

## **NTRD Program Disclaimers**

### **1. Disclaimer of Endorsement:**

The posting herein of progress reports and final reports provided to TCEQ by its NTRD Grant Agreement recipients does not necessarily constitute or imply an endorsement, recommendation, or favoring by TCEQ or the State of Texas. The views and opinions expressed in said reports do not necessarily state or reflect those of TCEQ or the State of Texas, and shall not be used for advertising or product endorsement purposes.

### **2. Disclaimer of Liability:**

The posting herein of progress reports and final reports provided to TCEQ by its NTRD Grant Agreement recipients does not constitute by TCEQ or the State of Texas the making of any warranty, express or implied, including the warranties of merchantability and fitness for a particular purpose, and such entities do not assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represent that its use would not infringe privately owned rights.

**New Technology Research & Development Program  
Grant Contract 582-5-70807-0022**

**Tasks 1, 2, & 3 Deliverable Report  
Final Report**

The preparation of this report is based on work funded in part  
by the State of Texas through a Grant from the  
Texas Commission on Environmental Quality.



August 3, 2007

**Texas Commission on Environmental Quality  
New Technology Research & Development (NTRD) Program  
Final Report**

**Contract Number:** 582-5-70807-0022  
**Grantee:** Combustion Components Associates

**Article 2 Section 2.1.4**

The PERFORMING PARTY shall submit a summary report of the efficiency of the ELIM NOx .

As has been reported over the months, there have been two separate systems in use, each different only in the catalyst being used. This also results in a difference in injection trigger temperature as per the operating instructions of the specific catalyst manufacturers.

The overall results of the performance of each of these system is listed below.

**System 1 Truck 408779**

Vanadium Based Catalyst with injection trigger temperature of 250 C.

Overall NOx Reduction	75.4%
NOx Reduction During Injection Time Only	86.9%

**System 2 Truck 408692**

Vanadium Based Catalyst with injection trigger temperature of 200 C.

Overall NOx Reduction	83.3%
NOx Reduction During Injection Time Only	90.6%

The difference in the above two numbers is that the overall NOx Reduction is measured over the course of the full operation of the vehicle in use, whereas the Reduction During Injection is measured only during the time the catalyst has achieved sufficient temperature to allow injection.

**COMBUSTION COMPONENTS ASSOCIATES, INC.**

884 Main Street, Monroe, Connecticut 06468

Tel: (203) 268-3139 Fax: (203) 261-7697

[www.combustioncomponents.com](http://www.combustioncomponents.com)



**Article 2 Section 2.2.6**

The PERFORMING PARTY shall submit a copy of the application, a copy of the Statement of Work, a copy of the contract with RTI and a notice of the test date to TCEQ

Please see attached documentation. A final test date has yet to be scheduled as the actual test engine is coming from one of the trucks in the fleet that is being used to age and de-green the ELIM NOx systems. Accordingly, once the engine is pulled from the vehicle it will be shipped to Southwest Research Institute and scheduled for the testing.

**Article 2 Section 2.3.4**

The PERFORMING PARTY shall submit monthly progress reports with associated billing statements, a final project summary report, and a copy of the EPA verification report to the TCEQ upon completion of this task.

Once the verification testing is completed at Southwest Research Institute and the EPA Verification report is completed, a copy will be forwarded to TCEQ per the terms of the contract.

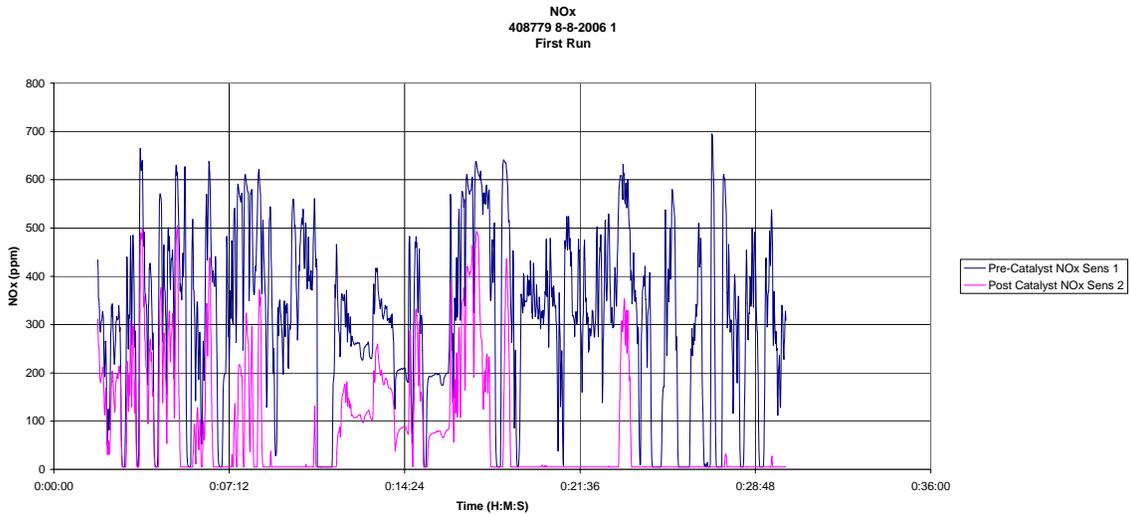
A handwritten signature in black ink, consisting of stylized, overlapping loops and lines, positioned to the left of a vertical red line.

Date: June 11, 2007

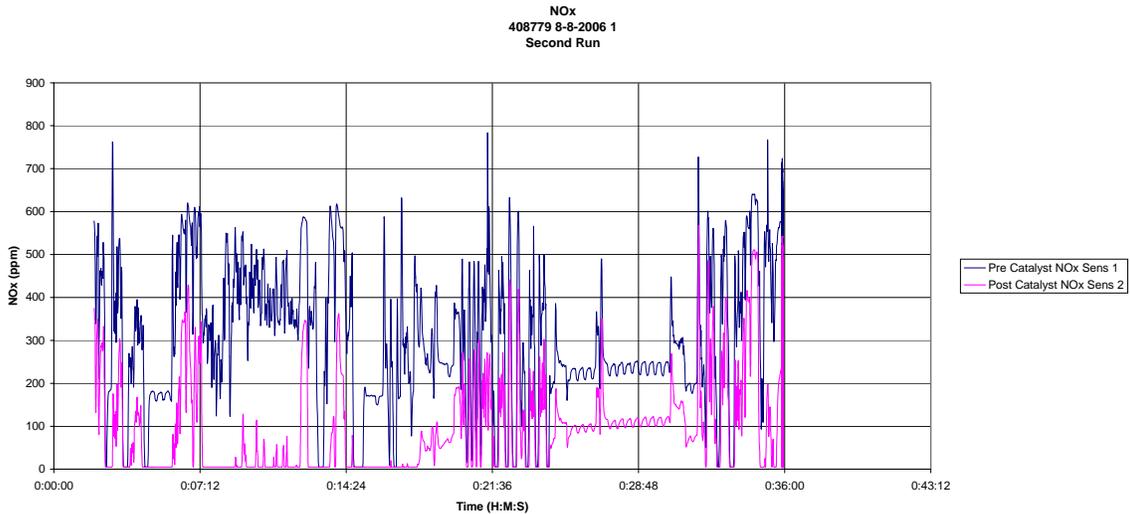
\_\_\_\_\_  
*Authorized Project Representative's Signature*

**NOTE:** Please attach any additional information that you feel should be a part of your report or that may be required to meet the deliverable requirements for tasks completed during this reporting period.

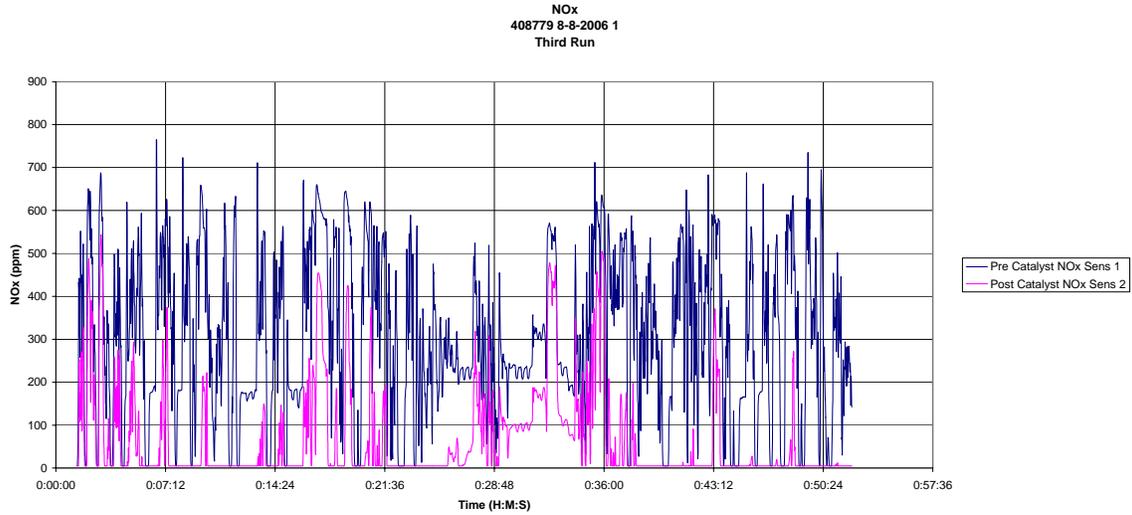
Waste Management Truck  
408779  
August Validation



Percent NOx Reduction: 74.3%



Percent NOx Reduction: 72.1%



Percent NOx Reduction: 78.5%

Validation of truck 408779 included three runs. Each run consisted of the vehicle leaving Waste Management with an empty dumpster on board, a leg with no dumpster and the final leg with a full dumpster on board. This encompasses a wide range of engine load given the different total weight conditions. Variation in Percent NOx Reduction can be attributed to the different weight of the dumpsters, both full and empty as well as the distance traveled under each condition.



