# Remarks prepared for

# Ronald Medford, Deputy Administrator

# National Highway Traffic Safety Administration

# For the

# NHTSA Workshop on Vehicle Mass-Size-Safety

# Washington, D.C.

# February 25, 2011

Thank you everyone for joining us today. I want to welcome you to our first workshop on the effects of light-duty vehicle mass and size on fleet safety. We expect that this will be the first of potentially several workshops that NHTSA will sponsor to help us dig deeper into these important issues.

**Why are we here today?**

NHTSA and EPA have begun the monumental task of developing fuel economy and GHG standards for light-duty vehicles for model years 2017 and beyond.

We know that this is a long way out, but, we're confident that providing lead time and the certainty of a National Program will help manufacturers make decisions that will allow them to meet strong standards that improve our nation's energy security and reduce GHG emissions.

As you all know, we've already set standards for model years 2012-2016. The industry stood with us when we announced these standards, and confirmed their willingness to rise to the challenge we set for them.

Make no mistake, the 2012-2016 standards are challenging. All manufacturers will need to apply more and new technologies to meet them.

As we look ahead to 2017 and beyond, we have to consider what technologies will be available in those model years for manufacturers to meet even more stringent standards. One of the technology options that manufacturers can choose to meet these standards is to make their vehicles lighter. A lighter car or truck will consume less fuel.

We'll be considering mass reduction along with many other technologies in evaluating what levels of standards will be feasible for model years 2017 and beyond, in part because many OEMs have already announced that they intend to invest in vehicle mass reduction and in new smaller vehicle designs as a way of meeting future standards.

The other important point to note about the rulemaking for 2017 and beyond is that the administration has recently agreed to harmonize the timing of our proposal with the California Air Resources Board's (CARB) process for establishing GHG standards in that state for light duty vehicles.

As a result, NHTSA and EPA are working a little faster than we'd originally anticipated, but we're optimistic that by working together with CARB to reach agreement on issues like the effect of vehicle mass and size on safety, we'll be in a better position to ultimately develop an effective, safe, and feasible National Program and provide manufacturers with the certainty they need to plan the next generation of fuel efficient vehicles.

**What questions are we trying to help answer through this and future workshops?**

If manufacturers are going to reduce vehicle mass or build smaller vehicles in order to meet future CAFE and GHG standards, we want to know ahead of time whether there will be safety implications as a result, and if so, what those implications might be.

NHTSA has long been required by case law to consider the safety effects of CAFE standards, and EPA has the discretion to consider safety effects of GHG standards under the Clean Air Act.

Part of estimating potential safety effects is understanding the relationship between mass and vehicle design. The extent of mass reduction that manufacturers may be considering to meet more stringent fuel economy and GHG standards may raise different vehicle safety concerns than the industry has previously faced.

Manufacturers may need to make the lighter vehicle stiffer to protect against intrusion. But making a vehicle stiffer affects both the forces on the vehicle's occupants in a crash, as well as the forces that the stiffer vehicle exerts on the vehicles it crashes into.

We are also concerned that lighter vehicles have a higher change in velocity (delta V), and thus higher injury and fatality risks during collisions with heavier vehicles. This will be especially important as heavier legacy vehicles will persist in fleet during the transition to lighter and smaller vehicles.

We don't think these are straightforward questions.

We have to try to estimate ahead of time how mass reduction might affect the safety of lighter vehicles, and how those lighter vehicles might affect the safety of drivers and passengers in the entire on-road fleet, as we're determining how much mass reduction we should consider in setting CAFE and GHG standards.

We want to make sure that we're encouraging manufacturers to pursue a path toward compliance that is both cost-effective and safe.

So how have the agencies started to try to answer these questions?

NHTSA, along with EPA, DOE, and CARB, have undertaken a number of studies to evaluate appropriate levels and techniques of mass reduction that manufacturers could consider for model years 2017 and beyond.

We're approaching these questions from two angles: First, we are using a statistical approach to study the effect of vehicle mass reduction on safety historically.

And second, we are using an engineering approach to investigate the affordable and feasible amount of mass reduction achievable while maintaining vehicle safety and other major functionalities such as Noise, Vibration, and Harshness (NVH) – basically, how aware you are of the road conditions when you're driving (in normal weather) – and performance. At the same time we are also studying the new challenges these lighter vehicles might bring to vehicle safety and we are studying the potential countermeasures available to effectively manage those challenges.

For this first workshop, our goal is to explain the agencies' ongoing studies and to solicit different ideas about how the agencies should be considering these questions. We hope to come back to these questions in a few months after we've

had a chance to complete some of these studies, so that we can discuss them with more information. Hopefully we can develop a plan to incorporate the different ideas raised at this workshop.

**How are the agencies using statistical analysis to evaluate fleet-wide safety effects of mass reduction?**

Researchers have been using statistical analysis of historical crash data to evaluate trends in vehicle safety due to mass reduction for over 10 years. Dr. Chuck Kahane of NHTSA, Mr. Mike Van Auken of Dynamic Research, Inc., and Mr. Tom Wenzel of Lawrence Berkeley National Lab, among others, have published a number of analyses of vehicle mass-size and safety.

As we know, these analyses have come up with different results: some associated a significant fatality increase with mass reductions, while others associated a fatality decrease with mass reduction.

