DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 533

[Docket No. 2005-22144]

RIN 2127-AJ71

Light Truck Average Fuel Economy Standards--Model Years 2008-2011; Request for Product Plan Information

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

ACTION: Request for Comments

SUMMARY: The purpose of this request for comments is to acquire new and updated information regarding vehicle manufacturers' future product plans to assist the agency in analyzing the proposed light truck corporate average fuel economy (CAFE) standards for MY 2008 – 2011, which are discussed in a companion notice published today. The agency is seeking information that will help it assess the effect of the proposed standards on fuel economy, manufacturers, consumers, the economy, and motor vehicle safety.

DATE: Comments must be received on or before November 23, 2005.

ADDRESSES: You may submit comments [identified by DOT DMS Docket Number 2005-22144] by any of the following methods:

· Web Site: <http://dms.dot.gov>. Follow the instructions for submitting comments on the DOT electronic docket site.

· Fax: 1-202-493-2251.

· Mail: Docket Management Facility; US Department of Transportation, 400 Seventh Street, SW, Nassif Building, Room PL-401, Washington, DC 20590-001.

· Hand Delivery: Room PL-401 on the plaza level of the Nassif Building, 400 Seventh Street, SW, Washington, DC, between 9 am and 5 pm, Monday through Friday, except Federal Holidays.

· Federal eRulemaking Portal: Go to <http://www.regulations.gov>. Follow the online instructions for submitting comments.

FOR FURTHER INFORMATION CONTACT: For non-legal issues, call Ken Katz, Lead Engineer, Fuel Economy Division, Office of International Policy, Fuel economy and Consumer Programs, at (202) 366-0846, facsimile (202) 493-2290, electronic mail kkatz@nhtsa.dot.gov. For legal issues, call Steve Wood or Christopher Calamita, Office of the Chief Counsel, at (202) 366-2992 or by facsimile at (202) 366-3820.

SUPPLEMENTARY INFORMATION:

I. Introduction

In December 1975, during the aftermath of the energy crisis created by the oil embargo of 1973-74, Congress enacted the Energy Policy and Conservation Act (EPCA). The Act established an automotive fuel economy regulatory program by adding Title V, "Improving Automotive Efficiency," to the Motor Vehicle Information and Cost Saving Act. Title V has been amended from time to time and codified without substantive change as Chapter 329 of Title 49 of the United States Code. Chapter 329 provides for the issuance of average fuel economy standards for passenger automobiles and automobiles that are not passenger automobiles (light trucks).

Section 32902(a) of Chapter 329 states that the Secretary of Transportation shall prescribe by regulation corporate average fuel economy (CAFE) standards for light trucks for each model year. That section also states that "[e]ach standard shall be the maximum feasible average fuel economy level that the Secretary decides the

manufacturers can achieve in that model year." (The Secretary has delegated the authority to implement the automotive fuel economy program to the Administrator of NHTSA. 49 CFR 1.50(f).) Section 32902(f) provides that, in determining the maximum feasible average fuel economy level, we shall consider four criteria: technological feasibility, economic practicability, the effect of other motor vehicle standards of the Government on fuel economy, and the need of the United States to conserve energy.

In a companion document, a notice of proposed rulemaking, published today in the *Federal Register*, NHTSA is proposing light truck average fuel economy standards for model years (MYs) 2008 – 2011 under a new reformed structure. To assist the agency in analyzing these proposed CAFE standards, NHTSA has included a number of additional questions, found in an appendix to this notice, directed primarily toward vehicle manufacturers.

To facilitate our analysis of the potential impacts of the proposal, we are seeking detailed comments relative to the requests found in the appendix of this document. The Appendix requests information from manufacturers regarding their product plans – including data about engines and transmissions – MY 2005 through MY 2012, and the assumptions underlying those plans. The Appendix also asks for estimates of the future vehicle population and the fuel economy improvement attributed to technologies.

To facilitate comments and to ensure the conformity of data received regarding manufacturers' product plans from MY 2005 through MY 2012, NHTSA has developed spreadsheet templates for manufacturers' use. The uniformity provided by these spreadsheets is intended to aid and expedite our review of the information provided. These templates are the preferred format for data submittal, and can be found under the CAFE heading of the Laws and Regulations section of the NHTSA website

(www.nhtsa.dot.gov). The Appendix also includes sample tables that manufacturers may refer to when submitting their data to the Agency.

For those manufacturers that submitted information to the previous request for product plan information (68 FR 74931, December 29, 2003; Docket No 16709), the agency will be providing spreadsheet files containing each manufacturer's confidential data directly to each manufacturer. The agency requests that manufacturers utilize these files when providing revised plans. Manufacturers that didn't supply the agency with product plan data in response to the previous request for product plan information are asked to use these templates for their data submission.

Additionally, the agency has placed in the docket for this notice a 2005 document, prepared under the auspices of the Department of Energy (DOE) for NHTSA, updating the estimates of light-truck fuel economy potential and costs in the 2001 NAS report, "Effectiveness and Import of Corporate Average Fuel Economy (CAFE) Standards." The agency seeks comments on this document. After having this document peer reviewed, the agency will place the peer reviewers' reports in the docket for public comment.

We note that the introduction of the 2005 DOE document states that that document does not address the costs and benefits of hybrid and diesel technology because these matters have been documented in a 2004 Energy and Environmental Analysis, Inc. (EEA) study for the DOE. The title of that study is "Future Potential of Hybrid and Diesel Powertrains in the U.S. Light-Duty Vehicle Market."[1] The agency has placed that study in the docket and seeks comments on it as well.

1 See http://www-cta.ornl.gov/cta/Publications/pdf/ORNL_TM_2004_181_HybridDiesel.pdf.

II. Comments

Submission of Comments

How Can I Influence NHTSA's Thinking on This Notice?

In developing the notice of proposed rulemaking for MY 2008-2011 light truck standards, we tried to address the concerns of all our stakeholders. Your comments will help us determine what standards should be set for light truck fuel economy. We welcome your views on all aspects of this notice, but request comments on specific issues throughout this notice. Your comments will be most effective if you follow the suggestions below:

- Explain your views and reasoning as clearly as possible.
- Provide empirical evidence, wherever possible, to support your views
- If you estimate potential costs, explain how you arrived at the estimate.
- Provide specific examples to illustrate your concerns
- Offer specific alternatives.
- Refer your comments to specific sections of the notice, such as the units or page numbers of the preamble, or the regulatory sections.
- Be sure to include the name, date, and docket number of the proceeding with your comments.