Memorandum

To: Environmental Technology Verification Program Applicant  
From: Air Pollution Control Technology Verification Center at RTI  
Date: May 25, 2007  
Re: Air Pollution Control Technology for Mobile Sources Verification Testing Terms & Conditions  
Cummins Filtration & Cummins Emission Solutions. DOC muffler and Closed Crankcase Filtration System  
EPA Cooperative Agreement No. CR 831911-01-1

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Thank you for expressing an interest in participating in the *Environmental Technology Verification Program*. Attachment A contains the relevant *Terms and Conditions and Operating Principles*. Taken together with Attachment B, *Statement of Work*; Attachment C, *Price and Billing Schedule*; and this memo, these documents comprise all terms applicable to the testing to be performed by RTI under the Air Pollution Control Technology Verification Center.

In order for RTI to perform the testing described in Attachment B, *Statement of Work*, we require your acceptance of the RTI Standard Terms & Conditions and Operating Principles for ETV (Attachment A), which will also reflect approval of the conditions in this memo and all Attachments incorporated by Attachment A.

If acceptable, please have an authorized official of your company sign below and return this page via fax to the attention of Ms. Carmen Rhodes at 919-541-7148. The quoted price for Verification testing includes these expenses: pre-test setup and check-out of the test equipment, development of the test/QA plan, conduct of the verification test, and preparation and issuance of the verification report and verification statement (if applicable). The applicant's share is given in Attachment C as a fixed lump sum. Once RTI has received your signed acceptance below, and received the product and other items required to conduct the test, the testing will commence. Questions regarding payments may be directed to Ms. Carmen Rhodes, Contract Specialist, RTI International, via phone at 919-485-2758, via fax at 919-541-7148, or via email at crhodes@rti.org.

Should you have any questions concerning a contractual matter, please contact Ms. Rhodes. For technical matters, please contact Mr. Drew Trenholm at 919-316-3742 or via email at atrenholm@rti.org.

ACCEPTED BY:

COMBUSTION COMPONENTS ASSOCIATES, INC.  
Name of Company

R. Gifford Broderick  
Authorized Signature

R. GIFFORD BRODERICK, PRESIDENT  
Printed Name & Title

MAY 29, 2007  
Date

**ATTACHMENT A**  
**RTI STANDARD TERMS & CONDITIONS AND OPERATING PRINCIPLES**  
**FOR ENVIRONMENT TECHNOLOGY VERIFICATION SERVICES**

**AIR POLLUTION CONTROL TECHNOLOGY VERIFICATION CENTER (APCTVC)**  
**Environmental Technology Verification Program®**

**These Terms and Conditions govern the work to be performed by RTI as specified in Attachment B, Statement of Work. By authorizing or accepting any portion of the work performed or to be performed by RTI as specified in Attachment B, Applicant shall be deemed to have accepted these Terms and Conditions.**

**1. Scope of Work** - RTI agrees to undertake the scope of work as defined in Attachment B, which is incorporated by reference.

**2. Invoicing and Payment** - Applicant shall remit the amount designated on Attachment C as "Applicant's Share" in accordance with the schedule included in Attachment C.

Advance payments will be held until project completion and will be applied to the final invoice. Amounts due to RTI will be invoiced. Payment of RTI's invoices is due in U.S. funds within 10 days of receipt. Notwithstanding the above, nonpayment of invoices shall be considered a default under the contract and shall give RTI the right to stop work or terminate the contract.

Payment may be made by electronic funds bank wire transfer (EFT), or via check to the invoice address. Transaction expenses and/or bank fees associated with payment by direct bank wire shall not be deducted from funds owed to RTI. Applicant shall make arrangements for full payment of amounts due RTI. Electronic transfers shall be directed as follows:

**For payment by Electronic Funds Transfer (EFT):**

Research Triangle Institute  
SunTrust Bank  
25 Park Place  
Atlanta, GA 30303  
Tel: 1.800.947.3786  
Acct. No.: 101-434-7  
ABA No.: 061000104 Swift Address: SNTRUS3A  
RTI EIN (Tax ID) No.: 56-0686338

**3. Independent Contractor** - RTI's relationship to Applicant under this contract is that of an independent contractor. Personnel retained or assigned by RTI to perform services covered by this contract will at all times be considered agents or employees of RTI and not agents or employees of Applicant.

RTI is an independent scientific contract research organization performing projects for governmental and private sponsors. To maintain its professional, scientific, and business integrity as an independent research contractor, it is further essential that the conclusions and results of the research performed under this contract be arrived at solely by RTI. To these ends, Applicant shall neither direct nor control the specific conclusions and results arising from RTI's professional and scientific services provided hereunder, nor the specific content of any report to be prepared or published by RTI hereunder.

**4. Confidentiality** - If requested by Applicant in advance and in writing, the APCTVC will maintain in confidence specifically identified proprietary information *supplied by Applicant* about a technology or product; provided that verification testing is feasible under those constraints. Any data *generated* by RTI hereunder will not be afforded confidential treatment.

**5. Application** - The APCTVC will accept applications for verification testing from any individual or organization that owns or controls the

technology or product (hereinafter referred to as "Applicant"). Any technology or product must be commercial-ready to be eligible for verification testing. Applicants will be required to enter into a contractual arrangement with RTI incorporating these Terms & Conditions prior to commencement of any testing services.

**6. Test Procedures** - The APCTVC will develop a generic verification protocol for each technology to be verified which establishes the test philosophy and data quality goals, and outlines the testing procedures to be used. A Test/QA plan that sets forth the details of the verification test of the specific technology will also be developed, reviewed, and approved by the APCTVC, Applicant, and the EPA. All verification tests will be performed according to the procedures specified in these documents. Attachment B identifies the generic protocol and test/QA plan applicable to this agreement.

**7. Advertising and Publicity** - Applicant agrees not to use RTI's name, or make any reference to RTI or any of its employees for advertising, sales promotions, or publicity purposes of any form related to this work, unless such advertisements or publicity materials have been previously approved in writing by RTI. The statement below has been approved by RTI and is the only statement that may be used by the Applicant without additional RTI approval. The statement must be used in its entirety, as written. Unless the Applicant indicates otherwise to RTI in writing, RTI may list the Applicant as a representative client in marketing materials.

*"The performance of the (Applicant's Name), (Product Identification Name and Model #) was verified through RTI under the Environmental Protection Agency's (EPA) Environmental Technology Verification Program®. The complete test results are presented in a verification test report and summarized in a Verification Statement signed by the Director of EPA's National Risk Management Research Laboratory. The report and verification statement are available on the Environmental Technology Verification Program® and APCTVC Web sites (<http://www.epa.gov/etv/> and <http://etv.rti.org/apct/index.html>) or from (Applicant's Name)."*

EPA's Guidelines for Proper Use of the Environmental Technology Verification Program Name and Logo dated November 2003 are attached and incorporated in these Terms and Conditions by reference.

**8. Endorsements** - The APCTVC conducts verification testing and issues verification test reports and verification statements. These reports and statements do not constitute APCTVC, RTI, or EPA endorsement, approval, or authorization for use of any technology or product tested. Any advertising or publicity related to the verification testing, test reports, and/or verification statement must include this notice.

**9. Reports and Statements** - The APCTVC will prepare and make available (via EPA and APCTVC web sites) verification test reports and verification statements for each technology or product tested. The test results will be made available to Applicant as early as feasible after the

verification test is completed. Applicant may then request in writing that a verification statement not be prepared. The verification report will still be prepared and made publicly available. No refund will be due Applicant if the verification statement is not prepared at its request. Three originals of each verification report and statement will be prepared. One original will be provided to Applicant, the second retained by the APCTVC, and EPA will retain the third.

**10. Dissemination of Project Reports** – Notwithstanding Articles 7, 8, and 9, Applicant may create and distribute re-prints of the verification test report or statement (“Report”) published by RTI, but only under the following conditions: (1) such Report is reprinted only in its entirety; (2) such Report was produced and signed by RTI, or any of its employees; and (3) such Report was furnished to Applicant by RTI in connection with this contract. Should Applicant wish to publish or have published any RTI Report in any edited form, Applicant must obtain RTI’s prior written consent. All RTI reports or summaries identified as “draft” and all RTI working notes or other works in progress are not subject to publication by Applicant absent RTI prior written approval.

**11. Intellectual Property Rights** - Applicants will retain all existing rights to any patents, improvements, technical data, (other than data generated by RTI), proprietary information, or other intellectual property associated with any technology or product nominated by an applicant to undergo verification testing. The rights to any intellectual property specifically related to the testing plan itself or RTI’s implementation thereof, including the evaluation of criteria, methodology, test procedures, data, or any other element or improvement thereto which is the product of the APCTVC staff or Technical Panel, will be retained and/or owned in its entirety by the APCTVC.

**12. In-Kind Cost** – The Applicant is requested to report documented in-kind contributions (labor and direct costs) on forms provided by the APCTVC. Eligible in-kind contributed costs are those incurred by the Applicant in direct support of the test. Activities that are in direct support include review of the test/QA plan, rental on space and equipment required for the test, labor costs for preparation, operation, maintenance, materials, and on-site management during the period of the test, and review of the Verification Report and Statement. If cred its or income accrue during the test period, they should be reported to allow net in-kind contributions to be determined.

