy today, it is very likely that any changes in weight would only be cost-effective in the heaviest vehicles in the fleet, where they would provide the most “bang for the buck”—which is precisely the case when auto manufacturers reduced the weight of their heaviest vehicles to meet the 1985 CAFE standard of 27.5 mpg. And weight reductions among the heaviest vehicles improves safety for all other vehicles on the highway. Safety improvements should also be an essential part of any re-design to improve fuel economy, producing a win-win for people and the environment.

## **Kahane Study Supports Weight Reduction Among Heavy Light Trucks, Contradicting Its Assertions Regarding Weight**

Even with its highly questionable methodology and inexplicable inconsistencies, Kahane's study does not support *reducing* CAFE standards. In fact, while critics of CAFE standards — like CEI — will most certainly seize upon and exaggerate Kahane's dubious correlation between vehicle weight and safety, even Kahane's study indicates that reducing the weight of the largest light trucks would increase safety:

- In collisions with passenger cars, Kahane found that for light trucks weighing more than 3,870 lbs., each 100-lb. weight reduction led to a *0.68 fatality reduction*.
- In collisions with other light trucks, he found that for light trucks weighing more than 3,870 lbs., each 100-lb. weight reduction led to a *1.50 fatality reduction*.<sup>33</sup>

Even industry apologist and CEI consultant<sup>34</sup> Leonard Evans, a former GM engineer, admits that decreasing the weight of the *heaviest* light trucks does not increase fatalities, and that “pick-up trucks and SUVs, had, on the average, higher fatality rates than MY 1996-99 passenger cars or minivans of comparable weight.”<sup>35</sup>

Thus, there is a widespread agreement that weight reduction in heavier SUVs and pickups reduces highway fatalities. Also, weight reduction in the heaviest vehicles is the most cost-effective approach for manufacturers to reduce weight in their fleet if it is necessary for compliance with new fuel economy standards. While vehicle incompatibility and light truck aggressivity involve many vehicle design and size factors and is not simply a question of vehicle mass, reducing the mass differential between heavy light trucks and passenger cars would be a positive step towards mitigating the serious harm of vehicle incompatibility for the heaviest vehicles.<sup>36</sup> And when such vehicles are redesigned to reduce weight, other safety factors such as structural incompatibility and roof strength can be improved as well.

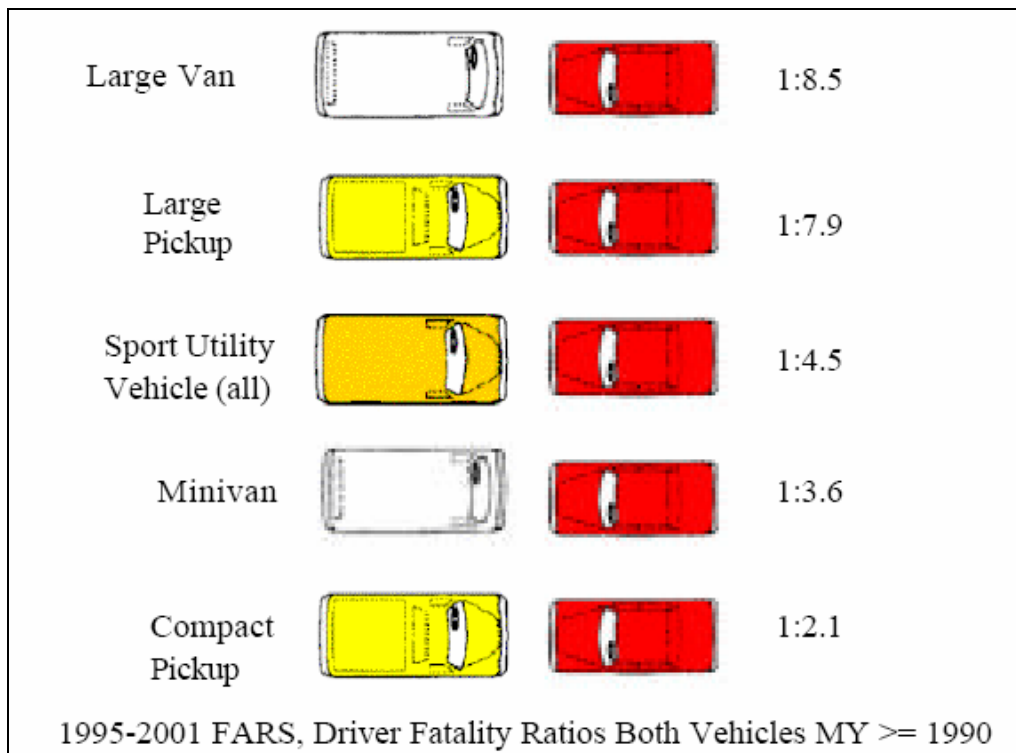
Although admitting that light trucks have higher fatality rates than passenger cars, Evans has tried to argue that light truck aggressivity is not a risk for passenger car occupants. Evans has recently asserted that SUVs do not pose an increased risk to passenger car occupants because if that were true, the ratio of car drivers killed in two-vehicle crashes (including both cars and light trucks) to the number killed in single-car crashes would have increased, and it has not:

