



April 8, 2011

Mr. Karl Simon, Director  
Compliance and Innovative Division Strategy  
USEPA Headquarters  
Ariel Rios Building  
120 Pennsylvania Avenue, N.W.  
Mail Code 6405J  
Washington, DC 20460

Dear Mr. Simon:

In June 2009, the Ozone Transport Commission (OTC) formally called on the USEPA to amend its enforcement policy regarding the sale and use of aftermarket catalytic converters (see Attachment 1). Per your request, the Ozone Transport Commission undertook an effort to develop a recommendation for a program design.

The OTC's recommended program design for a federal program (see Attachment 2), which is based on the California program, would establish more stringent emission performance and durability requirements for new aftermarket converters, in recognition of the significant advances in performance and durability of original equipment catalytic converters. These advances have also made the improved technology readily available and affordable for aftermarket converters. We have discussed our proposed program design with key stakeholders.

The USEPA's current enforcement policy regarding the use, installation and purchase of aftermarket catalytic converters was established in 1986, and has not been updated to reflect the significant improvements in automotive technologies and vehicle emission standards.

On-road mobile sources are significant sources of emissions contributing to the formation of ozone. Implementation of the OTC's recommended program is expected to provide significant and highly cost-effective emission reductions from the existing vehicle fleet.

A revised federal aftermarket catalytic converter program implemented nationally will provide states with needed significant NO<sub>x</sub> reductions to

Connecticut

Delaware

District of Columbia

Maine

Maryland

Massachusetts

New Hampshire

New Jersey

New York

Pennsylvania

Rhode Island

Vermont

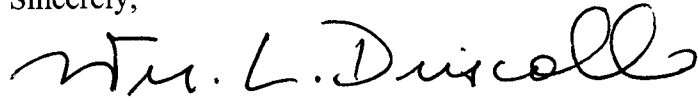
Virginia

William L. Driscoll  
Executive Director

444 N. Capitol St. NW  
Suite 638  
Washington, DC 20001  
(202) 508-3840  
FAX (202) 508-3841  
e-mail: ozone@otcair.org

help all areas attain and maintain the health-based ozone standards.

Sincerely,

A handwritten signature in black ink that reads "Wm. L. Driscoll". The signature is written in a cursive, flowing style.

William L. Driscoll  
Executive Director

Attachments

cc: Lori Stewart, Associate Director, EPA OTAQ  
Lee Cook, Manager, State Measures and Conformity Group, EPA OTAQ  
Chet France, Director, Assessment and Standards Division, EPA OTAQ  
Chris Salmi, OTC Mobile Source Committee Chair  
OTC State Air Directors

## Attachment-1: OTC Statement



### **Statement of the OTC Calling on the EPA to Update its Policy on Motor Vehicle Aftermarket Catalytic Converters**

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Connecticut

Delaware

District of Columbia

Maine

Maryland

Massachusetts

New Hampshire

New Jersey

New York

Pennsylvania

Rhode Island

Vermont

Virginia

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Anna Garcia  
Executive Director

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444 N. Capitol St. NW  
Suite 638  
Washington, DC 20001  
(202) 508-3840  
FAX (202) 508-3841  
e-mail: ozone@otcair.org

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The Ozone Transport Commission (OTC) states call on the Environmental Protection Agency to update its policy regarding the use, installation and purchase of aftermarket catalytic converters. That policy was established in 1986 and has not been updated to reflect the significant changes in automotive technologies and vehicle emission standards.

Motor vehicles are significant sources of emissions that lead to the formation of ozone and to toxic air emissions. However, with the significant advances in emission control performance and durability of motor vehicles that have occurred since 1986, improvements to the performance requirements for non-original equipment aftermarket catalytic converters are needed to keep pace.

The updated policy should address conversion efficiency and durability for new aftermarket catalytic converters as well as compatibility with the vehicle's Onboard Diagnostics (OBD) system for 1996 and newer vehicles. The policy should also address the sale of used original equipment catalytic converters.

Adopted by the Commission on June 10,2009

  
Chair

## **Attachment-2: OTC Recommendation**

### **OTC Mobile Source Committee**

### **Recommended Federal Aftermarket Catalytic Converter Program (FACCP)**

#### **EXECUTIVE SUMMARY**

In June 2009, the Ozone Transport Commission (OTC) formally called on the USEPA to amend its enforcement policy regarding the sale and use of aftermarket catalytic converters designed for use on federally certified passenger cars and light-trucks (see Attachment-1). This document lays out a recommended program design that is based on the recent changes California adopted for aftermarket catalytic converters (ACCs). In developing this recommendation, comments were solicited from interested stakeholders (see Section V).