**13. Indemnification** -Each party shall indemnify, defend, and hold the other party, its affiliates, agents, servants and employees harmless from and against any and all losses, costs, claims, actions, suits and liabilities, including reasonable attorney’s fees, arising out of or relating to the indemnifying party’s performance except those losses resulting from the negligence, willful omission, or willful misconduct of the indemnified party, its employees, agents, consultants or subcontractors in connection with the performance of this contract. The indemnified party shall give the indemnifying party prompt written notice of any loss, cost, claim, action, suit or liability. Applicant will not be responsible for damage occasioned by fire, theft, accident, or otherwise, to RTI’s stored supplies, materials, equipment, or to RTI’s belongings brought onto the “Place of Performance” as defined in Attachment B, except to the extent such damage occurs as a result of the negligence or willful misconduct of Applicant or its employees, agents, consultants or subcontractors.

The liability of the indemnifying party for damages from any cause related to or arising out of this contract, its making, performance or interpretation, whether in contract or in tort, including negligence, willful omission, or willful misconduct, shall be for actual direct (excluding all incidental, special, indirect, and/or consequential) damages. Applicant’s recovery of actual damages from RTI shall be limited to an amount no greater than Applicant’s share as defined in

Attachment C to this contract, including all modifications thereof.

**14. Risk of Loss** – Applicant expressly assumes the risk for any injuries or loss that may be sustained by Applicant during the contract period, and hereby releases, acquits and discharges RTI, its governors, officers, agents and employees; all of its subcontractors and their governors, officers, agents and employees; and the U.S. Government, from any and all actions, suits, damages, claims or judgments that may result from personal injury or loss or damage to property that is sustained in the course of or related to this contract, to the full extent permitted by law.

**15. Termination Due to Breach of Contract** – Either party shall have the right to terminate this contract upon fifteen (15) days written notice if the other party fails to perform any material provision of this contract and such failure is not cured within fifteen (15) calendar days from receipt of the notice. In the event of a termination hereunder, Applicant shall reimburse RTI for all work performed prior to termination on a cost reimbursement basis. In no event will the Applicant be obligated to pay RTI costs exceeding the amount authorized by this contract.

**16. Amendments** – This contract, including the cover memorandum, these Terms and Conditions, and all other attachments and exhibits incorporated by reference, constitutes the full and complete agreement of the parties and may only be amended in a writing signed by both parties. Reference by RTI to any purchase number supplied by Applicant shall be for accounting identification purposes only, and any terms or conditions therein or in any acknowledgment, confirmation, or other communication by Applicant in addition to or in conflict with these Terms and Conditions are rejected.

**17. Waiver of Rights** - Failure of either party to enforce any of its rights shall not constitute a waiver of such rights. If any provision herein is held invalid or unenforceable, such provision shall be deemed modified only to the extent necessary to render the same valid or excluded from this contract, as the situation may require. This contract shall be enforced and construed as if such provision had been included as so modified in scope or applicability, or had not been included, as the case may be.

**18. Applicable Laws** – Insofar as this contract is not governed by Federal laws and regulations, it shall be construed and interpreted solely in accordance with the laws of the State of North Carolina.

**19. Export Laws of the United States** – All transfers of information, including data, under the terms of this contract shall at all times be subject to the export control and oilier applicable laws and regulations of the United States. Each party agrees that it shall not make any disposition, by way of trans-shipment, re-export, diversion or otherwise, except as said laws and regulation may expressly permit, of information or data furnished under this contract.

**20. Health and Safety Laws** – Applicant agrees to comply with and abide by all general health and safety regulations and instructions issued by RTI, its subcontractors, or the U.S. Government and to obey all applicable U.S., state and local laws and regulations while onsite at RTI or the U.S. Environmental Protection Agency.

**21. Force Majeure** – No liability shall result to either party from delay in performance or from non-performance caused by circumstances beyond the control of the party who has delayed performance or not performed. The non-performing party shall be diligent in attempting to remove any such cause and shall promptly notify the other party of its extent and probable duration and shall give the other party such evidence as it reasonably can of such force majeure

## Guidelines for Proper Use of the Environmental Technology Verification Program Name and Logo

### I. INTRODUCTION

The purpose of the Environmental Technology Verification Program (ETV) is to convey objective, third-party data to the environmental marketplace about the performance of new environmental technologies. It is believed that the increased availability of such information will assist decision makers in selecting more effective and economically feasible technologies. Easy identification of technologies that have been tested and verified through ETV will facilitate the use of such data in the marketplace. As such, the Name (Environmental Technology Verification Program) and Logo (see Figure 1) may only be used in accordance with the following guidelines. **Please distribute these guidelines to anyone who will be responsible for preparing materials that will contain the ETV Name or Logo on your behalf.**



Figure 1. ETV Logo Options

**Under no circumstances shall the Name or Logo be used in a manner that would imply EPA endorsement, approval, certification, guarantee, or warrantee of the company, its products, its technologies, or its services.**

ETV oversees the proper use of the ETV Name and Logo. This includes monitoring the use of the Name and Logo in the marketplace and directly contacting those organizations that are using them improperly or without authorization. Consequences to developers/vendors of inaccurately using the Name and/or Logo may include the revocation of the developer's/vendor's verification statement and report.

### II. GENERAL EDUCATIONAL USE OF THE ETV NAME AND LOGO

EPA's ETV Name and Logo may be used for **general educational purposes** by anyone without specific permission from the Agency. The Name and Logo may be displayed when describing ETV, such as in an educational brochure, newsletter, an annual report, or published general news or scientific article that provides details about the program's operation, requirements, or progress. In particular, EPA's ETV verification organizations are free and encouraged to use the Name and Logo in all of their public documents that discuss or publicize the program.

### III. USE OF THE LOGO BY VENDORS OF VERIFIED TECHNOLOGIES

- **Who May Use the ETV Logo?** Vendors of technologies that have completed the verification process may use the ETV Logo to advertise the availability of information verified by ETV and the fact that the product or technology has completed verification under the EPA ETV Program.
- **When May the Logo Be Used?** The Logo may be used only after the vendor has received the completed verification report and statement from the ETV verification organization. [Note: Vendors may state publicly that a specific product/technology is being verified by ETV at any point after its acceptance into the program for verification. However, vendors may not use the ETV Logo until verification is completed and a report and statement have been issued.]
- **Prohibition on Using the Logo on a Product or a Product Label.** Under no circumstances may the ETV Logo be used alone on a product label on any verified technology. See Paragraph V below for additional details.

### IV. USE OF THE LOGO IN PRODUCT/TECHNOLOGY ADVERTISING

Only developers/vendors with products or technologies that have completed verification in the ETV Program may use the ETV Logo in print or electronic advertising, promotional, and sales materials. When doing so, they must comply with the following requirements.

- When preparing print or Web advertisements, brochures, or other outreach documents, the Logo must be placed on or directly adjacent to the verified product/technology name, number, or other identification, so that the reader is clearly made aware of which individual product or technology has been verified.
- The Logo may not be placed along the bottom or side of the advertisement next to other general icons unless every product pictured or listed in the advertisement has been verified under the Environmental Technology Verification Program.
- Press releases that highlight the performance of an ETV verified technology may include the ETV Logo anywhere on the document. No other technologies can be featured in the same article unless these technologies have also completed the ETV verification process. (*See Attachment A*)
- If the Logo is used in a general advertisement for a product line where only certain models have been verified, the developer/vendor should include language that clarifies the situation (e.g., “The Widget Model 35B has been verified by the Environmental Technology Verification Program”) or the developer/vendor may include specific language under each of the verified models (e.g., include a bullet point “Environmental Technology Verification Program verified” in a list of product attributes).

- The ETV Name and Logo cannot be used as part of a product/technology name.
- When using the Logo on the Web, the Logo must be hot-linked to the ETV Web site at [www.epa.gov/etv](http://www.epa.gov/etv). (See Attachment B)
- The only time the Logo may be used by vendors without making reference to a specific verified product or technology is when it is used to inform the public of the purpose of the mark. For example, a developer/vendor may display the Logo in a brochure, manual, or other document along with a statement that reads, "Look for the Logo associated with our Widget Model 35B. This means that the product's performance was verified under EPA's Environmental Technology Verification Program." Under no circumstances may the Name or Logo be used in a manner that would imply EPA endorsement of the company, its products, its services, or the verified product.

## V. LOGO DISCLAIMER STATEMENT

When the Logo is used by a vendor or developer in connection with a product or its advertising, it shall always be accompanied by the following statement:

Information on the performance characteristics of [technology name] can be found at [www.epa.gov/etv](http://www.epa.gov/etv), or call [vendor contact] at xxx-yyy-zzzz for a copy of the ETV verification report. Use of the ETV Name or Logo does not imply approval or certification of this product nor does it make any explicit or implied warranties or guarantees as to product performance.

The disclaimer statement must accompany the Logo, but they do not have to appear side-by-side; the phrase may be placed where normal explanatory information is found. For example, if the Logo is placed:

- On print advertisements or posters, the disclaimer statement may be placed with standard trademark and registration information at the bottom of the advertisement where other companies' products are recognized (e.g., "Product X is a registered trademark of XYZ Corp."); or
- On brochures and manuals, the phrase must appear with the first use of the Logo and/or in the front section with the recognition of trademarks.

The type on the Logo disclaimer statement must be visible – at a minimum, 2.5 point type size. In addition, the disclaimer statement should be translated into languages appropriate for the intended end market of the product.

## VI. REPRODUCTION OF THE LOGO

The Logo is available in color and in black and white in several graphic formats: \*.EPS (Encapsulated Postscript), \*.BMP (Bitmap), and \*.tif (tagged image file).