How Do I Prepare and Submit Comments?

Your comments must be written and in English. To ensure that your comments are correctly filed in the Docket, please include the docket number of this document in your comments.

Your comments must not be more than 15 pages long. (49 CFR 553.21). We established this limit to encourage you to write your primary comments in a concise

fashion. However, you may attach necessary additional documents to your comments. There is no limit on the length of the attachments.

Please submit two copies of your comments, including the attachments, to Docket Management at the address given above under ADDRESSES. Comments may also be submitted to the docket electronically by logging onto the Dockets Management System website at http://dms.dot.gov. Click on "Help & Information" or "Help/Info" to obtain instructions for filing the document electronically.

How Can I Be Sure That My Comments Were Received?

If you wish Docket Management to notify you upon its receipt of your comments, enclose a self-addressed, stamped postcard in the envelope containing your comments. Upon receiving your comments, Docket Management will return the postcard by mail.

How Do I Submit Confidential Business Information?

If you wish to submit any information under a claim of confidentiality, you should submit three copies of your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given above under FOR FURTHER INFORMATION CONTACT. In addition, you should submit two copies, from which you have deleted the claimed confidential business information, to Docket Management at the address given above under ADDRESSES. When you send a comment containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation. (49 CFR part 512.)

Will the Agency Consider Late Comments?

We will consider all comments that Docket Management receives before the close of business on the comment closing date indicated above under DATES. Due to the statutory deadline (April 1, 2006), we will be very limited in our ability to consider

comments filed after the comment closing date. If Docket Management receives a comment too late for us to consider it in developing a final rule, we will consider that comment as an informal suggestion for future rulemaking action.

How Can I Read the Comments Submitted by Other People?

You may read the comments received by Docket Management at the address given above under ADDRESSES. The hours of the Docket are indicated above in the same location.

You may also see the comments on the Internet. To read the comments on the Internet, take the following steps:

(1) Go to the Docket Management System (DMS) Web page of the Department of Transportation (http://dms.dot.gov/).

(2) On that page, click on "search."

(3) On the next page (http://dms.dot.gov/search/searchFormSimple.cfm), type in the four-digit docket number shown at the beginning of this document. Example: If the docket number were "NHTSA-1998-1234," you would type "1234." After typing the docket number, click on “search."

(4) On the next page, which contains docket summary information for the docket you selected, click on the desired comments. You may download the comments. However, since the comments are imaged documents, instead of word processing documents, the downloaded comments are not word searchable.

Please note that even after the comment closing date, we will continue to file relevant information in the Docket as it becomes available. Accordingly, we recommend that you periodically check the Docket for new material.

Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comment (or signing the

comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the Federal Register published on April 11, 2000 (Volume 65, Number 70; Pages 19477-78) or you may visit http://dms.dot.gov.

Authority: 15 U.S.C. 2002; delegation of authority at 49 CFR 1.50.

Issued on: August 23, 2005

Stephen R. Kratzke
Associate Administrator
For Rulemaking

Billing Code: 4910-59-P
[Signature page for RIN 2127-AJ27; Request for comments]

APPENDIX

I. Definitions

As used in this appendix--

1. "Automobile," "fuel economy," "manufacturer," and "model year," have the meaning given them in Section 32901 of Chapter 329 of Title 49 of the United States Code, 49 U.S.C. 32901.

2. "Cargo-carrying volume," "gross vehicle weight rating" (GVWR), and "passenger-carrying volume" are used as defined in 49 CFR 523.2.

3. "Basic engine" has the meaning given in 40 CFR 600.002-85(a)(21). When identifying a basic engine, respondent should provide the following information:

(i) Engine displacement (in liters). If the engine has variable displacement (i.e., cylinder deactivation) the respondent should provide both the minimum and maximum engine displacement.

(ii) Number of cylinders or rotors.

(iii) Number of valves per cylinder.

(iv) Cylinder configuration (V, in-line, etc.).

(v) Other engine characteristics, abbreviated as follows:

A – Atkinson cycle

AM – Atkinson/Miller cycle

D – Diesel cycle

M – Miller cycle

O – Otto cycle

OA – Otto/Atkinson cycle

V – V-shaped

I – Inline

R – Rotary

DI - Direct injection

IDI - Indirect injection

MPFI - Multipoint fuel injection

PFI – Port fuel injection

SEFI – Sequential electronic fuel injection

TBI – Throttle body fuel injection

NA – Naturally aspirated

T – Turbocharged

S – Supercharged

FFS - Feedback fuel system

2C – Two-stroke engines

C – Camless

OHV – Overhead valve

SOHC - Single overhead camshaft

DOHC - Dual overhead camshafts

VVT - Variable valve timing

VVLT – Variable valve lift and timing

CYDA – Cylinder deactivation

IVT – Intake valve throttling

CVA – Camless valve actuation

VCR – Variable compression ratio

LBFB – lean burn-fast burn combustion

DCL – Dual cam lobes

E – Exhaust continuous phasing

EIE – Equal continuous intake and exhaust phasing

ICP – Intake continuous phasing

IIE – Independent continuous intake and exhaust

CV – Continuously variable valve lift

F – Fixed valve lift

SVI – Stepped variable intake with 2 or more fixed profiles

SVIE - Stepped variable intake and exhaust with 2 or more fixed profiles

4. "Domestically manufactured" is used as defined in Section 32904(b)(2) of Chapter 329, 49 U.S.C. 32904(b)(2).

5. “Footprint” means the product of a vehicle’s wheelbase and average track width, presented in square feet. For purposes of this definition, track width is the lateral distance between the centerlines of the tires at ground when the tires are mounted on rims with zero offset. For purposes of this definition, wheelbase is the longitudinal distance between front and rear wheel centerlines. In case of multiple rear axles, wheelbase is measured to the midpoint of the centerlines of the wheels on the rearmost axle.

6. "Light truck" means an automobile of the type described in 49 CFR Part 523.3 and 523.5.