The recommended changes to the USEPA's current policy for approving after market catalytic converters establish more stringent emission performance and durability requirements for new aftermarket converters in recognition of the significant advances in catalytic converter performance and durability that have occurred for original equipment catalytic converters. These advancements have made the technology more readily available and affordable. The recommendations also modify the current provisions allowing the sale and usage of used catalytic converters.

The recommended program was discussed with key stakeholders including the Manufacturers of Emission Controls Association (MECA) and their associated industries as well as the USEPA and staff from the California Air Resources Board (CARB). MECA supports the recommended program.

The USEPA's current enforcement policy governing aftermarket catalytic converters, adopted in 1986, requires manufacturers to demonstrate that their converters will reduce engine out emissions by at least 30 to 70 percent for 25,000 miles of vehicle use. However, vehicles meeting current emission certification standards can require catalytic conversion efficiencies in excess of 95% in order to comply with the more stringent emission standards that have been adopted since the late 1980s. Further, catalytic converter technology has improved to the point where aftermarket converters can be designed to achieve a significantly higher level of performance in a cost-effective manner.

The recommended changes to the USEPA enforcement policy would replace the existing policy with performance standards for aftermarket catalytic converters based on reducing engine out emission levels to the point that in-use vehicles equipped with aftermarket catalysts can comply with certification emission standards. The required durability period for these aftermarket converters would be extended from 25,000 miles to 5 years or 50,000 miles of use. The amendments would also require manufacturers to demonstrate that their catalysts are compatible with vehicle on-board diagnostic (OBD) systems for 1996 and newer vehicles, warrant that the converters are free from defects, and

implement quality control procedures to ensure production components perform as expected in-use.

The USEPA policy currently permits the practice of reselling used original equipment catalytic converters provided that the reseller uses a process to ensure that the converters still have a reasonable level of performance. The recommended policy would eliminate the provisions permitting the sale of used converters for pre-ODB II vehicles (Model Year 1995 and older vehicles) and calls on the USEPA to study the appropriateness of allowing the reuse of OBD II era (Model Year 1996 and newer vehicles) catalytic Converters. If the reuse of OBD II era catalysts is to continue, verification of proper performance of the converter, and whether this would be accomplished through independent testing or reliance on the OBD II system, must be a component of the revised policy.

Based on the estimated emission reductions for the aftermarket catalytic converter rule amendments in California, the emission reductions that may be achieved in the OTR from the recommended new Federal Aftermarket Catalytic Converter Program (FACCP) policy will be significant. New aftermarket catalytic converters designed to meet the recommended requirements would cost up to \$200 more per unit than those currently available for older vehicles. However, due to the substantially better emissions performance and durability requirements of these converters, it is estimated that the recommended requirements would be cost effective emission reductions.

## **I. Purpose**

Under the recommended program, the USEPA would update its enforcement policy regarding the use, installation and purchase of aftermarket catalytic converters. The USEPA's enforcement policy was established in 1986 and has not been updated to reflect the significant changes in automotive technologies and vehicle emission standards.

The updated policy would address conversion efficiency and durability for new aftermarket catalytic converters as well as compatibility with the vehicle's Onboard Diagnostics II (OBD II) system for 1996 and newer vehicles. The policy would also address the sale of used original equipment catalytic converters.

## **II. Background**

Catalytic converters reduce vehicle exhaust emission levels by chemically converting engine-out emissions before the exhaust gas leaves the tailpipe. A converter contains a substrate that directs exhaust gases through narrow channels coated with precious metals that initiate the conversion of pollutants into primarily carbon dioxide, water vapor and nitrogen.

Since the introduction in mid-1970, catalytic converters continue to be the single most important technology for the control of emissions from gasoline powered motor vehicles. Current catalytic converter designs are more than 95% efficient in removing the

hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO<sub>x</sub>) from engine exhaust before they reach the atmosphere. Improvements in catalytic converter washcoats, precious metal loading, and substrate designs over the years, in combination with better vehicle fuel control systems, are the primary factors that have made compliance with Federal and State Inspection/Maintenance (I/M) programs' emission standards possible.