- The Logo may be displayed either as a solid image or an outlined image. It is recommended that the display of the ETV Logo be consistent

throughout a publication.

- The Logo should appear as a crisp, clear, and distinguishable image (i.e., not a second or third generation reproduction).
- The Logo may be resized, but the proportions must be maintained.
- The Logo must not be altered, cut apart, or separated in any way.
- The colors of the two-color Logo must be reproduced faithfully.
- The two-color Logo may be reproduced in black and white.
- A simplified outline or “line art” Logo may be reproduced in the following manner:
  - Black or white on solid colors: or
  - One-color in the color of your choice.

**For additional questions regarding the use of the Logo, contact:**

The applicable ETV Verification Organization, or

Environmental Technology Verification Program  
Office of Research and Development  
513-569-7871 (phone)  
513-569-7680 (fax)

Environmental Technology Verification Program Internet Web Site: [www.epa.gov/ctv](http://www.epa.gov/ctv)

## ATTACHMENT A

### Appropriate Use of the ETV Logo in Advertisements

This Bacharach brochure page highlights several points on the adequate use of the ETV Logo in advertisements.

- The Logo may be used only after the vendor has received the completed verification report and statement from the ETV verification organization.
- The Logo may not be placed along the bottom or side of the advertisement next to other general icons unless every product pictured or listed in the advertisement has been verified under the Environmental Technology Verification Program.
- The advertisement includes the statement: "The use of the ETV Name or Logo does not imply approval or certification of this product nor does it make any explicit or implied warranties or guarantees as to product performance."

Press releases that highlight the performance of an ETV verified technology may include the ETV Logo anywhere on the document.

## Introducing The ECA 450



It's like no other industrial grade portable combustion efficiency and environmental analyzer on the market today.

The ECA 450 determines the burner efficiency of furnaces, boilers and other industrial combustion equipment, helping plants reduce fuel costs while determining and monitoring pollutant levels. And it does it with the most user-friendly interface currently available. In fact, no other competitive instrument offers as many features or delivers such sophisticated measurements with such ease.

In addition, the ECA 450 is EPA/ETV test verified for NO<sub>x</sub> emissions ensuring more accurate measurements.

So whether you're concerned about combustion efficiency or environmental compliance – or both – the ECA 450 is a simple solution for your sophisticated needs.

Information on the performance characteristics of this technology can be found at [www.epa.gov/etv](http://www.epa.gov/etv) or call Bacharach, Inc. at 1-800-736-4666 for a copy of the ETV verification report. The use of the ETV Name or Logo does not imply approval or certification of this product nor does it make any explicit or implied as to product performance.

1.800.736.4666

BACHARACH

## ATTACHMENT B

### Appropriate Use of the ETV Logo on the Web

When developers, vendors, or verification organizations prepare ETV advertisements or other information regarding ETV verified products for inclusion on the Web, the Logo must be placed on the Web page in order to identify the ETV Program. In all cases of the use of the Logo on the Web, the Logo should be hot-linked to the EPA ETV Web site at [www.epa.gov/etv](http://www.epa.gov/etv)

As an example, the NSF International Web site incorporates most of the guidelines for appropriate Logo use: [www.nsf.org/etv](http://www.nsf.org/etv)



**Information On:**

- Services
- Product/Service Listings
- Product Certification
- Standards & Publications
- Training & Conferences
- ISO Registration
- Employment

**Information For:**

- Consumers
- Regulators
- Clients
- International

### NSF & EPA - ETV Partnerships

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NSF/EPA Environmental Technology Verification Pilots



EPA ETV Pilots

- Drinking Water Systems Center
- Wet Weather Flow Technologies
- Source Water Protection Technologies

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To learn more about USEPA Environmental Technology Verification Program visit: <http://www.epa.gov/etv/>

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**ATTACHMENT B  
STATEMENT OF WORK**

AIR POLLUTION CONTROL TECHNOLOGY VERIFICATION CENTER  
Environmental Technology Verification (ETV) Program

**1.0 Applicant:** Combustion Components Associates, Inc.  
Attn: Mr. Peter Reba  
(reba@cca-inc.net)  
884 Main Street  
Monroe, CT 06468

**2.0 Introduction:**

The Air Pollution Control Technology Verification Center (APCT Center) will conduct verification testing for the two Applicant technology systems specified below.

Combustion Components Associates, Inc. (CCA) ELIM-NO<sub>x</sub>® MSCR-00 urea-based selective catalytic reduction (SCR) systems for heavy-duty diesel highway engines for use with commercial ultralow sulfur diesel fuel (ULSD) conforming to 40 CFR 86.1313-2007. The ELIM-NO<sub>x</sub>® Haldor Topsoe system uses a vanadium catalyst and the ELIM-NO<sub>x</sub>® CSI system uses a zeolite catalyst.

**3.0 Description of technology systems to be verified:**

CCA will provide the technology to the Air Pollution Control Technology Verification Center (APCT Center) as the following items, to be shipped directly to Southwest Research Institute (SWRI):

1. one degreened ELIM-NO<sub>x</sub>® Haldor Topsoe (vanadium) MSCR-00 urea-based SCR system, serial number TCEQ-3, manufactured in April 2007, with documented degreening history of 75-125 hours.
2. one aged ELIM-NO<sub>x</sub>® Haldor Topsoe (vanadium) MSCR-00 urea-based SCR system, serial number TCEQ-1, manufactured in March 2006, with documented aging history of at least 1000 hours.
3. one degreened ELIM-NO<sub>x</sub>® CSI (zeolite) MSCR-00 urea-based SCR system, serial number TCEQ-6, manufactured in April 2007, with documented degreening history of 75-125 hours.
4. one aged ELIM-NO<sub>x</sub>® CSI (zeolite) MSCR-00 urea-based SCR system, serial number TCEQ-5, manufactured in March 2006, with documented aging history of at least 1000 hours.
5. one 1999 Mack E7-350 heavy-duty diesel engine, serial number 9F2149-11GBA.

CCA will provide, prior to scheduling verification testing, documentation to include model and serial numbers, date of manufacture, hours of service, service description summary, maintenance and performance summary, and written instructions typically provided with the ELIM-NO<sub>x</sub>® MSCR-00 urea-based SCR system.

CCA is responsible for removing the items following the completion of the verification testing at SWRI.

**4.0 Testing:**

The test is described below and summarized in the test/QA plan.

**ATTACHMENT B (Continued)**  
**STATEMENT OF WORK**

4.1 Test Overview.

The ETV testing will occur at SWRI under contract to the APCT Center. Testing will be performed in accordance with the approved technology-specific test/QA plan, as specified in the *Generic Verification Protocol for Determination of Emissions Reductions from Selective Catalytic Reduction Control Technologies for Highway, Nonroad, and Stationary Use Diesel Engines*. The Generic Protocol and the test/QA plan are available to the applicant.

Under the referenced protocol, supplemental emissions tests (SET) are required and will be conducted. The levels of NO<sub>x</sub> are of primary interest but emissions of HC, PM, and CO will also be measured. The levels of NO<sub>2</sub> are also of interest; both NO<sub>2</sub> and the NO<sub>2</sub>/NO<sub>x</sub> ratio will be reported. Ammonia slip is a concern with SCR systems, and therefore, ammonia will be measured using CTM-038, based on 40 CFR 63 Appendix A, Test Method 320 *Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy*. The soluble organic fraction (SOF) test will be performed on collected particulate. Other secondary measurements are CO<sub>2</sub>, engine backpressure, and SCR catalyst inlet and outlet temperature.

The test matrix is detailed in Table 1. This test matrix addresses performance related only to immediate effects and does not address cumulative or residual effects.

**Table 1. ELIM-NO<sub>x</sub> ® MSCR-00 urea-based SCR system verification testing matrix**

Engine	Condition	Test Cycle <sup>a</sup>
Mack E7-350	Baseline	highway FTP (C+H+H+H) + SET
Mack E7-350/ELIM-NO <sub>x</sub> ® Haldor Topsoe MSCR-00	Degreened	highway FTP (C+H+H+H) + SET
Mack E7-350/ELIM-NO <sub>x</sub> ® Haldor Topsoe MSCR-00	Aged	highway FTP (C+H+H+H) + SET
Mack E7-350	Baseline	highway FTP (C+H+H+H) + SET
Mack E7-350/ELIM-NO <sub>x</sub> ® CSI MSCR-00	Degreened	highway FTP (C+H+H+H) + SET
Mack E7-350/ELIM-NO <sub>x</sub> ® CSI MSCR-00	Aged	highway FTP (C+H+H+H) + SET

<sup>a</sup> All testing will be conducted using ULSD fuel.

4.2 Test Engines and Fuel.

ETV verification testing will be performed on a 1999 Mack E7-350 728-in<sup>3</sup> non-urban bus heavy-duty diesel engine, serial number 9F2149-11GBA, to be provided by CCA. The rated power is 350 hp at 1800 rpm, with a rated torque of 1360 lb-ft at 1200 rpm. The EPA engine family ID is 1MKXH11.9V60. CCA will provide documentation of the service and maintenance history, repair history, and damage history for the engine before testing is initiated.

Engine preconditioning is required prior to generating emissions or performance data with any engine obtained from an in-use field application. For in-use engines, initial operation will include fully warming, then stopping the engine, and draining the as-received lubricating oil. Commercially available oil meeting the given engine manufacturer's recommendation will be used to complete an oil and filter change. Similarly, an in-use engine which arrives for testing with a dry crankcase will undergo two consecutive oil change processes. In either case, at that point, the engine will be run for three (3) hours to season the fresh lubricating oil, before the four-hour operation at rated conditions specified in section 4.3.