7. A "model" is a vehicle line, such as the Chevrolet Impala, Ford Taurus, Honda Accord, etc., which exists within a manufacturer's fleet.

8. "Model Type" is used as defined in 40 CFR 600.002-85(a)(19).

9. "Percent fuel economy improvements" means that percentage which corresponds to the amount by which respondent could improve the fuel economy of vehicles in a given model or class through the application of a specified technology, averaged over all vehicles of that model or in that class which feasibly could use the technology. Projections of percent fuel economy improvement should be based on the assumption of maximum efforts by respondent to achieve the highest possible fuel economy increase through the application of the technology. The baseline for determination of percent fuel economy improvement is the level of technology and vehicle performance with respect to acceleration and gradeability for respondent's 2005 model year vehicles in the equivalent class.

10. "Percent production implementation rate" means that percentage which corresponds to the maximum number of vehicles of a specified class, which could feasibly employ a given type of technology if respondent made maximum efforts to apply the technology by a specified model year.

11. "Production percentage" means the percent of respondent's vehicles of a specified model projected to be manufactured in a specified model year.

12. "Project" or "projection" refers to the best estimates made by respondent, whether or not based on less than certain information.

13. "Redesign" means any change, or combination of changes, to a vehicle that would change its weight by 50 pounds or more or change its frontal area or aerodynamic drag coefficient by 2 percent or more.

14. "Relating to" means constituting, defining, containing, explaining, embodying, reflecting, identifying, stating, referring to, dealing with, or in any way pertaining to.

15. "Respondent" means each manufacturer (including all its divisions) providing answers to the questions set forth in this appendix, and its officers, employees, agents or servants.

16. "Test Weight" is used as defined in 40 CFR 86.082-2.

17. "Transmission class" is used as defined in 40 CFR 600.002-85(a)(22). When identifying a transmission class, respondent also must indicate whether the type of transmission, and whether it is equipped with a lockup torque converter (LUTC), a split torque converter (STC), and/or a wide gear ratio range (WR) and specify the number of forward gears or whether the transmissions a continuously variable design (CVT). If the transmission is of a hybrid type, that should also be indicated.
18. "Truckline" means the name assigned by the Environmental Protection Agency to a different group of vehicles within a make or car division in accordance with that agency's 2001 model year pickup, van (cargo vans and passenger vans are considered separate truck lines), and special purpose vehicle criteria.
19. "Variants of existing engines" means versions of an existing basic engine that differ from that engine in terms of displacement, method of aspiration, induction system or that weigh at least 25 pounds more or less than that engine.

II. Assumptions

All assumptions concerning emission standards, damageability regulations, safety standards, etc., should be listed and described in detail by the respondent.

III. Specifications – Light Truck Data

Go to www.nhtsa.dot.gov/cars/rules/CAFE/rulemaking.htm for spreadsheet templates.

1. Identify all light truck models currently offered for sale in MY 2005 whose production you project discontinuing before MY 2008 and identify the last model year in which each will be offered.

2. Identify all basic engines offered by respondent in MY 2005 light trucks which respondent projects it will cease to offer for sale in light trucks before MY 2008, and identify the last model year in which each will be offered.

3. For each model year 2005-2012, list all projected trucklines and provide the information specified below for each model type. Model types that are essentially identical except for their nameplates (e.g., Chrysler Town & Country/Dodge Caravan)

may be combined into one item. Engines having the same displacement but belonging to different engine families are to be grouped separately. Within the fleet, the vehicles are to be sorted first by truckline, second by basic engine, and third by transmission type. Spreadsheet templates can be found at www.nhtsa.dot.gov/cars/rules/CAFE/rulemaking.htm. These templates include codes and definitions for the data that the Agency is seeking.

a. General Information

1. Number – a unique number assigned to each model
2. Manufacturer - manufacturer abbreviation (e.g., GMC)
3. Model – name of model (i.e., Escalade)
4. Nameplate – vehicle nameplate (i.e., Escalade ESV)
5. Fuel Economy – measured in miles per gallon; weighted (FTP + highway) fuel economy
6. Actual FE (FFVs) – measured in miles per gallon; for flexible fuel vehicles, fuel economy when vehicle is operated on gasoline
7. Engine Code – unique number assigned to each engine

A. Manufacturer – manufacturer abbreviation

B. Name – name of engine

C. Configuration – classified as V = V4, V6, V8, or V10; I = inline; R=rotary

D. Fuel – classified as CNG = compressed natural gas, D = diesel, E = electricity, E85 = ethanol flexible-fuel, E100 = neat ethanol, G = gasoline, H = hydrogen, LNG = liquefied natural gas, LPG = propane, M85 = methanol flexible-fuel, M100 = neat methanol

E. Engine's country of origin

F. Engine Oil Viscosity – typical values as text include 0W20, 5W20, etc.; ratio between the applied shear stress and the rate of shear, which measures the resistance of flow of the engine oil (as per SAE Glossary of Automotive Terms)

G. Cycle – combustion cycle of engine. Classified as A = Atkinson, AM = Atkinson/Miller, D = Diesel, M = Miller, O = Otto, OA = Otto/Atkinson

H. Air/Fuel Ratio – the weighted (FTP + highway) air/fuel ratio (mass): a number generally around 14.7

I. Fuel System – mechanism that delivers fuel to engine. Classified as DI = direct injection, IDI = indirect injection, MPFI = multipoint fuel injection, PFI = port fuel injection, SEFI = sequential electronic fuel injection, TBI = throttle body fuel injection

J. Aspiration – based on breathing or induction process of engine (as per SAE Automotive Dictionary). Classified as NA = naturally aspirated, S = supercharged, T = turbocharged

K. Valvetrain Design – describes design of the total mechanism from camshaft to valve of an engine that actuates the lifting and closing of a valve (as per SAE Glossary of Automotive Terms). Classified as C = camless, DOHC = dual overhead cam, OHV = overhead valve, SOHC = single overhead cam

L. Valve Actuation/Timing – based on valve opening and closing points in the operating cycle (as per SAE J604). Classified as CC=continuously controlled, EIE = equal continuous intake and exhaust phasing, DCL = dual cam lobes, E = exhaust continuous phasing, F = fixed, I = intake continuous phasing, IIE = independent continuous intake and exhaust phasing