if the growth in SUVs led to large increases in fatality risk to drivers from car-SUV crashes, the number of car drivers killed in two vehicle crashes would increase relative to the number killed in single car crashes...No such trend has occurred.<sup>37</sup>

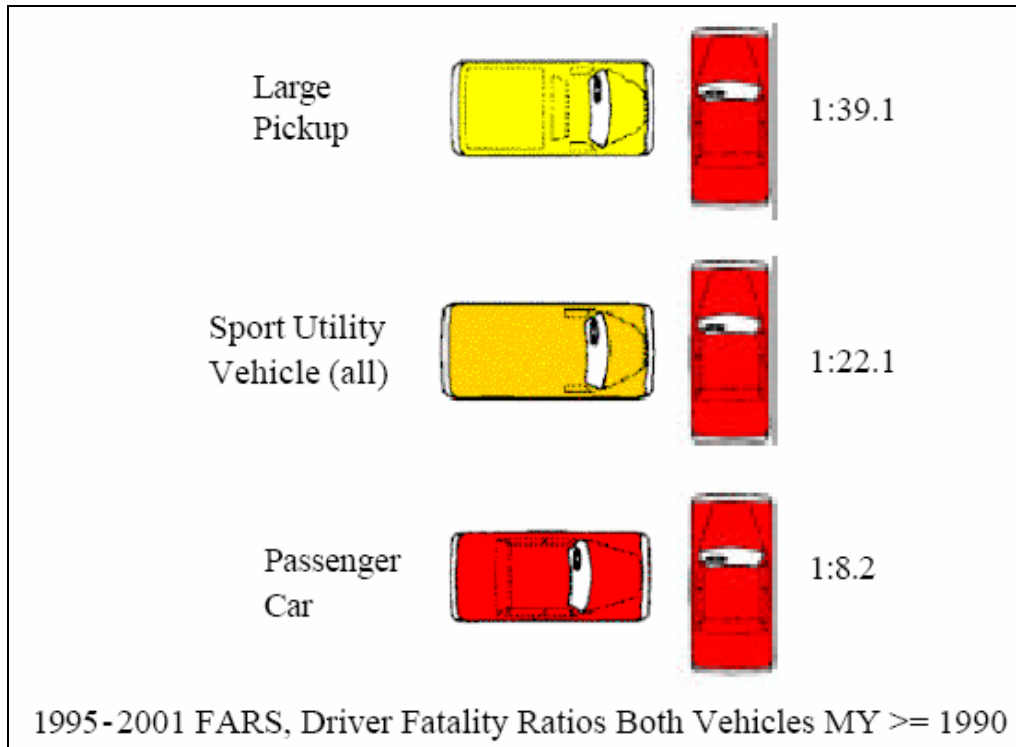
However, in such a proposal — after adjusting for the increasing number of light trucks on the road — if car-to-car crash fatalities declined but fatalities from light truck-to-car collisions increased, the increased fatalities from light trucks running into cars might be washed out by improvements in car-to-car crash safety. It is far more accurate when analyzing vehicle

incompatibility to look at the driver fatality ratios for crashes between light truck-to-car crashes and car-to-car crashes.