The baseline and test fuels will be commercial ultralow sulfur diesel fuel (ULSD) conforming to 40 CFR 86.1313-2007. The baseline and test fuels will be from a single batch and will be analyzed to document they meet the specifications required by the generic verification protocol cited above.

**ATTACHMENT B (Continued)  
STATEMENT OF WORK**

4.3 Baseline Engine Testing for ELIM-NO<sub>x</sub>® Haldor Topsoe System.

Following test cell setup, SWRI will set and record intake restrictions and exhaust backpressure to the engine manufacturer’s specifications. SWRI will stabilize the engine on the ULSD baseline fuel prior to conducting baseline verification tests. SWRI will warm up the engine, run 4 hours at rated condition, and perform a torque map, and prepare the engine and dynamometer control settings by running at least three hot transient FTP cycles. Prior to shutting down for the overnight soak, SWRI will run the engine for an additional 20 minutes at rated horsepower and then idle for 2 minutes.

Following this preparation, a baseline for engine-out emissions over a single cold and 3 hot transient cycle sequence and the SET sequence will be conducted for HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO, and PM (NO<sub>2</sub> is reported as the difference between NO<sub>x</sub> and NO). Brake specific fuel consumption (BSFC) over each transient cycle, based on carbon balance, will also be reported. The PM filters will be analyzed for SOF. During the runs, backpressure and exhaust temperature will be recorded on a second-by-second basis.

The verification protocol requires that the emissions from engines used for verification testing must not exceed 110% of the certification standards for that engine category. For 1998-2003 non-urban bus engines, the certification standards are defined in EPA’s on-highway engine family box OH-10. Furthermore, the Office of Transportation and Air Quality (OTAQ) assumes 5% reduction in PM emissions due to the use of ULSD fuel. Therefore, the criteria established to indicate that the test engine is acceptable and that the verification testing can proceed are that the baseline emissions from the engine using ULSD fuel cannot exceed 110% of OH-10 (1.1 x OH-10) for HC, CO, and NO<sub>x</sub>, and also cannot exceed 110% of [(OH-10)-5%], or (1.045 x OH-10) for PM. Table 2 presents the required emission performance of the test engine, as well as the certification standards.

**Table 2. Test Engine Baseline Emissions Requirement for Verification Testing**

	HC		CO		NO <sub>x</sub>		PM	
	g/kWh	g/hp-hr	g/kWh	g/hp-hr	g/kWh	g/hp-hr	g/kWh	g/hp-hr
OH-10	1.74	1.30 <sup>a</sup>	20.79	15.50 <sup>a</sup>	5.36	4.00 <sup>a</sup>	0.13	0.100 <sup>a</sup>
Acceptance criteria	1.92	1.43	22.86	17.05	5.90	4.40	0.140	0.105

<sup>a</sup> Certification standards for EPA highway engine family box OH-10 for 1998-2003 non-urban bus engines.

If the engine exceeds the emissions requirements in Table 2, verification testing will stop and CCA may either proceed with a similar engine or discontinue the verification test. If CCA chooses to proceed with a similar engine, the company will provide the APCT Center with documentation to include model and serial numbers, date of manufacture, hours of service, service description summary, maintenance and performance summary and deliver the engine to SWRI. Replacing the engine may result in indeterminate downtime and may delay completion of the verification test. After receipt of the engine, the complete verification test will begin again. The contract will be revised to incorporate the replacement engine into the scope of work. The revised cost will include the cost to conduct the complete verification testing on the replacement engine and the costs incurred for work completed with the initial engine. If CCA chooses to discontinue the verification test, the company will be charged only for the completed work and the balance of payment will be refunded to CCA.

4.4 Installation and Inspection of the Degreened ELIM-NO<sub>x</sub>® Haldor Topsoe System.

SwRI will visually inspect the degreened ELIM-NO<sub>x</sub>® Haldor Topsoe system for external signs of damage and record the condition. After inspection, the degreened system will be installed per the

**ATTACHMENT B (Continued)**  
**STATEMENT OF WORK**

manufacturer's written instructions.

4.5 Emissions Testing of Degreened ELIM-NOx® Haldor Topsoe System Using ULSD Fuel.

SwRI will operate the engine with the degreened system installed, reset the backpressure and intake restriction to the engine manufacturer's desired level, and verify satisfactory engine operation. Exhaust backpressure will be recorded during the performance check.

SwRI will stabilize the engine by running it on the ULSD baseline fuel prior to conducting degreened verification tests. The baseline command cycle will be recalled and used for preparations and testing. SwRI will perform a torque map on the engine with the degreened system installed for reference and consistency only. SwRI will prepare the engine by running at least three hot transient cycles. Prior to shutting down for the overnight soak, SwRI will run the engine for an additional 20 minutes at rated horsepower and then idle for 2 minutes. Engine conditioning should not exceed 2 hours.

Following this preparation, emissions of HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO, and PM (NO<sub>2</sub> is reported as the difference between NO<sub>x</sub> and NO) with the degreened system in place will be measured over the single cold and 3 hot transient cycle sequence and the SET sequence using ULSD fuel. BSFC will be reported as in 4.3. The PM filters will be analyzed for SOF. During the runs, backpressure and SCR catalyst inlet and outlet temperature will be recorded on a second-by-second basis.

4.6 Installation and Inspection of the Aged ELIM-NOx® Haldor Topsoe System.

SwRI will visually inspect the aged ELIM-NOx® Haldor Topsoe system for external signs of damage and record the condition. After inspection, the aged system will be installed per the manufacturer's written instructions.

4.7 Emissions Testing of Aged ELIM-NOx® Haldor Topsoe System Using ULSD Fuel.

SwRI will operate the engine with the aged system installed, reset the backpressure and intake restriction to the engine manufacturer's desired level, and verify satisfactory engine operation. Exhaust backpressure will be recorded during the performance check.

SwRI will stabilize the engine by running it on the ULSD baseline fuel prior to conducting aged verification tests. The baseline command cycle will be recalled and used for preparations and testing. SwRI will perform a torque map on the engine with the aged system installed for reference and consistency only. SwRI will prepare the engine by running at least three hot transient cycles. Prior to shutting down for the overnight soak, SwRI will run the engine for an additional 20 minutes at rated horsepower and then idle for 2 minutes. Engine conditioning should not exceed 2 hours.

Following this preparation, emissions of HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO, and PM (NO<sub>2</sub> is reported as the difference between NO<sub>x</sub> and NO) with the aged system in place will be measured over the single cold and 3 hot transient cycle sequence and the SET sequence using ULSD fuel. BSFC will be reported as in 4.3. The PM filters will be analyzed for SOF. During the runs, backpressure and SCR catalyst inlet and outlet temperature will be recorded on a second-by-second basis.

4.8 Functional Testing of the Aged ELIM-NOx® Haldor Topsoe System.

Functional testing of the reductant level monitoring and notification system, the reductant leak monitoring and notification system, and other SCR system malfunction monitoring systems is required for SCR

**ATTACHMENT B (Continued)**  
**STATEMENT OF WORK**

systems. Functional testing of the ELIM-NOx® Haldor Topsoe system will consist of triggering the sensors and system to register sensor error for urea pressure, low urea pressure, high urea pressure, low urea consumption, sensor error for urea level, low levels in the urea tank, empty levels in the urea tank, and high urea consumption. The system will show a yellow warning light and display a text message, indicating operator attention is required, when the urea tank level is low. All other circumstances for this functional test will cause the system to show a red light, sound an audible alarm, and display a text message. Any condition resulting in a red light, audible alarm, and text message display will shut down injection and initiate the engine starter interrupt whereby a counter is activated allowing only three more attempts to start the vehicle unless corrective action is taken. SWRI will conduct the functional test on the aged system per CCA's written instructions.

Upon completion of functional testing, SWRI will remove the ELIM-NOx® Haldor Topsoe system from the engine to restore it to its baseline configuration.

4.9 Baseline Engine Testing for ELIM-NOx® CSI System.

Following test cell setup, SWRI will set and record intake restrictions and exhaust backpressure to the engine manufacturer's specifications. SWRI will stabilize the engine on the ULSD baseline fuel prior to conducting baseline verification tests. SWRI will warm up the engine, run 4 hours at rated condition, and perform a torque map, and prepare the engine and dynamometer control settings by running at least three hot transient FTP cycles. Prior to shutting down for the overnight soak, SWRI will run the engine for an additional 20 minutes at rated horsepower and then idle for 2 minutes.

Following this preparation, a baseline for engine-out emissions over a single cold and 3 hot transient cycle sequence and the SET sequence will be conducted for HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO, and PM (NO<sub>2</sub> is reported as the difference between NO<sub>x</sub> and NO). Brake specific fuel consumption (BSFC) over each transient cycle, based on carbon balance, will also be reported. The PM filters will be analyzed for SOF. During the runs, backpressure and exhaust temperature will be recorded on a second-by-second basis.

4.10 Installation and Inspection of the Degreened ELIM-NOx® CSI System.

SWRI will visually inspect the degreened ELIM-NOx® CSI system for external signs of damage and record the condition. After inspection, the degreened system will be installed per the manufacturer's written instructions.

4.11 Emissions Testing of Degreened ELIM-NOx® CSI System Using ULSD Fuel.

SWRI will operate the engine with the degreened system installed, reset the backpressure and intake restriction to the engine manufacturer's desired level, and verify satisfactory engine operation. Exhaust backpressure will be recorded during the performance check.