M. Valve Lift – describes the manner in which the valve is raised during combustion (as per SAE Automotive Dictionary). Classified as CV = continuously variable (throttled), F = fixed, SVI = stepped variable intake with 2 or more fixed profiles, SVIE = stepped variable intake and exhaust with 2 or more fixed profiles

N. Cylinders – the number of engine cylinders. An integer equaling 3, 4, 5, 6, 8, or 10

O. Valves/Cylinder – the number of valves per cylinder. An integer equaling 2, 3, or 4

P. Deactivation – weighted (FTP + highway) aggregate degree of deactivation. Classified as Y= valve deactivation on half of the cylinders, N= no valve deactivation, 0.0-? (e.g., for deactivation of half the cylinders over half the drive cycle, enter 0.25)

Q. Displacement – total volume displaced by a piston in a single stroke, measured in liters

R. Compression Ratio (min) – typically a number around 8; for fixed CR engines, should be identical to maximum CR

S. Compression Ratio (max) – a number between 8 and 14; for fixed CR engines, should be identical to minimum CR

T. Horsepower – the maximum power of the engine, measured as horsepower/KW@rpm

U. Torque – the maximum torque of the engine, measured as lb-ft@rpm

8. Transmission Code – an integer; unique number assigned to each transmission

A. Manufacturer – manufacturer abbreviation

B. Name – name of transmission

C. Country of origin - where the transmission is manufactured

D. Type – type of transmission. Classified as C = clutch, CVT1 = belt or chain CVT, CVT2 = other CVT, T = torque converter

E. Number of Forward Gears – integer indicating number of forward gears

F. Control – classified as A = automatic, M = manual; ASMT would be coded as Type = C, Control = A

G. Logic – indicates aggressivity of automatic shifting. Classified as A = aggressive, C = conventional U.S.

9. Origin – classification as domestic or import, listed as D = domestic, I = international

b. Sales – actual and projected US production for MY2005 to MY 2012 inclusive, measured in thousands of vehicles

c. Vehicle Information

1. Style – classified as Pickup; Sport Utility; or Van

2. Class – classified as Cargo Van; Crossover Vehicle; Large Pickup; Midsize Pickup; Minivan; Passenger Van; Small Pickup; Sport Utility Vehicle; or Sport Utility Truck

3. Structure – classified as either Ladder or Unibody

4. Drive – classified as A = all-wheel drive; F = front-wheel drive; R = rear-wheel-drive; 4 = 4-wheel drive

5. Wheelbase – measured in inches; defined per SAE J1100, L101 (July 2002)

6. Track Width (front) – measured in inches; defined per SAE J1100, W101-1 (July 2002), and clarified above

7. Track Width (rear) – measured in inches; defined per SAE J1100, W101-2 (July 2002), and clarified above

8. Footprint – wheelbase times average track width; measured in square feet

9. Curb Weight – total weight of vehicle including batteries, lubricants, and other expendable supplies but excluding the driver, passengers, and other payloads (as per SAE J1100); measured in pounds

10. Test Weight – weight of vehicle as tested, including the driver, operator (if necessary), and all instrumentation (as per SAE J1263); measured in pounds

11. GVWR – Gross Vehicle Weight Rating; weight of loaded vehicle, including passengers and cargo; measured in pounds

12. Frontal Area – a measure of the height times width of the front of a vehicle, e.g. 35 square feet.

13. Drag Coefficient, C_d – a dimensionless measure of the aerodynamic sleekness of an object, e.g., 0.25.

14. Coefficient of Rolling Resistance, C_r – a dimensionless measure of the resistance to motion experienced by one body rolling upon another, e.g., 0.0012.

15. Seating (max) – number of usable seat belts before folding and removal of seats (where accomplished without special tools); provided in integer form

16. Fuel Capacity – measured in gallons of diesel fuel or gasoline; MJ (LHV) of other fuels (or chemical battery energy)

17. Electrical System Voltage – measured in volts, e.g., 12 volt, 42 volts

18. Front Head Room – measured in inches; defined per SAE J1100, H61 (July 2002)

19. Rear Head Room – measured in inches; defined per SAE J1100, H63, H86 (July 2002)

20. Front Shoulder Room – measured in inches; defined per SAE J1100, W3, W85 (July 2002)

21. Rear Shoulder Room – measured in inches; defined per SAE J1100, W4, W86 (July 2002)

22. Front Hip Room – measured in inches; defined per SAE J1100, W5 (July 2002)

23. Rear Hip Room – measured in inches; defined per SAE J1100, W6 (July 2002)

24. Front Leg Room – measured in inches; defined per SAE J1100, L34 (July 2002)

25. Rear Leg Room – measured in inches; defined per SAE J1100, L51, L86 (July 2002)

26. Turning Circle – diameter of the circle made by the front wheel with the steering at full lock (the left or right stop) and the vehicle perpendicular to the roadway (as per SAE J695); measured in feet

d. MSRP – measured in dollars (2005); actual and projected average MSRP (sales-weighted, including options) for MY2005 to MY 2012 inclusive

e. Type (Hybridization) – the type of hybridization of the vehicle, if any. Classified as E = electric, H = hydraulic

f. Planning and Assembly

1. US/Canadian/Mexican Content – measured as a percentage; overall percentage, by value, that originated in U.S., Canada and Mexico

2. Predecessor – number and name of model upon which current model is based, if any

3. Last Freshening – model year

4. Next Freshening – model year

5. Last Redesign – model year; where redesign means any change, or combination of changes to a vehicle that would change its weight by 50 pounds or more or change its frontal area or aerodynamic drag coefficient by 2 percent or more.

6. Next Redesign – model year

7. Employment Hours Per Vehicle – number of hours of U.S. labor applied per vehicle produced

The agency also requests that each manufacturer provide an estimate of its overall light truck CAFE for each model year. This estimate should be included as an entry in the spreadsheets that are submitted to the agency.