We suspect that part of the reason for these different results stems from the fact that the analyses are often based on different databases and different statistical methodologies.

In order to try to resolve these concerns to support the upcoming CAFE and GHG rulemaking for 2017 and beyond, the agencies have kicked off the following studies.

First, NHTSA has contracted with UMTRI to provide an <u>independent</u> review of recent and updated statistical analyses of relationship between vehicle mass, size and fatality rate. Over 20 papers and studies are being reviewed, including studies done by Kahane, Wenzel, and DRI, among others. We've charged the reviewer with reviewing the validity of the studies, in terms of the data the studies are based upon, the methodologies used, and the potential utility of the studies in predicting the possible effect on fatalities and injuries of mass reduction for future vehicles.

Second, NHTSA and DOE, with help from EPA, are working closely to create a common, updated database for statistical analysis. This database consists of fatality data of MY 2000-2007 vehicles in CY 2002-2008. We intend to share this database with the public once it is created and confirmed to be robust. We hope to significantly reduce, and perhaps eliminate, any discrepancy in results due to differences in input data by using a common database.

Using this updated database, Dr. Kahane will update his 2010 fatality study that examined crash data from MY 1991-1999 vehicles in CY 1995-2000 , and Mr. Wenzel will also extend his 2010 casualty study. Mr. Wenzel will also seek to replicate Dr. Kahane's updated study using the same database and methodology.

And third, NHTSA initiated an independent peer review of Dr. Kahane's 2010 study. NHTSA has created Docket No. NHTSA-2010-0152 for this peer review and the two peer reviewers' reports are available to read there.

**How are the agencies using engineering studies and crash simulation to evaluate how much mass can be feasibly reduced from a vehicle, and how making a vehicle lighter might affect the vehicle's safety for its occupants?**

OEMs, government agencies, supplier groups, universities, and other interest groups have been sponsoring studies trying to determine how much mass can be reduced from a light-duty vehicle. These studies vary in many aspects: some focus only on the body-in-white and closures, some focus only on using certain material (such as high-strength steel or aluminum), some consider costs broadly and some are more limited.

Determining feasible amounts of mass reduction is a complicated undertaking. A study's result can vary depending on many factors including: the baseline vehicle employed, the mass reduction techniques considered, the cost constraints, the extent to which vehicle functionality is maintained, and the applicable time frame of the study.

A solid answer to this question will include all of these factors, which means that the agencies have to consider a number of available studies to ensure that all of

these factors are evaluated, since very few studies account for all of these factors at once.

In order to try to come up with a solid answer that is applicable to high volume production vehicles and based on the most up-to-date technologies, the agencies have kicked off the following studies:

First, NHTSA has begun a project with Electricore (with EDAG and George Washington University as subcontractors) to study the maximum feasible mass reduction for a mid-size car. The project will consider the use of multiple materials, and consider mass reduction in all vehicle sub-systems. The redesigned vehicle will need to maintain +/- 10 percent cost parity to the baseline vehicle, and either maintain or improve vehicle functionality.

As part of the project, the contractor will build a CAE model and demonstrate the vehicle's structural performance in NHTSA's NCAP and roof crush tests, and also in IIHS offset and side impact test programs. This study is on a very aggressive timeline, and we plan to have it completed in time to support the final rule for the CAFE and GHG rulemaking for 2017 and beyond.

Second, because meeting NCAP and IIHS tests is only part of the story with regard to how a vehicle will perform in vehicle-to-vehicle crashes, NHTSA will use the model developed by EDAG to perform a variety of vehicle-to-vehicle crash simulations to study the effect of vehicle mass reduction and investigate the safety counter measures for significantly lighter designs.

The study will evaluate how the proposed design will perform in a variety of simulated crash configurations. This study will also include an evaluation of potential countermeasures to reduce any safety concerns associated with light-weight vehicles.

And third, the agencies are working on the next phase of the Lotus light-weight vehicle study for CARB that came out last year.

As you are probably aware, the 1$^{st}$ phase of the Lotus study has produced 2 designs for light-weighted vehicles: a "high development scenario" that reduced

the mass of a 2009 Toyota Venza by 38 percent, and a "low development scenario" that reduced mass by 23 percent.

In the 2nd phase of the study, Lotus is validating the high development design by creating a CAE model and performing crash simulations. NHTSA is actively involved in the 2nd phase of the study with Lotus and EPA by performing crash simulations and validating the model. Lotus and the agencies are having biweekly meetings to evaluate the safety performance of the model. NHTSA also hopes to incorporate the Lotus vehicle model into the simulation study to account for a broader range of vehicle designs.

Additionally, EPA has also recently contracted with FEV and EDAG to take the Lotus Low Development design and do an engineering evaluation and cost study. The final model will also be given to NHTSA to evaluate crash simulation.

So that's a lot of information, and you'll hear a lot more detail about all of these studies over the next several hours. But in a nutshell, NHTSA and the other government agencies have a number of studies underway in all major areas for vehicle mass reduction and safety analysis, and we're excited to get input from stakeholders and the rest of the public.

We may not have a lot of time for questions and answers from the audience today, given how much material we have to get through, but we're making a transcript of the proceedings and we encourage you to submit comments and responses to the dockets we open.

Have a productive day and enjoy the workshop!