SWRI will stabilize the engine by running it on the ULSD baseline fuel prior to conducting degreened verification tests. The baseline command cycle will be recalled and used for preparations and testing. SWRI will perform a torque map on the engine with the degreened system installed for reference and consistency only. SWRI will prepare the engine by running at least three hot transient cycles. Prior to shutting down for the overnight soak, SWRI will run the engine for an additional 20 minutes at rated horsepower and then idle for 2 minutes. Engine conditioning should not exceed 2 hours.

Following this preparation, emissions of HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO, and PM (NO<sub>2</sub> is reported as the difference between NO<sub>x</sub> and NO) with the degreened system in place will be measured over the single

## ATTACHMENT B (Continued) STATEMENT OF WORK

cold and 3 hot transient cycle sequence and the SET sequence using ULSD fuel. BSFC will be reported as in 4.3. The PM filters will be analyzed for SOF. During the runs, backpressure and SCR catalyst inlet and outlet temperature will be recorded on a second-by-second basis.

### 4.12 Installation and Inspection of the Aged ELIM-NOx® CSI System.

SwRI will visually inspect the aged ELIM-NOx® CSI system for external signs of damage and record the condition. After inspection, the aged system will be installed per the manufacturer's written instructions.

### 4.13 Emissions Testing of Aged ELIM-NOx® CSI System Using ULSD Fuel.

SwRI will operate the engine with the aged system installed, reset the backpressure and intake restriction to the engine manufacturer's desired level, and verify satisfactory engine operation. Exhaust backpressure will be recorded during the performance check.

SwRI will stabilize the engine by running it on the ULSD baseline fuel prior to conducting aged verification tests. The baseline command cycle will be recalled and used for preparations and testing. SwRI will perform a torque map on the engine with the aged system installed for reference and consistency only. SwRI will prepare the engine by running at least three hot transient cycles. Prior to shutting down for the overnight soak, SwRI will run the engine for an additional 20 minutes at rated horsepower and then idle for 2 minutes. Engine conditioning should not exceed 2 hours.

Following this preparation, emissions of HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, NO, and PM (NO<sub>2</sub> is reported as the difference between NO<sub>x</sub> and NO) with the aged system in place will be measured over the single cold and 3 hot transient cycle sequence and the SET sequence using ULSD fuel. BSFC will be reported as in 4.3. The PM filters will be analyzed for SOF. During the runs, backpressure and SCR catalyst inlet and outlet temperature will be recorded on a second-by-second basis.

### 4.14 Functional Testing of the Aged ELIM-NOx® CSI System.

Functional testing of the reductant level monitoring and notification system, the reductant leak monitoring and notification system, and other SCR system malfunction monitoring systems is required for SCR systems. Functional testing of the ELIM-NOx® CSI system will consist of triggering the sensors and system to register sensor error for urea pressure, low urea pressure, high urea pressure, low urea consumption, sensor error for urea level, low levels in the urea tank, empty levels in the urea tank, and high urea consumption. The system will show a yellow warning light and display a text message, indicating operator attention is required, when the urea tank level is low. All other circumstances for this functional test will cause the system to show a red light, sound an audible alarm, and display a text message. Any condition resulting in a red light, audible alarm, and text message display will shut down injection and initiate the engine starter interrupt whereby a counter is activated allowing only three more attempts to start the vehicle unless corrective action is taken. SwRI will conduct the functional test on the aged system per CCA's written instructions.

### 4.15 Data Handling and Reports.

The only official transmittal of ETV data will be from the test laboratory directly to the APCT Center, the ETV office at RTI. Following completion of the ETV testing, SwRI will prepare a report to summarize the data and the testing process and will forward it to RTI. RTI will prepare the ETV report, which will be distributed as described in the protocol.

**ATTACHMENT B (Continued)**  
**STATEMENT OF WORK**

The performance of the candidate technology will be reported as the percent difference between the mean emissions from the baseline engine and the mean emissions from the engine with the candidate technology installed. In addition, the 95% confidence interval on the percent different will be determined and reported.

The APCT Center will not issue a verification statement if, due to low emission reduction results, the performance of a technology cannot be distinguished from zero. If the 95% confidence interval on the mean emission reduction includes zero reduction, the technology does not give reductions that are statistically significant. Section 8.0 of the protocol explains the Applicant's options, which include authorizing additional tests at its expense (to narrow the confidence interval). In keeping with ETV policy, a verification report will be issued.

**5.0 Direct Cost:**

The applicant is expected to provide ETV cost-share in cash amounting to **\$166,000**.

**6.0 Schedule:**

A technology specific test/QA plan addendum for the verification will be finalized following receipt of the completed contractual documents and payment. It will be reviewed by the Applicant, by the APCT Center, and by the EPA prior to starting verification testing. Testing is anticipated to begin July 2007, but depends upon acceptance of these terms and the laboratory test schedule. Preliminary data will be released to the Applicant for its use as soon as the SwRI data review and QA process is complete and SwRI has delivered its report to the APCT Center. TCEQ and OTAQ will be kept informed of test scheduling and completion and progress on the reporting.

The final Verification Report and Verification Statements will be released immediately following EPA approval. Because the test/QA plan addendum and other sequential activities (not all within the control of the APCT Center) must take place before release, the APCT Center cannot set a firm delivery date. Our target delivery date will be 4 months following test completion.

AIR POLLUTION CONTROL TECHNOLOGY VERIFICATION CENTER  
Environmental Technology Verification (ETV) Program

## Attachment C

### Billing Schedule

Combustion Components Associates, Inc.  
Attn: Mr. Peter Reba  
(reba@cca-inc.net)  
884 Main Street  
Monroe, CT 06468

ELIM-NOx® MSCR-00 urea-based selective catalytic reduction (SCR) systems

<b>Milestone</b>	<b>Amount</b>
Before initiation of verification testing	\$166,000.00
<b>Total Applicant's Share</b>	<b>\$166,000.00</b>

Payment terms provided in Article 2 of Attachment A, RTI Standard Terms & Conditions and Operating Principles for ETV Services.

<u>Manufacturer Name</u>	Combustion Components Ass
<u>Manufacturer Code</u>	
<u>Mfr Contact1 - First Name</u>	Peter
<u>Mfr Contact1 - Last Name</u>	Reba
<u>Address1</u>	884 Main Street
<u>Address2</u>	
<u>Address3</u>	
<u>City</u>	Monroe
<u>State</u>	Connecticut
<u>Zip</u>	6468
<u>Mfr Contact1 - Email</u>	<a href="mailto:reba@cca-inc.net">reba@cca-inc.net</a>
<u>Contact1 Phone Number 1</u>	203.268.3138 ext 125
<u>Contact1 Ph. No. 1 Type</u>	
<u>Contact1 Phone Number 2</u>	630.707.6401
<u>Contact1 Ph. No. 2 Type</u>	
<u>Contact1 Phone Number 3</u>	
<u>Contact1 Ph. No. 3 Type</u>	
<u>Mfr Contact2 - First Name</u>	Greg
<u>Mfr Contact2 - Last Name</u>	Baccari
<u>Mfr Contact2 - Email</u>	<a href="mailto:baccari@cca-inc.net">baccari@cca-inc.net</a>
<u>Contact2 Phone Number 1</u>	203.268.3138 ext 126
<u>Contact2 Ph. No. 1 Type</u>	
<u>Contact2 Phone Number 2</u>	
<u>Contact2 Ph. No. 2 Type</u>	
<u>Contact2 Phone Number 3</u>	
<u>Contact2 Ph. No. 3 Type</u>	
<u>Notes</u>	

Revision 5

<u>Product Name</u>	ELIM NOx™ MOBILE SYSTEM
<u>Product Number</u>	MSCR-00-00-0000
<u>Product Version</u>	
<u>Submission Type</u>	New
<u>Technology Type</u>	Selective Catalytic Reducer
<u>Monitoring System Description</u>	

SCR Tank Level,  
 Urea injection  
 pressure, urea  
 injection amount,  
 engine rpm, engine  
 load

<u>Application Category</u>	On Highway
<u>Application SubCategory</u>	HHDE
<u>Application Engines</u>	MACK E7-350
<u>Application Boxes</u>	OH-10
<u>Exhaust - Minimum Temp.</u>	200/392
<u>Exhaust - Minimum Temp.</u>	Degrees C/Degrees F
<u>Exhaust - Minimum Time at Temp.</u>	
<u>Exhaust - Minimum Time at Temp. Units</u>	
<u>Exhaust - Minimum Time and Temp. - Supporting Data</u>	
<u>Engine Operating Conditions</u>	

Engine should be maintained according to manufacturers guidelines. Engine needs to be in good overall working condition, no oil leaks, no compression loss, etc.

<u>Regeneration Type</u>	None
<u>Regeneration Description</u>	None
<u>Engine Performance Effects</u>	None
<u>Fuel Consumption Effects</u>	None
<u>Engine Backpressure Effects</u>	None
<u>Oil Consumption Effects</u>	None
<u>Secondary Emissions</u>	ammonia

Secondary Emissions Procedures Proper tuning of the system will eliminate ammonia slip.

Fuel Requirements None

Fuel Sulfur Requirements None

Misfueling Considerations None

Maintenance Requirement 1 Refilling of urea tank.

Maintenance Requirement 1 - Interval Usage is rated at 4 gallons urea per 100 gallons fuel consumption. Tanks should be refilled accordingly.

Maintenance Requirement 2

Maintenance Requirement 2 - Interval

Maintenance Requirement 3

Maintenance Requirement 3 - Interval

Maintenance Requirement 4

Maintenance Requirement 4 - Interval

Useful Life1 16,000

Useful Life1 Units hours

Useful Life2

Useful Life2 Units

Est. Date 500 Sold

In-Use Test Plan Periodic installation of our Stack Pack. This consists of Nox meters before and after catalyst for Nox measurement and calculated reductions.