4. Does respondent project introducing any variants of existing basic engines or any new basic engines, other than those mentioned in your response to Question 3, in its light truck fleets in MYs 2005-2012? If so, for each basic engine or variant indicate:

a. The projected year of introduction,

b. Type (e.g., spark ignition, direct injection diesel, 2-cycle, alternative fuel use),

c. Displacement (If engine has variable displacement, please provide the minimum and maximum displacement),

d. Type of induction system (e.g., fuel injection with turbocharger, naturally aspirated),

e. Cylinder configuration (e.g., V-8, V-6, I-4),

f. Number of valves per cylinder (e.g., 2, 3, 4),

g. Valvetrain design (e.g., overhead valve, overhead camshaft,

h. Valve technology (e.g., variable valve timing, variable valve lift and timing, intake valve throttling, camless valve actuation, etc.)

i. Horsepower and torque ratings,

j. Models in which engines are to be used, giving the introduction model year for each model if different from "a," above.

5. Relative to MY 2005 levels, for MYs 2005-2012, please provide information, by truckline and as an average effect on a manufacturer's entire light truck fleet, on the weight and/or fuel economy impacts of the following standards or equipment:

a. Federal Motor Vehicle Safety Standard (FMVSS 208) Automatic Restraints

b. FMVSS 201 Occupant Protection in Interior Impact

c. Voluntary installation of safety equipment (e.g., antilock brakes)

d. Environmental Protection Agency regulations

e. California Air Resources Board requirements

f. Other applicable motor vehicle regulations affecting fuel economy.

6. For each of the model years 2005-2012, and for each light truck model projected to be manufactured by respondent (if answers differ for the various models), provide the

requested information on new technology applications for each of items "6a" through "6r" listed below:

(i) description of the nature of the technological improvement;

(ii) the percent fuel economy improvement averaged over the model;

(iii) the basis for your answer to 6(ii), (e.g., data from dynamometer tests conducted by respondent, engineering analysis, computer simulation, reports of test by others);

(iv) the percent production implementation rate and the reasons limiting the implementation rate;

(v) a description of the 2005 baseline technologies and the 2005 implementation rate; and

(vi) the reasons for differing answers you provide to items (ii) and (iv) for different models in each model year. Include as a part of your answer to 6(ii) and 6(iv) a tabular presentation, a sample portion of which is shown in Table III-A.

a. Improved automatic transmissions. Projections of percent fuel economy improvements should include benefits of lock-up or bypassed torque converters, electronic control of shift points and torque converter lock-up, and other measures which should be described.

b. Improved manual transmissions. Projections of percent of fuel economy improvement should include the benefits of increasing mechanical efficiency, using improved transmission lubricants, and other measures (specify).

c. Overdrive transmissions. If not covered in "a" or "b" above, project the percentage of fuel economy improvement attributable to overdrive transmissions (integral or auxiliary gear boxes), two-speed axles, or other similar devices intended to increase the range of available gear ratios. Describe the devices to be used and the application by model, engine, axle ratio, etc.

d. Use of engine crankcase lubricants of lower viscosity or with additives to improve friction characteristics or accelerate engine break-in, or otherwise improved lubricants to

lower engine friction horsepower. When describing the 2005 baseline, specify the viscosity of and any fuel economy-improving additives used in the factory-fill lubricants.

e. Reduction of engine parasitic losses through improvement of engine-driven accessories or accessory drives. Typical engine-driven accessories include water pump, cooling fan, alternator, power steering pump, air conditioning compressor, and vacuum pump.

f. Reduction of tire rolling losses, through changes in inflation pressure, use of materials or constructions with less hysteresis, geometry changes (e.g., reduced aspect ratio), reduction in sidewall and tread deflection, and other methods. When describing the 2005 baseline, include a description of the tire types used and the percent usage rate of each type.

g. Reduction in other driveline losses, including losses in the non-powered wheels, the differential assembly, wheel bearings, universal joints, brake drag losses, use of improves lubricants in the differential and wheel bearing, and optimizing suspension geometry (e.g., to minimize tire scrubbing loss).

h. Reduction of aerodynamic drag.

i. Turbocharging or supercharging.

j. Improvements in the efficiency of 4-cycle spark ignition engines including (1) increased compression ratio; (2) leaner air-to-fuel ratio; (3) revised combustion chamber configuration; (4) fuel injection; (5) electronic fuel metering; (6) interactive electronic control of engine operating parameters (spark advance, exhaust gas recirculation, air-to-fuel ratio); (8) variable valve timing or valve lift; (9) multiple valves per cylinder; (10) cylinder deactivation; (11) friction reduction by means such as low tension piston rings and roller cam followers; (12) higher temperature operation; and (13) other methods (specify).

k. Direct injection gasoline engines.

l. Naturally aspirated diesel engines, with direct or indirect fuel injection.

m. Turbocharged or supercharged diesel engines with direct or indirect fuel injection.

n. Stratified-charge reciprocating or rotary engines, with direct or indirect fuel injection.

o. Two cycle spark ignition engines.

p. Use of hybrid drivetrains

q. Use of fuel cells; provide a thorough description of the fuel cell technology employed, including fuel type and power output.

r. Other technologies for improving fuel economy or efficiency.

7. For each model of respondent's light truck fleet projected to be manufactured in each of MYs 2005-2012, describe the methods used to achieve reductions in average test weight. For each specified model year and model, describe the extent to which each of the following methods for reducing vehicle weight will be used. Separate listings are to be used for 4x2 light trucks and 4x4 light trucks.

a. Substitution of materials.

b. "Downsizing" of existing vehicle design to reduce weight while maintaining interior roominess and comfort for passengers, and utility, i.e., the same or approximately the same, payload and cargo volume, using the same basic body configuration and driveline layout as current counterparts.

c. Use of new vehicle body configuration concepts, which provides reduced weight for approximately the same payload and cargo volume.

8. Indicate any MY 2005-2012 light truck model types that have higher average test weights than comparable MY 2004 model types. Describe the reasons for any weight increases (e.g., increased option content, less use of premium materials) and provide supporting justification.

9. For each new or redesigned vehicle identified in response to Question 3 and each new engine or fuel economy improvement identified in your response to Questions 3, 4, 5, and 6, provide your best estimate of the following, in terms of constant 2005 dollars:

(a) Total capital costs required to implement the new/redesigned model or improvement according to the implementation schedules specified in your response. Subdivide the capital costs into tooling, facilities, launch, and engineering costs.

(b) The maximum production capacity, expressed in units of capacity per year, associated with the capital expenditure in (a) above. Specify the number of production shifts on which your response is based and define "maximum capacity" as used in your answer.