Original equipment manufacturer (OEM) catalytic converters are designed and certified to last for at least 100,000 to 150,000 miles on newer model vehicles. Heat, vibration, and poisons can eventually reduce catalytic converter efficiencies to the point that older vehicles will not be able to meet federal and state emission requirements and Onboard Diagnostics (OBD) test limits. Such converters need to be replaced; however, OEM replacement converters are typically expensive, costing from \$500 to over \$1000. Compounding the problem, many vehicles requiring a replacement converter have considerably less than 100,000 miles of expected life remaining, making such large repair costs difficult to justify.

Another significant advance that occurred in the 1990's was the implementation of On-Board Diagnostic II (OBD II) systems on light- and medium-duty vehicles. These systems use the vehicle's on-board computer to monitor the performance of its emission control systems, including the catalytic converter. Aftermarket catalytic converters meeting the current converter conversion efficiency requirements are generally not compatible with vehicle OBD II systems because their level of performance, even when relatively new, can fall below the levels at which the OBD II system will indicate a malfunction.

Because some OBD II equipped vehicles are now more than 14 years old, the need already exists in the marketplace for aftermarket catalytic converters that are compatible with these vehicles. As such, the USEPA policy on the use of aftermarket catalytic converters, last updated in 1986, clearly needs to be updated.

### **III. Main Components of the Recommended Aftermarket Catalytic Converter Program**

Table-1 provides a summary and comparison of the recommended program to current Federal Aftermarket Catalytic Converter Program enforcement policy

1. Tightens durability and emissions requirements for pre-OBD (pre-1996) aftermarket converters.
  - The current policy requires 25,000 mile durability and 70%/70%/30% HC/CO/NO<sub>x</sub> conversion efficiencies.
  - The recommended policy requires 50,000 mile durability and meeting vehicle certification emission standards (mass-based).

- Simplify certification procedures by allowing for “worst-case” vehicle certification for pre-OBD to reduce certification costs while maintaining emissions reduction performance.
2. Requires OBD aftermarket converters demonstrate full functionality with OBD II system at emissions level of 1.5 x tailpipe OEM thresholds. To ensure that the in-use emissions from vehicles are not adversely compromised by the use of aftermarket catalysts, the recommended program would include new evaluation procedures for new aftermarket catalytic converters that would replace the existing performance requirements based on converter efficiency to standards based on vehicle tailpipe emission levels, require a demonstration of compatibility with the vehicle’s on-board diagnostic II (OBD II) system, and extend the durability and warranty periods from 25,000 miles to a 5 year or 50,000 mile period
  3. Sunsets “remanufactured” or used converters:

Under the recommended program, the use of remanufactured or used OEM converters would sunset for pre-OBD II (Model Year 1995 and earlier) vehicles. For OBD II vehicles, the recommendation calls for the USEPA to evaluate the reuse of the catalytic converters, including a determination of whether additional verification testing and certification is necessary or if the OBD II system itself is sufficient to ensure continued compliance with emission standards. If the former, the USEPA would need to develop appropriate testing protocols to ensure the catalytic converter systems will continue to meet the applicable emission standards and goals of this recommendation. For example, the productive re-use of relatively new used OEM converters for vehicles that were scrapped for other reasons, e.g., accidents, may offer lower cost compliance mechanisms.

4. Other Recommended Components of the OBD II Compliant Federal Aftermarket Catalytic Converter Program
  - OBD MIL demonstration required for OBD equipped vehicles: The recommended procedures would also require a demonstration of OBD II compatibility. Manufacturers would demonstrate through the emission testing that their new aftermarket catalytic converters would not cause a test vehicle’s Malfunction Indicator Light (MIL) to illuminate when the catalyst is functioning properly. The manufacturers would then severely age a prototype converter to demonstrate that the test vehicle’s OBD II system will detect the converter as malfunctioning by the time its conversion efficiency deteriorates to the point that vehicle emissions exceed the manufacturers’ limits for malfunction detection by no more than a factor of 50 percent
  - Allows for limited aggregation of similar vehicles for worst-case vehicle certification for OBDII vehicles

- Allow engine dynamometer aging for pre-OBD and OBD converters.
  - Converter quality reporting requirements: The recommended program would require aftermarket catalytic converter manufacturers to monitor the aftermarket catalytic converter production process to ensure that production components actually meet the approved specifications. Manufacturers would check for adequate precious metal content, base metal content, and wash coat loading. Inspections to ensure proper application of the wash coat, installation of matting materials, and the absence of leaks in the converters shell would also be required. The recommended procedures would require manufacturers to report the results of their quality control checks to the USEPA on at least a quarterly basis.
5. Vehicles Applicability Guide requirement and installation requirements to be supplied by the aftermarket converter manufacturer
  6. Labeling of aftermarket catalytic converters with permanent, visible labeling