Warranty

Operating Instructions

Installation Requirements Qualified diesel engine mechanic. Use of Self Learn System

Installation Procedure Training and instructions provided with system

<u>Operator or Maintenance Worker Qualifications or Training</u>	Qualified diesel engine mechanic.
<u>Product Label</u>	
<u>Contact for Replacement Parts and Supplies</u>	CCA 203.268.3139
<u>Failure Modes</u>	Running urea tank empty.
<u>Safety Issues</u>	None
<u>Engine Manufacturer Comments</u>	None
<u>Notes</u>	
<u>Claimed THC Reduction</u>	
<u>Claimed CO Reduction</u>	
<u>Claimed NOx Reduction</u>	45%
<u>Claimed PM Reduction</u>	
<u>Emissions Reductions</u>	
<u>Supplementary Data</u>	
<u>Reagent Consumption Rate</u>	4 gallons urea per 100 gallons deisel fuel
<u>Reagent Consumption Rate Units</u>	gallons
<u>Reagent Replensishment Interval</u>	Usage is rated at 4 gallons urea per 100 gallons fuel consumption. Tanks should be refilled accordingly.
<u>Curie Point</u>	N/A
<u>Curie Point Units</u>	N/A

Test Number  
Test Date  
Test Time  
Test Type  
Test Cycle  
Test Reason 1  
Test Reason2  
Test Purpose  
Test Procedure  
Test Device Age  
Test Device Age Units  
Test Device History  
Test Engine Family Name  
Test Engine ID  
Test Engine Model  
Test Engine Manufacturer  
Test Engine Type  
Test Eng. PM Cert. Category  
Test Eng. NOx Cert. Category  
Test Engine CertificationType  
Test Engine - Model Year  
Test Engine - Date Manufactured  
Test Eng. - Rated Hp  
Test Eng. - Displacement  
Test Fuel  
Test Fuel Sulfur Level  
Test Laboratory Name  
Test Laboratory City  
Test Laboratory State  
Test Cell  
Test results units  
HC/OMHCE  
CO  
NOx  
PM  
CO2  
NMHC/ONMHCE  
HC + NOx  
Formaldehyde (HCHO)  
Ammonia (NH3)  
Ammonia - Average (ppm)  
Max.Exhaust Backpressure  
Exhaust Backpressure Units

Max Exhaust Temperature  
Max SCR Catalyst Inlet Temp.  
Max SCR Catalyst Outlet Temp.  
Exhaust Temperature Units  
Max. Exhaust Flow  
Exhaust Flow Units  
Fuel Consumption  
Fuel Consumption Units  
Reductant Consumption  
Reductant Consumption Units  
PM SOF  
Test Engine Power  
Test Engine Power Units  
Peak Torque  
Peak Torque Units  
Active Regeneration  
Commencement Time  
Condition Sensed  
Condition Sensed - Measured  
Units  
Event  
Codes Stored if Event Occurs  
Information Stored if Event  
Occurs  
Notification Method  
Design Criteria for Notification  
Test Method Summary  
Test Results  
Test Comments

Revision 5

Functional Description

**CBI**  
solution is injected into the exhaust stream after the turbocharger. The injector is kept cool via return flow routing of the urea. This prevents crystallization of the urea and plugging of the injector when exposed to the hot exhaust gases.

Dimensions

MSCR-03-00-0000 Urea Tank Assembly 15.8 in X 16.75 in X 11.5 in

Housing

304 Stainless Steel

Case

N/A

Mesh

N/A

Compression

N/A

Part Number

MSCR-03-01-0100

Description  
Tank - 6 gallon

Part Number  
MSCR-05-01-0000

Description  
Upper Body

Part Number  
MSCR-02-01-0600

Description  
3 way Std. Female Connector

Part Number  
MSCR-06-01-0000

Description  
Thermistor Assembly

Part Number  
MSCR-04-03-0000

Description  
Filter/Mount Assembly

Part Number  
MSCR-01-01-0700

Description  
Mototron Controller

MSCR-03-04-0000

Manual Fill Cap Assembly

MSCR-05-02-0000

Lower Body

MSCR-02-01-0700

Fuse Holder with Cap

MSCR-06-01-0200

Thermistor

MSCR-04-03-0100

Filter Assembly

MSCR-01-02-0000

Relay

MSCR-03-04-0100

Cap (w/ gasket)

MSCR-05-03-0112

24 Volt Coil

MSCR-02-01-0800

Fuse - 20 Amp

MSCR-06-01-0500

Thermistor Plug (Drilled)

MSCR-04-03-0110

Housing (filter)

MSCR-01-02-0100

Powerview Display Unit

MSCR-03-04-0200

Gasket w/ton - cap

MSCR-05-03-0024

Bobbin

MSCR-02-01-2000

Pin - Standard Conn.

MSCR-06-02-0100

Thermistor Boss

MSCR-04-03-0120

Element (filter)

MSCR-01-02-0100

Powerview Display Unit

MSCR-03-04-0300

Lanyard Wire

MSCR-05-03-0100

O-ring (coil)

MSCR-02-10-1000

Mototron Wiring Harness

MSCR-06-03-0000

Blk. pressure sensor/hose assy

MSCR-04-03-0200

3/8" Tee

MSCR-01-02-0200

Mount Screw - Display Unit

MSCR-03-04-0400

Lanyard Clamp

MSCR-05-04-0000

O-ring (lower body)

MSCR-02-10-0300

Wiring Harness

MSCR-06-03-0100

Blk. pressure sensor assy

MSCR-04-03-0300

Spacer

MSCR-01-02-0300

Mount Screw - Display Unit

MSCR-03-05-0000

Level Sensor Assembly

MSCR-05-05-0000

Retaining nut

MSCR-02-10-0200

Ext. Cable w/ resistor

MSCR-06-03-0110

Blk. pressure sensor

MSCR-04-03-0400

Hex hd cap screw

MSCR-01-02-0400

Hex Nut - Display Unit

MSCR-03-05-0020

Level Sensor Connector assy

MSCR-05-06-0000

Thermal shield

MSCR-02-10-0300

20' Motobus Extension Cable

MSCR-06-03-0200

Hose Assembly

MSCR-04-03-0500

Reducing Bushing 3/8" to 1/4"

MSCR-04-03-0600

Pipe nipple (close nipple)

MSCR-03-05-0100

Level Sensor (w/ gasket)

MSCR-05-07-0000

Injector Gasket

MSCR-02-10-0400

Relay Connector

MSCR-06-03-0400

Female Connector

MSCR-04-03-0700

Male Push-On Elbow

MSCR-04-03-0800

Hose Swivel - Male

MSCR-03-05-0200

Hex Soc. Cap Scr. Level Sensor

MSCR-05-09-0000

Orifice Plate .005 X .005

MSCR-02-10-0410

Relay Terminals

MSCR-06-03-0500

Backpressure snubber

MSCR-04-03-0900

Injector Mounting Assembly

MSCR-04-03-1000

Bracket - Injector Mount

MSCR-03-05-0300

Flat Washer - Level Sensor

MSCR-05-09-0000

Valve (finished)

MSCR-02-10-0510

Motobus Connector

MSCR-06-04-0100

Bracket - Injector Mount

MSCR-04-03-1100

Shut - Injector mount

MSCR-04-03-1110

Hose (feet)

MSCR-03-06-0000

Drain plug (3/8" NPT)

MSCR-05-10-0008

Spring, Valve

MSCR-02-10-0610

Motobus Hub

MSCR-06-04-0200

Hex Nut - Injector mount

MSCR-04-03-1120

Washer - Injector mount

MSCR-04-03-1120

Hose End - Female

MSCR-03-07-0000

Drain plug (1" NPT)

MSCR-05-10-0008

Restrictor Orifice .025

MSCR-02-10-0614

Motobus Conn Terminal

MSCR-06-04-0300

Nox Mount Assembly

MSCR-04-03-1200

Nox Boss (Sensor Mount)

MSCR-04-03-1300

Hose Assembly - injector - #4

MSCR-03-08-0000

Elbow (3/8" X .625)