(c) The actual capacity that is planned to be used each year for each new/redesigned model or fuel economy improvement.

(d) The increase in variable costs per affected unit, based on the production volume specified in (b) above.

(e) The equivalent retail price increase per affected vehicle for each new/redesigned model or improvement. Provide an example describing methodology used to determine the equivalent retail price increase.

10. Please provide respondent's actual and projected U.S. light truck sales, 4x2 and 4x4, 0-8,500 lbs. GVWR and 8501-10,000 lbs., GVWR for each model year from 2005 through 2012, inclusive. Please subdivide the data into the following vehicle categories:

i. Standard Pickup Heavy (e.g., C2500/3500, F-250/350)

ii. Standard Pickup Light (e.g., C1500, F-150)

iii. Compact Pickup (e.g., S-10, Ranger, Dakota)

iv. Standard Cargo Vans Heavy (e.g., G3500, E-250/350)

v. Standard Cargo Vans Light (e.g., G1500/2500, E-150)

vi. Standard Passenger Vans Heavy (e.g., G3500, E-250/350)

vii. Standard Passenger Vans Light (e.g., G1500/2500, E-150)

viii. Compact Cargo Vans (e.g., Astro/Safari)

ix. Compact Passenger Vans (e.g., Sienna, Odyssey, Caravan)

x. Full-size Sport Utilities (e.g., Tahoe, Expedition, Sequoia)

xi. Mid-size Sport Utilities (e.g., Trailblazer, Explorer)

xii. Compact Utilities (e.g., Wrangler, RAV4)

xiii. Crossover Vehicle (e.g., Pacifica, Rendezvous, RX 330)

xiv. Sport Utility Trucks (e.g., Avalanche, Ridgeline)

See Table III-B for a sample format.

11. Please provide your estimates of projected total industry U.S. light (0-10,000 lbs, GVWR) truck sales for each model year from 2005 through 2012, inclusive. Please subdivide the data into 4x2 and 4x4 sales and into the vehicle categories listed in the sample format in Table III-C.

12. Please provide your company's assumptions for U.S. gasoline and diesel fuel prices during 2005 through 2012.

13. Please provide projected production capacity available for the North American market (at standard production rates) for each of your company's light truckline designations during MYs 2005-2012.

14. Please provide your estimate of production lead-time for new models, your expected model life in years, and the number of years over which tooling costs are amortized.

Note: The parenthetical numbers in Tables III-A refer to the items in Section III, Specifications.

Table III-A--Technology Improvements

Technological Improvement	Baseline Technology	Percent Fuel Economy Improvement, %	Basis for Improvement Estimate	Models on Which Technology is Applied	Production Share of Model With Technological Improvement				
					2005	2006	2007	2008	2009+
(6a.) Improved Auto Trans.									
LT-1		7.0			0	0	15	25	55
LT-2		6.5			0	0	0	20	25
LT-3		5.0			0	10	30	60	60
(6b) Improved Manual Trans.									
LV-1		1.0			2	5	5	5	5
U-1		0.7			0	0	0	8	10

Table III-B--Actual and Projected U.S. Light Truck Sales

Amalgamated Motors Light Truck Sales Projections						
Model Line	Model Year					
	2005	2006	2007	2008	2009	2010+
Compact Pickup	43,500					
Standard Pickup – Light	209,340					
Standard Pickup – Heavy	120,000					
Compact Cargo Van	60,000					
Standard Cargo Van – Light	20,000					
Standard Cargo Van – Heavy	29,310					
Compact Passenger Van/Minivan	54,196					
Standard Passenger Van – Light	38,900					
Standard Passenger Van – Heavy						
Compact Sport Utility						
Mid-size Sport Utility						
Full-size Sport Utility						
Crossover Vehicle						
Sport Utility Truck						
Total	TBD					

Table III-C--Total U.S. Light Truck Sales

Model Type	2005	2006	2007	2008	2009	2010+
Compact Pickup						
Standard Pickup - Light						
Standard Pickup - Heavy						
Compact Cargo Van						
Standard Cargo Van – Light						
Standard Cargo Van – Heavy						
Compact Passenger Van/Minivan						
Standard Passenger Van – Light						
Standard Passenger Van – Heavy						
Compact Sport Utility						
Mid-size Sport Utility						
Full-size Sport Utility						
Crossover Vehicle						
Sport Utility Truck						
Total						

IV. Cost and Potential Fuel Economy Improvements of Technologies

The agency requests that each manufacturer and other interested parties provide estimates of the range of costs and fuel economy improvements of available fuel economy technologies. These estimates should follow the format provided by Tables IV-A through IV-D. For comparison purposes the agency has listed the technologies included in the NAS report, together with the range (low and high) of fuel economy improvement and cost estimates for all of the technologies included in the report.

The agency has also added some technologies to these tables as well as separate rows for the cost and fuel economy improvement estimates when technologies are applied to engines having a different number of cylinders or when they are applied to vehicles with different numbers of gears. Thus, for example, if a manufacturer or other interested party has different cost and fuel economy improvement estimates for the application of a technology to a 4-cylinder and a 6-cylinder engine, these estimates should be represented as separate rows on its table. Likewise, for example, if a manufacturer or other interested party has different cost and fuel economy improvement estimates for using 6-speed automatic transmission versus a 4-speed and a 5-speed automatic transmission, these estimates should be represented as separate rows on its table.

The agency is also interested in whether different cost and fuel economy improvement estimates apply to different vehicle classes. Thus, the agency is asking for any information regarding the effectiveness and cost of fuel economy technologies on a vehicle class basis. Light truck vehicle classes are listed in Tables III-B and III-C.

If respondents have information that breaks out the cost and fuel economy improvement estimates by vehicle classes, the agency asks that in addition to providing charts which provide a respondent's complete range of estimates, that respondents provide separate charts for each vehicle class following the example of Tables IV-B and IV-D. Spreadsheet templates for these tables can be found at: www.nhtsa.dot.gov/cars/rules/CAFE/rulemaking.htm

If a manufacturer or other interested party has fuel economy improvement and cost estimates for technologies not included on these tables, the agency asks the manufacturer or other interested party to provide that information to the agency.