#### **IV. Estimated Emission Reduction Benefits**

##### Estimate of Emission Benefits

- Emission Reductions Based on California Assumptions (source: Initial Statement of Reasons for Rulemaking, Public Hearing To Consider Amendments To Regulations Regarding New Aftermarket Catalytic Converters And Used Catalytic Converters Offered For Sale And Use In California, September 7, 2007).
  - 880,000 aftermarket converters sold in California per year
  - 74% of sales are pre-OBD aftermarket catalytic converters
  - 8,000 miles per year vehicle miles traveled (VMT)
  - Pre-OBD converter has 3 year average life
  - EMFAC estimates 3.5 M pre-OBD vehicles in California in 2012 and 1.26 million with aftermarket converters
- Based on measured emission rates and vehicle populations, CARB estimated their rule would result in a reduction of 5.3 tpd HC and 31.3 tpd NOx
- Simple ratio of California versus federal fleet populations (10%) would predict a potential 49 state benefit of:
  - 47.7 tpd HC and 282 tpd NOx
  - Added potential benefit of 462 tpd CO
- Actual emissions reductions are likely to be greater since California pre-OBD converters had to achieve 60% NOx conversion (vs. 30% for Federally certified converters) and 100% of federal aftermarket converters are pre-OBD technology.



- OBD compatible converters with advanced catalyst technology were being sold in California under an MOU since 2002.

## **V. Increased Prices for New Aftermarket Catalytic Converters under the Recommended Program**

Aftermarket catalytic converters for pre-OBD II vehicles currently average \$100 each. It is estimated that the average price of an aftermarket converter for pre-OBD II vehicles under the recommended program will initially increase by \$100 to \$200 as a result of the recommended changes. For OBDII equipped vehicles, the average price increase would range from \$250 to \$450.

## **VI. Public Process**

The outreach process used in developing these recommendations included meetings and conference calls with interested parties including representatives from the California Air Resources Board (CARB), the USEPA's Regional Offices 1 and 2 as well as the Office of Transportation and Air Quality (OTAQ), the Manufacturers of Emissions Control Association (MECA), and state environmental representatives from states within the Ozone Transport Region (OTR) and the Northeast States for Coordinated Air Use Management (NESCAUM). A reverse chronologically ordered listing of those calls/meetings is as follows:

April 7, 2010 – Subcommittee Call – Final Recommendations review

April 1, 2010 - Subcommittee Call with the USEPA Regions 1 and 2, OTAQ, MECA and Umicore to review recommendations

February 17, 2010 - Subcommittee Call - Revising Recommendation

December 14, 2009 - Call with Mike McCarthy (California ARB) - pros and cons of the CA program

October 22, 2009 - Subcommittee Call - Developing recommendation

August 31, 2009 - Call with Chris Salmi and Karl Simon (EPA) - elements of a recommendation for Fed program

June 10, 2009 - OTC Statement at Annual Meeting Signed - request for federal program

February 26, 2009 - Call with MECA - MECA presentation on potential reductions

## **VII. Summary**

- Significant advances in catalyst performance and durability for original equipment applications have made the technology more readily available today.
- Testing conducted by the CARB on used vehicles has demonstrated readily achievable, cost effective, reductions in emissions with advanced aftermarket converter technology on pre-OBD and OBD equipped vehicles.
- If the CARB requirements for aftermarket catalytic converters are implemented federally, the NO<sub>x</sub> reductions could be greater than CARB's estimates for California because current federal aftermarket catalytic converters are less effective than CARB-certified converters.
- Cost effectiveness is estimated to be under \$4,000 per ton of VOC and NO<sub>x</sub> reduced
- Federal program could be based on streamlined version of CARB program and incorporate learning from the California experience to lower costs and improve vehicle coverage for ACCs under the revised program.
- A revised federal aftermarket program would provide states significant NO<sub>x</sub> reductions to help with future ozone attainment efforts