As the graphic below illustrates, drivers of passenger cars face increased fatality risks in frontal crashes with *any* type of light truck compared to if they crashed with another passenger car instead. In frontal collisions with compact pickups, for example, passenger car drivers die at twice the rate of the compact pickup drivers. In frontal collisions with a full-size pickup, the passenger car driver is *eight times* more likely to die than the pickup driver. Note that these crashes only include vehicles of model year 1990 or more recent and drivers between the ages of 26 and 55:



A passenger car driver also suffers acutely elevated fatality risks when being struck in the side by a light truck as compared to if they were struck instead by another passenger car. In side impact crashes between two passenger cars, the driver of the struck vehicle has eight times the fatality risk of the driver of the striking vehicle. However, when a passenger car is being struck in the side by an SUV, the car driver has a *22 times* greater fatality risk than the SUV driver. And when a passenger car is struck in the side by a large pickup truck, the car driver is almost *40 times* more likely to die than the pickup driver.<sup>38</sup> The aggressivity of light trucks is undeniable.



Although reducing the weight of heavy SUVs is supported by the problematic Kahane study and would save lives, it is unlikely that more stringent CAFE standards would result in significant weight reductions across the vehicle fleet — despite endless jeremiads from CAFE-hostile groups like CEI. Indeed, the most erroneous aspect of Kahane’s analysis is the overall focus on vehicle weight as the über safety factor, strongly forwarding the implication that fuel economy standards result in general vehicle weight reductions, which is false. Rather, weight reduction, which is expensive, is limited to the heaviest vehicles from which the most weight can be taken most easily, and this improves safety overall in the vehicle fleet.<sup>39</sup>

### **Kahane’s Study is Fraught with Omissions and Inconsistencies**

Beyond the major confusions and contradictions of the Kahane study we have already addressed, there are numerous other problematic omissions and inconsistencies in the methodology and results.

Kahane omits from his study significant vehicle populations, perhaps because their inclusion could have undermined his findings. Heavy-duty, 200/300-series pickup trucks — as well as full-sized vans — are not included in the study, despite the fact that NHTSA research demonstrates that these vehicles are the most aggressive vehicles on the road.<sup>40</sup> Moreover, Kahane omits all two-door passenger cars, despite the fact that this means excluding *one quarter* of passenger cars. The vast majority of two-door cars are not sports or muscle cars. In addition, this leads to the exclusion of two-door SUVs, many of which, like the Ford Explorer Sport, are appallingly rollover-prone and cheaply made. With these kind of important omissions, it is unlikely that Kahane’s study accurately reflects the passenger vehicle population.

Not only does the study omit important vehicle populations, but the way Kahane has calculated the amount that different vehicle types are driven may radically skew his safety results. In his 1997 study Kahane assumed that lighter cars are driven more than heavier cars, at least partially because younger drivers tend to buy lighter cars and younger drivers drive more than older drivers. In this new study, however, Kahane uses information from the National Automotive Sampling System (NASS) to calculate that vehicle miles traveled (VMT) by heavier vehicles is higher than for lighter vehicles.<sup>41</sup>

The notion that VMT increases by increased vehicle weight is not just unintuitive, but contradicts other large pools of odometer information, such as the California Smog Check. The California data indicate that, outside of import luxury cars, VMT increases with each successively *lighter* vehicle class — a conclusion similar to Kahane’s 1997 study but opposite to the 2003 Kahane study.