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Table IV-A – Estimates of Fuel Economy Improvement of Fuel Economy Technologies for All Vehicle Classes

	NAS		Amalgamated	
	Low	High	Low	High
Production-Intent Engine Technology				
Engine Friction Reduction	1.0%	5.0%	[1.0%]c	[6.0%]c
Low Friction Lubricants	1.0%	1.0%	[0.5%]c	[1.0%]c
Multi-Valve, Overhead Camshaft	2.0%	5.0%	[2.5%]c	[3.6%]c
Variable Valve Timing	2.0%	3.0%	[2.0%]c	[3.2%]c
- 4 cylinder engine	2.0%	3.0%	[2.5%]c	[3.2%]c
- 6 cylinder engine	2.0%	3.0%	[2.0%]c	[3.0%]c
- 8 cylinder engine	2.0%	3.0%	[2.0%]c	[2.5%]c
Variable Valve Lift & Timing	1.0%	2.0%	[1.0%]c	[1.5%]c
Cylinder Deactivation	3.0%	6.0%	[4.0%]c	[6.5%]c
- 6 cylinder engine	3.0%	6.0%	[4.0%]c	[4.5%]c
- 8 cylinder engine	3.0%	6.0%	[5.5%]c	[6.5%]c
Engine Accessory Improvement	1.0%	2.0%	[0.5%]c	[2.5%]c
Engine Supercharging & Downsizing	5.0%	7.0%		
Production-Intent Transmission Technology				
5-Speed Automatic Transmission	2.0%	3.0%	[2.0%]c	[2.8%]c
Continuously Variable Transmission	4.0%	8.0%	[5.0%]c	[6.5%]c
Automatic Transmission w/ Aggressive Shift Logic	1.0%	3.0%		
6-Speed Automatic Transmission (vs. 5-speed automatic)	1.0%	2.0%	[1.0%]c	[2.7%]c
6-Speed Automatic Transmission (vs. 4-speed automatic)	3.0%	5.0%	[3.5%]c	[4.0%]c
Production-Intent Vehicle Technology				
Aero Drag Reduction	1.0%	2.0%	[0.9%]c	[2.0%]c
Improve Rolling Resistance	1.0%	1.5%	[0.8%]c	[1.5%]c
Emerging Engine Technology				
Intake Valve Throttling	3.0%	6.0%	[4.0%]c	[7.0%]c
Camless Valve Actuation	5.0%	10.0%	[6.0%]c	[9.0%]c
Variable Compression Ratio	2.0%	6.0%	[2.5%]c	[5.5%]c
Direct Injection	N/A	N/A	[2.0%]c	[2.5%]c
Diesel Engine	N/A	N/A	[15%]c	[40%]c
Emerging Transmission Technology				
Automatic Shift Manual Transmission (AST/AMT)	3.0%	5.0%	[4.0%]c	[5.0%]c
Advanced CVTs	0.0%	2.0%	[1.0%]c	[1.0%]c
Emerging Vehicle Technology				
42 Volt Electrical Systems	1.0%	2.0%	[1.0%]c	[3.0%]c
Integrated Starter/Generator	4.0%	7.0%	[5.0%]c	[8.5%]c
Electric power Steering	1.5%	2.5%	[1.0%]c	[2.0%]c
Vehicle Weight Reduction	3.0%	4.0%	[2.0%]c	[6.0%]c

Table IV-B – Estimates of Fuel Economy Improvement of Fuel Economy Technologies for the Full-size Sport Utility Vehicle Class

	NAS		Amalgamated	
	Low	High	Low	High
Production-Intent Engine Technology				
Engine Friction Reduction	1.0%	5.0%	[1.0%]c	[6.0%]c
Low Friction Lubricants	1.0%	1.0%	[0.5%]c	[1.0%]c
Multi-Valve, Overhead Camshaft	2.0%	5.0%	[2.5%]c	[3.6%]c
Variable Valve Timing	2.0%	3.0%	[2.0%]c	[3.2%]c
- 4 cylinder engine	N/A	N/A	N/A	N/A
- 6 cylinder engine	2.0%	3.0%	[2.0%]c	[3.0%]c
- 8 cylinder engine	2.0%	3.0%	[2.0%]c	[2.5%]c
Variable Valve Lift & Timing	1.0%	2.0%	[1.0%]c	[1.5%]c
Cylinder Deactivation	3.0%	6.0%	[4.0%]c	[6.5%]c
- 6 cylinder engine	3.0%	6.0%	[4.0%]c	[4.5%]c
- 8 cylinder engine	3.0%	6.0%	[5.5%]c	[6.5%]c
Engine Accessory Improvement	1.0%	2.0%	[0.5%]c	[2.5%]c
Engine Supercharging & Downsizing	5.0%	7.0%		
Production-Intent Transmission Technology				
5-Speed Automatic Transmission	2.0%	3.0%	[2.0%]c	[2.8%]c
Continuously Variable Transmission	N/A	N/A	N/A	N/A
Automatic Transmission w/ Aggressive Shift Logic	1.0%	3.0%		
6-Speed Automatic Transmission (vs. 5-speed automatic)	1.0%	2.0%	[1.0%]c	[2.7%]c
6-Speed Automatic Transmission (vs. 4-speed automatic)	3.0%	5.0%	[3.5%]c	[4.0%]c
Production-Intent Vehicle Technology				
Aero Drag Reduction	1.0%	2.0%	[0.9%]c	[2.0%]c
Improve Rolling Resistance	1.0%	1.5%	[0.8%]c	[1.5%]c
Emerging Engine Technology				
Intake Valve Throttling	3.0%	6.0%	[4.0%]c	[7.0%]c
Camless Valve Actuation	5.0%	10.0%	[6.0%]c	[9.0%]c
Variable Compression Ratio	2.0%	6.0%	[2.5%]c	[5.5%]c
Direct Injection	N/A	N/A	[2.0%]c	[2.5%]c
Diesel Engine	N/A	N/A	[15%]c	[40%]c
Emerging Transmission Technology				
Automatic Shift Manual Transmission (AST/AMT)	3.0%	5.0%	[4.0%]c	[5.0%]c
Advanced CVTs	N/A	N/A	N/A	N/A
Emerging Vehicle Technology				
42 Volt Electrical Systems	1.0%	2.0%	[1.0%]c	[3.0%]c
Integrated Starter/Generator	4.0%	7.0%	[5.0%]c	[8.5%]c
Electric power Steering	1.5%	2.5%	[1.0%]c	[2.0%]c
Vehicle Weight Reduction	3.0%	4.0%	[2.0%]c	[6.0%]c