| <b><u>Table-1: Summary of a Recommended Revisions to the Federal Aftermarket Catalytic Converter (FAMCC) Program</u></b> |  |  |
|--|--|--|
| <b>Proposed Requirements for Non – OBD Equipped Vehicles</b>   |  |  |
| <i>Criteria</i>  | <i>Current Federal Program<sup>1</sup></i>   | <i>Recommended Federal Program</i>   |
| Performance  | <b>Efficiency based:</b> 70%, 70%, 30% conversion efficiencies (HC, CO & NOx) must be maintained at end of 25k miles or 5 years.   | <b>Mass Based (grams/mile):</b> Performance Standards based on meeting the vehicle certification tailpipe emission levels for vehicle being tested for 50k, 5 yrs.   |
| Warranty   | 25K, 5yrs.   | 50K, 5yrs.   |
| Used or remanufactured converters permitted?   | Yes  | Yes, a reseller would be able to certify a used OEM converter using an approved emissions testing protocol that can evaluate whether the used converter meets the applicable standards.  |
| Certification Procedure  | Must demonstrate compliance with the <u>worst case vehicle</u> in the application category, i.e., the vehicle with the highest weight and largest engine in the category to which the converter is intended to apply | Must demonstrate compliance with the worst case vehicles within <u>four general classes</u> of vehicles, i.e., passenger cars and light-duty trucks each with single and dual exhaust configurations   |
| FAMCC Aging Procedure  | On-vehicle mileage accumulation  | Would allow for the use of accelerated aging of converters using a RAT-A engine dynamometer cycle rather than actual on-vehicle mileage accumulation for durability demonstration (RAT-A refers to a defined engine dynamometer-based converter aging cycle) |
| Estimated Price  | \$100  | \$200 - \$300  |

<sup>1</sup> Based on the USEPA's 8/5/86 policy document

| <b>Recommended Requirements for OBD Equipped Vehicles</b> |   |  |
|---|---|--|
| <i>Criteria</i>   | <i>Current Federal Program<sup>2</sup></i>  | <i>Recommended Federal Program</i>   |
| Performance   | <p>Efficiency based (70-70-30) and must meet 1 of these 2 Options:</p> <p>Option 1:<br/>AMCCs that meet the requirements of the current USEPA AMCC policy, provided the AMCC warranty is honored when the OBDII system indicates a catalyst malfunction during the 25000 mile warranty period or;</p> <p>Option 2: AMCCs that meet the requirements of the California AMCC/OBDII procedures provided the AMCC warranty is honored when the OBDII system indicates a catalyst malfunction during the 25,000 mile warranty period, and provided that the information described above is submitted to the USEPA.</p> | <p>Mass Based (grams/mile) Performance Standards based on meeting the vehicle certification tailpipe emission levels for vehicle being tested for 50k, 5 yrs. <u>with full OBD compliance.</u></p>   |
| Warranty  | 25K, 5yrs   | 5yrs or 50,000miles & 50,000 miles emissions performance warranty  |
| Used or remanufactured converters permitted?              | Yes   | Yes, a reseller would be able to certify a used OEM converter using an approved emissions testing protocol that can evaluate whether the used converter meets the applicable standards.  |
| Certification/Applicability Procedures                    | Worst case vehicle  | Aggregation of similar vehicles permitted for a limited worst case AMCC certification process for OBD-equipped vehicles. Criteria for worst case vehicle aggregation to be defined based on vehicle engine and emissions control similarities (note: this provision is not part of California's AMCC rules). |

<sup>2</sup> Based on 8/2/00 and 9/30/04 letters from the USEPA to MECA

|                      |                                 |  |
|----------------------|---------------------------------|--|
|                      |                                 | <p>2 Proposed Options for certifying an AMCC in the FAMCC Program:</p> <p>1. AMCC must have a CARB Executive Order for the analogous California- certified vehicle with the AMCC manufacturer providing full OBD warranty on the Federally certified equivalent vehicle model or;</p> <p>2. AMCC must meet California’s AMCC/OBDII standards including durability and warranty requirements for the applicable federally emissions certified vehicle. The AMCC manufacturer must submit to the USEPA the same information that they would send to the CARB under their procedures.<sup>3</sup></p> |
| AMCC Aging Procedure | On-vehicle mileage accumulation | Would allow for the use of accelerated aging of converters using a RAT-A engine dynamometer cycle rather than actual on-vehicle mileage accumulation for durability demonstration (RAT-A refers to a defined engine dynamometer-based converter aging cycle)   |
| Estimated Price      | \$100                           | \$350 - \$550  |

<sup>3</sup> The information to be submitted to the USEPA would include a list of applicable vehicles for each new converter; the USEPA would select vehicles from the list for the manufacturer’s compliance determination.

Also, the AMCC manufacturer must conduct an OBDII compliance check, ie, aging of converter with demonstration that during emissions testing the converter will cause the MIL to illuminate while not exceeding the emissions limit (2.6 times the certification emission limit).