While the California data may or may not be representative of national vehicle trends, they indicate a highly significant dissimilarity with Kahane’s new study. Applying the 2003 Kahane study’s assumptions regarding different vehicle classes’ VMTs to the 1997 Kahane study — without applying any of the other revisions Kahane made in his new study — nearly doubles the car fatality rates of the 1997 study for most car crash types, making them approximately the same as the fatality rates found in the 2003 study.<sup>42</sup> If in the 2003 study Kahane is incorrectly assuming that heavier vehicles are driven more miles than lighter vehicles, the supposedly higher fatality risks of lighter vehicles compared to heavier vehicles would be artificially inflated.

Another idiosyncrasy in the Kahane study is the finding that weight reductions in passenger cars and light trucks result in increased pedestrian fatality rates. It is not only unintuitive but unconvincing that lighter vehicles could be significantly more deadly to pedestrians than heavier vehicles. While Kahane suggests that, in the case of lighter passenger cars, such an abnormality may be due to vehicle geometry or driving behavior, he calls the finding “surprising” and admits significant uncertainty concerning the cause.<sup>43</sup> In addition, Kahane does not even attempt to explain how weight reductions in light trucks would *increase* pedestrian fatalities. Such statistically significant aberrations suggest that there is a problem with Kahane’s data set or methodology, or both.

In addition, there are many inconsistencies in the way vehicle fatality rates change from one crash situation to another. For example, the correlation between vehicle weight reductions and increasing fatality rates that Kahane asserts should mean that, as the weight differential increases between two vehicles, the fatality rate increases. But the fatality rates in the study are not consistent. According to the study, reducing by 100 lbs. the weight of a passenger car results in a higher fatality rate if it is involved with a light-duty truck than if it is involved with a heavy-duty truck.<sup>44</sup> This makes no sense, and it suggests that Kahane’s results are not, as he states, “linear and additive.”<sup>45</sup>

## CEI Misrepresents Record on CAFE Court Rulings

CEI frequently cites 1992 and 1995 court rulings, which it claims demonstrate the “bias by the agency [NHTSA] against the evidence of CAFE’s lethal effects.”<sup>46</sup> This is disingenuous, however, since CEI ultimately lost the line of the CAFE cases they rely so heavily upon. In order to prevent misrepresentation of this judicial record, a description of the cases follows:

In the 1990 case *CEI v. NHTSA*, CEI challenged tougher fuel economy standards for passenger cars for model years 1987-89, claiming that the standards did not reflect safety considerations. The D.C. Circuit Court of Appeals held that NHTSA’s standards were not arbitrary and capricious. The Court stated:

Petitioners claim that NHTSA acted arbitrarily and capriciously in underestimating the significance of the effect of CAFE standards on vehicle size and safety. They claim that the size-safety relationship is so strong and direct that NHTSA should have lowered its standards to the levels manufacturers would have achieved without CAFE constraints. We disagree. The factual record before the agency on the size-safety CAFE question is sufficiently equivocal that it was not arbitrary or capricious for NHTSA to conclude that, on balance, the CAFE standards as set would not have adverse safety consequences.<sup>47</sup>

Another case was brought in August 1988 when, at the behest of the auto industry and CEI, NHTSA initiated a rulemaking proceeding on whether *to reduce* the CAFE standards for model years 1989 and 1990 (passenger car statute on fuel economy permits NHTSA to temporarily lower standards by 1.5 mpg for passenger cars as an emergency measure). The agency subsequently lowered the standard for 1989 to 26.5 mpg, but left the question open as to the standard for model year 1990. In May 1989, NHTSA closed proceedings on the 1990 standard, leaving the requirement at 27.5 mpg.