Table IV-C – Cost Estimates for Fuel Economy Technologies for All Vehicle Classes

[ ]c = CONFIDENTIAL	NAS		Amalgamated	
Technology	**Low**	**High**	**Low**	**High**
Production-Intent Engine Technology				
Engine Friction Reduction	$ 35	$ 140	[$30]c	[$90]c
Low Friction Lubricants	$ 8	$ 11	[$1]c	[$5]c
Multi-Valve, Overhead Camshaft	$105	$ 140	[$110]c	[$180]c
Variable Valve Timing	$ 35	$ 140	[$30]c	[$130]c
- 4 cylinder engine	$ 35	$ 140	[$40]c	[$110]c
- 6 cylinder engine	$ 35	$ 140	[$30]c	[$100]c
- 8 cylinder engine	$ 35	$ 140	[$60]c	[$130]c
Variable Valve Lift & Timing	$ 70	$ 210	[$50]c	[$190]c
Cylinder Deactivation	$112	$ 252	[$80]c	[$280]c
- 6 cylinder engine	$112	$ 252	[$200]c	[$280]c
- 8 cylinder engine	$112	$ 252	[$80]c	[$150]c
Engine Accessory Improvement	$ 84	$ 112	[$5]c	[$5]c
Engine Supercharging & Downsizing	$350	$ 560	[$500]c	[$750]c
Production-Intent Transmission Technology				
5-Speed Automatic Transmission	$ 70	$ 154	[$90]c	[$140]c
Continuously Variable Transmission	$140	$ 350	[$500]c	[$500]c
Automatic Transmission w/ Aggressive Shift Logic	$ -	$ 70		
6-Speed Automatic Transmission (vs. 5-speed automatic)	$140	$ 280	[$110]c	[$225]c
6-Speed Automatic Transmission (vs. 4-speed automatic)	N/A	N/A	[$200]c	[$350]c
Production-Intent Vehicle Technology				
Aero Drag Reduction	$ -	$ 140	[$100]c	[$100]c
Improve Rolling Resistance	$ 14	$ 56	[$6]c	[$6]c
Emerging Engine Technology				
Intake Valve Throttling	$210	$ 420	[$220]c	[$380]c
Camless Valve Actuation	$280	$ 560		
Variable Compression Ratio	$210	$ 490		
Direct Injection	N/A	N/A	[$210]c	[$315]c
Diesel Engine	N/A	N/A	[$1,500]c	[$5,000]c
Emerging Transmission Technology				
Automatic Shift Manual Transmission (AST/AMT)	$ 70	$ 280	[$90]c	[$240]c
Advanced CVTs	$350	$ 840	[$390]c	[$640]c
Emerging Vehicle Technology				
42 Volt Electrical Systems	$ 70	$ 280	[$80]c	[$190]c
Integrated Starter/Generator	$210	$ 350	[$190]c	[$340]c
Electric power Steering	$105	$ 150	[$100]c	[$140]c
Vehicle Weight Reduction	$210	$ 350	[$150]c	[$250]c

Table IV-D – Cost Estimates for Fuel Economy Technologies for the Full-size Sport Utility Vehicle Class

[ ]c = CONFIDENTIAL	NAS		Amalgamated	
Technology	**Low**	**High**	**Low**	**High**
Production-Intent Engine Technology				
Engine Friction Reduction	$ 35	$ 140	[$30]c	[$90]c
Low Friction Lubricants	$ 8	$ 11	[$1]c	[$5]c
Multi-Valve, Overhead Camshaft	$105	$ 140	[$110]c	[$180]c
Variable Valve Timing	$ 35	$ 140	[$30]c	[$130]c
- 4 cylinder engine	N/A	N/A	N/A	N/A
- 6 cylinder engine	$ 35	$ 140	[$30]c	[$100]c
- 8 cylinder engine	$ 35	$ 140	[$60]c	[$130]c
Variable Valve Lift & Timing	$ 70	$ 210	[$50]c	[$190]c
Cylinder Deactivation	$112	$ 252	[$80]c	[$280]c
- 6 cylinder engine	$112	$ 252	[$200]c	[$280]c
- 8 cylinder engine	$112	$ 252	[$80]c	[$150]c
Engine Accessory Improvement	$ 84	$ 112	[$5]c	[$5]c
Engine Supercharging & Downsizing	$350	$ 560	[$500]c	[$750]c
Production-Intent Transmission Technology				
5-Speed Automatic Transmission	$ 70	$ 154	[$90]c	[$140]c
Continuously Variable Transmission	N/A	N/A	N/A	N/A
Automatic Transmission w/ Aggressive Shift Logic	$ -	$ 70		
6-Speed Automatic Transmission (vs. 5-speed automatic)	$140	$ 280	[$110]c	[$225]c
6-Speed Automatic Transmission (vs. 4-speed automatic)	N/A	N/A	[$200]c	[$350]c
Production-Intent Vehicle Technology				
Aero Drag Reduction	$ -	$ 140	[$100]c	[$100]c
Improve Rolling Resistance	$ 14	$ 56	[$6]c	[$6]c
Emerging Engine Technology				
Intake Valve Throttling	$210	$ 420	[$220]c	[$380]c
Camless Valve Actuation	$280	$ 560		
Variable Compression Ratio	$210	$ 490		
Direct Injection	N/A	N/A	[$210]c	[$315]c
Diesel Engine	N/A	N/A	[$1,500]c	[$5,000]c
Emerging Transmission Technology				
Automatic Shift Manual Transmission (AST/AMT)	$ 70	$ 280	[$90]c	[$240]c
Advanced CVTs	N/A	N/A	N/A	N/A
Emerging Vehicle Technology				
42 Volt Electrical Systems	$ 70	$ 280	[$80]c	[$190]c
Integrated Starter/Generator	$210	$ 350	[$190]c	[$340]c
Electric power Steering	$105	$ 150	[$100]c	[$140]c
Vehicle Weight Reduction	$210	$ 350	[$150]c	[$250]c