CEI, in a case decided in 1992, *CEI v. NHTSA*, challenged NHTSA’s termination of reconsideration of the 1990 passenger car standard, arguing that NHTSA had failed to consider safety impacts of maintaining the standard of 27.5 mpg. On a record with limited NHTSA analysis on the safety question, a conservative court criticized the agency on the grounds that NHTSA needed to better address the safety impacts in its rulemaking record and remanded the rulemaking to the agency for further consideration.<sup>48</sup>

Following the remand, NHTSA reopened the rulemaking in October 1992 to request comments on whether it should lower the 1990 standard and about the potential safety effect of changing the rule. *Because there was no significant effect on safety that was demonstrated in the record submitted by auto manufacturers, the agency terminated the rulemaking without any further action.* This led to the 1995 case *CEI v. NHTSA*, in which the Court of Appeals stated that “No manufacturer suggested that lowering the MY 1990 CAFE Standard would affect its production or sale of cars, and no other commenter provided evidence that a standard of 27.5 mpg would cause any manufacturer to increase the price of larger, safer cars.”<sup>49</sup>

The Court held that, in terminating the rulemaking, NHTSA's decision was rooted in the agency's rulemaking record, it would not harm safety, and it was not arbitrary or capricious:

The record adequately supports the NHTSA's conclusion that maintaining the 27.5 mpg CAFE standard for MY 1990 would not significantly affect the safety of the motoring public.... NHTSA reasonably concluded from the evidence before it that the MY 1990 CAFE standard did not cause automobile manufacturers either to downsize or to refrain from upsizing their cars.<sup>50</sup>

## **Conclusions**

The new Kahane study is so beset with flaws and unexplained inconsistencies that its conclusions are highly dubious at best. Instead of promoting the myth that vehicle weight is the most important determinant of vehicle safety, NHTSA should invest more resources in investigating vehicle size, design, and other crucial safety factors. Moreover, the agency should examine the actual historical effects of the diverging car/truck vehicle fleet and the proliferation of light trucks. The real story is that the last decade's lax CAFE standards have allowed manufacturers to ramp up sales of their most rollover-prone, aggressive vehicles, thus gravely degrading the overall safety of the American highway.

Instead of updating the Kahane study, NHTSA should have:

- 1) Used the available historical record on vehicle weight changes under the CAFE program;
- 2) Distinguished — as did DRI in both 2002 and 2003 — the divergent effects of weight and size within the research model;
- 3) Conducted a vehicle make/model specific analysis to identify factors that improve safety consistent with improvements in vehicle fuel economy and used “best in class” analysis to highlight its findings;
- 4) Developed expertise in new vehicle technologies and lightweight, high-strength metals capable of achieving major improvements in fuel economy without weight reduction;
- 5) Examined opportunities for “win-win” design when analyzing vehicle quality and safety to estimate the likely future impact of CAFE standards;
- 6) Responded to concerns about safety on the merits, with safety standards for rollover prevention and crashworthiness, as well as vehicle compatibility, that set out non-negotiable baselines for vehicle safety design; and
- 7) Set more meaningful fuel economy standards for both passenger cars and light trucks.

If the agency's concern for safety in the context of fuel economy improvements is sincere, it should move quickly to support proposed new safeguards in the areas of rollover and compatibility recently passed by the Senate in Title IV of S. 1072, the highway funding bill. Significant new advances for safety improvements in these areas are both feasible and a moral imperative. Until NHTSA clearly speaks with a pro-safety voice in its testimony before Congress and public and private statements on the bill, any concern for safety expressed in its complex maneuverings to stall vehicle fuel economy are suspect.

The importance of acting soon to raise fuel economy cannot be understated. A meaningful new fuel economy standard, extended to vehicles up to 10,000 lbs., would provide manufacturers with both the incentive and opportunity to comprehensively re-design their vehicles to improve fuel economy and safety at the same time, and would finally put an end to this deeply misleading debate, a debate which has substituted red herring distractions for real solutions and has far too long delayed action for the real public good.

## Endnotes

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- <sup>2</sup> Haddon, William, Brian O'Neill, Hans Joksch. *Relationship Between Car Size, Car Weight, and Crash Injuries in Car-to-Car Crashes*, Third International Congress on Automotive Safety, San Francisco, July 1974.
- <sup>3</sup> Office of Technology Assessment. *Technology Assessment of Changes in the Future Use and Characteristics of the Automobile Transportation System — Volume II: Technical Report* (NTIS order #PB-293645), Washington, DC: Congress of United States, February 1979. 211-214.
- <sup>4</sup> Comments from the Alliance of Automobile Manufacturers, Docket Number, NHTSA-2002-11419.
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- <sup>6</sup> Kahane 2.
- <sup>7</sup> Kahane 98.
- <sup>8</sup> Kahane 94-99.
- <sup>9</sup> Kahane 98.
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- <sup>12</sup> Ross 5-6.
- <sup>13</sup> Van Auken 82-88.
- <sup>14</sup> Kahane vii.
- <sup>15</sup> Gladwell, Malcolm. "Big and Bad: How the S.U.V. ran over automotive safety" *New Yorker* (Jan. 12, 2003), 31.
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- <sup>18</sup> Kahane xviii.
- <sup>19</sup> Kahane 261.
- <sup>20</sup> Kahane xviii.
- <sup>21</sup> Kahane 261.
- <sup>22</sup> Kahane 261.
- <sup>23</sup> Edwards, Mervyn *et al.* Transport Research Laboratory (UK), *The Essential Requirements for Compatible Cars in Frontal Collisions, Development of Criteria and Standards for Vehicle Compatibility*, 17th International Technical Conference on the Enhanced Safety of Vehicles, Amsterdam, June 2001.
- <sup>24</sup> Grzebieta, Raphael *et al.* Monash University (Australia), *Geometric Compatibility in Near Side Impact Crashes*, 17th International Technical Conference on the Enhanced Safety of Vehicles, Amsterdam, June 2001.
- <sup>25</sup> Sayer, Keith, Chair of Side Impact Working Group. International Harmonized Research Activities Side Impact Working Group Status Report, 17th International Technical Conference on the Enhanced Safety of Vehicles, Amsterdam, June 2001.
- <sup>26</sup> Comments by Tom Wenzel and Marc Ross to Docket NHTSA-2003-16318, Mar. 24, 2003. p. 11.
- <sup>27</sup> EPA Appendix H.
- <sup>28</sup> EPA Appendix H.
- <sup>29</sup> Summers, Stephen M., William T. Hollowell, Alope Prasad, Proceedings of the Eighteenth International Conference on Enhanced Safety of Vehicles, Paper No. 307, Nagoya, Japan. May 2003.
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- <sup>31</sup> EPA iii.
- <sup>33</sup> Kahane 143-144.
- <sup>34</sup> Experts@CEI, CEI Expert Biography: Leonard Evans. <[http://www.cei.org/dyn/view\\_bio.cfm/199](http://www.cei.org/dyn/view_bio.cfm/199)>.
- <sup>35</sup> Comments by CEI to Docket No. NHTSA-2003-16318, Mar. 24, 2004, p. 5-6.
- <sup>36</sup> Kahane 11-12.
- <sup>37</sup> CEI 6.
- <sup>38</sup> Summers 3.

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- <sup>39</sup> Summers 4.  
<sup>40</sup> Summers 2.  
<sup>41</sup> Kahane 29.  
<sup>42</sup> Wenzel 4-5.  
<sup>43</sup> Kahane x.  
<sup>44</sup> Kahane xi.  
<sup>45</sup> Kahane xii.  
<sup>46</sup> CEI 3.  
<sup>47</sup> *CEI v. NHTSA*, 901 F.2d 107, 1990.  
<sup>48</sup> *CEI v. NHTSA*, 956 F.2d 312, 1992.  
<sup>49</sup> *CEI v. NHTSA*, 45 F.3d 481, 1995  
<sup>50</sup> *CEI v. NHTSA* 1995.