MSCR-05-10-0008

Shim

MSCR-02-10-0710

Motobus Conn Wire Seal

MSCR-06-04-0400

Washer - Injector mount

MSCR-04-03-1400

Nox Plug

MSCR-04-03-1500

Straight Connector #6 to #4

MSCR-03-09-0000

Label

MSCR-05-10-0008

Restrictor Orifice .025

MSCR-02-10-0810

Motobus Conn Cavity Plug

MSCR-06-05-0000

Nox Mount Assembly

MSCR-04-03-1600

Back press Sensor Boss

MSCR-04-04-0100

Gear Pump

MSCR-03-10-0000

Stationary Breather

MSCR-05-15-0000

DC/DC Converter

MSCR-02-10-0910

Motobus Conn Strain Relief

MSCR-06-05-0100

Washer - Injector mount

MSCR-04-04-0200

Load Sensor

MSCR-04-04-0215

Weld Kit

MSCR-03-11-0000

Heater Assembly

MSCR-05-15-0000

Dummy Plug

MSCR-02-10-1010

Murphy to Motobus Cable Assy

MSCR-06-05-0200

Nox Plug Gasket

MSCR-04-04-0220

Humidity Sensor

MSCR-04-04-0230

Humidity Sensor Connector

MSCR-03-13-0000

Mobile Breather

MSCR-05-15-0000

Bus to key on and CAN

MSCR-02-12-0100

24 to 12 volt conversion jumper

MSCR-06-08-0000

Weld Kit

MSCR-04-04-0225

Humidity Sensor

MSCR-04-04-0240

2.2K Ohm Resistor

MSCR-03-13-0100

1/2" X 1/2" FNPT 90° Elbow

MSCR-05-15-0000

24 to 12 volt conversion jumper

MSCR-02-13-1000

Main Assembly

MSCR-06-10-0000

Nox Plug Gasket

MSCR-04-04-0230

Humidity Sensor

MSCR-04-04-0240

stationary box 12v harness

MSCR-03-13-0200

1/2" to 3/8" Reducer

MSCR-05-15-0000

24 to 12 volt conversion jumper

MSCR-02-14-1000

Exceptions to main harness

MSCR-06-11-0000

Back press Sensor Boss

MSCR-04-04-0215

Humidity Sensor

MSCR-04-04-0220

CCApaint to point no resistor

MSCR-03-14-0000

1/4" Ball Valves

MSCR-05-15-0000

24 to 12 volt conversion jumper

MSCR-02-14-1200

CAN 12V power, gnd assemblies

MSCR-06-11-1000

Load Sensor

MSCR-04-04-0215

Humidity Sensor

MSCR-04-04-0230

stationary box 12v harness assemblies

MSCR-03-15-0000

3/8" Ball Valves

MSCR-05-15-0000

General Harness (1) pwr.gnd

MSCR-02-14-1300

General Harness (1) pwr.gnd assemblies

MSCR-06-11-1200

Weld Kit

MSCR-04-04-0215

Humidity Sensor

MSCR-04-04-0240

stationary box 12v harness assemblies

MSCR-03-16-0000

3/4" to 1/2" Reducer

MSCR-05-15-0000

General Harness (1) pwr.gnd assemblies

MSCR-02-14-1400

General Harness (1) pwr.gnd assemblies

MSCR-06-11-1200

Weld Kit

MSCR-04-04-0215

<u>Manufacturer Name</u>	Combustion Components Ass
<u>Manufacturer Code</u>	
<u>Mfr Contact1 - First Name</u>	Peter
<u>Mfr Contact1 - Last Name</u>	Reba
<u>Address1</u>	884 Main Street
<u>Address2</u>	
<u>Address3</u>	
<u>City</u>	Monroe
<u>State</u>	Connecticut
<u>Zip</u>	6468
<u>Mfr Contact1 - Email</u>	<a href="mailto:reba@cca-inc.net">reba@cca-inc.net</a>
<u>Contact1 Phone Number 1</u>	203.268.3138 ext 125
<u>Contact1 Ph. No. 1 Type</u>	
<u>Contact1 Phone Number 2</u>	630.707.6401
<u>Contact1 Ph. No. 2 Type</u>	
<u>Contact1 Phone Number 3</u>	
<u>Contact1 Ph. No. 3 Type</u>	
<u>Mfr Contact2 - First Name</u>	Greg
<u>Mfr Contact2 - Last Name</u>	Baccari
<u>Mfr Contact2 - Email</u>	<a href="mailto:baccari@cca-inc.net">baccari@cca-inc.net</a>
<u>Contact2 Phone Number 1</u>	203.268.3138 ext 126
<u>Contact2 Ph. No. 1 Type</u>	
<u>Contact2 Phone Number 2</u>	
<u>Contact2 Ph. No. 2 Type</u>	
<u>Contact2 Phone Number 3</u>	
<u>Contact2 Ph. No. 3 Type</u>	
<u>Notes</u>	

Revision 5

<u>Product Name</u>	ELIM NOx™ MOBILE SYSTEM
<u>Product Number</u>	MSCR-00-00-0000
<u>Product Version</u>	
<u>Submission Type</u>	New
<u>Technology Type</u>	Selective Catalytic Reducer
<u>Monitoring System Description</u>	

SCR Tank Level,  
 Urea injection  
 pressure, urea  
 injection amount,  
 engine rpm, engine  
 load

<u>Application Category</u>	On Highway
<u>Application SubCategory</u>	HHDE
<u>Application Engines</u>	MACK E7-350
<u>Application Boxes</u>	OH-10
<u>Exhaust - Minimum Temp.</u>	200/392
<u>Exhaust - Minimum Temp.</u>	Degrees C/Degrees F
<u>Exhaust - Minimum Time at Temp.</u>	
<u>Exhaust - Minimum Time at Temp. Units</u>	
<u>Exhaust - Minimum Time and Temp. - Supporting Data</u>	
<u>Engine Operating Conditions</u>	

Engine should be maintained according to manufacturers guidelines. Engine needs to be in good overall working condition, no oil leaks, no compression loss, etc.

<u>Regeneration Type</u>	None
<u>Regeneration Description</u>	None
<u>Engine Performance Effects</u>	None
<u>Fuel Consumption Effects</u>	None
<u>Engine Backpressure Effects</u>	None
<u>Oil Consumption Effects</u>	None
<u>Secondary Emissions</u>	ammonia

Secondary Emissions Procedures

Proper tuning of the system will eliminate ammonia slip.

Fuel Requirements

None

Fuel Sulfur Requirements

None

Misfueling Considerations

None

Maintenance Requirement 1

Refilling of urea tank.

Maintenance Requirement 1 - Interval

Usage is rated at 4 gallons urea per 100 gallons fuel consumption. Tanks should be refilled accordingly.

Maintenance Requirement 2

Maintenance Requirement 2 - Interval

Maintenance Requirement 3

Maintenance Requirement 3 - Interval

Maintenance Requirement 4

Maintenance Requirement 4 - Interval

Useful Life1

16,000

Useful Life1 Units

hours

Useful Life2

Useful Life2 Units

Est. Date 500 Sold

In-Use Test Plan

Periodic installation of our Stack Pack. This consists of Nox meters before and after catalyst for Nox measurement and calculated reductions.

Warranty

Operating Instructions

Installation Requirements

Qualified diesel engine mechanic. Use of Self Learn System

Installation Procedure

Training and instructions provided with system

<u>Operator or Maintenance Worker Qualifications or Training</u>	Qualified diesel engine mechanic.
<u>Product Label</u>	
<u>Contact for Replacement Parts and Supplies</u>	CCA 203.268.3139
<u>Failure Modes</u>	Running urea tank empty.
<u>Safety Issues</u>	None
<u>Engine Manufacturer Comments</u>	None
<u>Notes</u>	
<u>Claimed THC Reduction</u>	
<u>Claimed CO Reduction</u>	
<u>Claimed NOx Reduction</u>	45%
<u>Claimed PM Reduction</u>	
<u>Emissions Reductions</u>	
<u>Supplementary Data</u>	
<u>Reagent Consumption Rate</u>	4 gallons urea per 100 gallons deisel fuel
<u>Reagent Consumption Rate Units</u>	gallons
<u>Reagent Replensishment Interval</u>	Usage is rated at 4 gallons urea per 100 gallons fuel consumption. Tanks should be refilled accordingly.
<u>Curie Point</u>	N/A
<u>Curie Point Units</u>	N/A

Test Number  
Test Date  
Test Time  
Test Type  
Test Cycle  
Test Reason 1  
Test Reason2  
Test Purpose  
Test Procedure  
Test Device Age  
Test Device Age Units  
Test Device History  
Test Engine Family Name  
Test Engine ID  
Test Engine Model  
Test Engine Manufacturer  
Test Engine Type  
Test Eng. PM Cert. Category  
Test Eng. NOx Cert. Category  
Test Engine CertificationType  
Test Engine - Model Year  
Test Engine - Date Manufactured  
Test Eng. - Rated Hp  
Test Eng. - Displacement  
Test Fuel  
Test Fuel Sulfur Level  
Test Laboratory Name  
Test Laboratory City  
Test Laboratory State  
Test Cell  
Test results units  
HC/OMHCE  
CO  
NOx  
PM  
CO2  
NMHC/ONMHCE  
HC + NOx  
Formaldehyde (HCHO)  
Ammonia (NH3)  
Ammonia - Average (ppm)  
Max.Exhaust Backpressure  
Exhaust Backpressure Units

Max Exhaust Temperature  
Max SCR Catalyst Inlet Temp.  
Max SCR Catalyst Outlet Temp.  
Exhaust Temperature Units  
Max. Exhaust Flow  
Exhaust Flow Units  
Fuel Consumption  
Fuel Consumption Units  
Reductant Consumption  
Reductant Consumption Units  
PM SOF  
Test Engine Power  
Test Engine Power Units  
Peak Torque  
Peak Torque Units  
Active Regeneration  
Commencement Time  
Condition Sensed  
Condition Sensed - Measured  
Units  
Event  
Codes Stored if Event Occurs  
Information Stored if Event  
Occurs  
Notification Method  
Design Criteria for Notification  
Test Method Summary  
Test Results  
Test Comments

Revision 5

Functional Description

**CBI**  
solution is injected into the exhaust stream after the turbocharger. The injector is kept cool via return flow routing of the urea. This prevents crystallization of the urea and plugging of the injector when exposed to the hot exhaust gases.

Dimensions

MSCR-03-00-0000 Urea Tank Assembly 15.8 in X 16.75 in X 11.5 in

Housing

304 Stainless Steel

Case

N/A

Mesh

N/A

Compression

N/A

Part Number

MSCR-03-01-0100

Description  
Tank - 6 gallon

Part Number  
MSCR-05-01-0000

Description  
Upper Body

Part Number  
MSCR-02-01-0600

Description  
3 way Std. Female Connector

Part Number  
MSCR-06-01-0000

Description  
Thermistor Assembly

Part Number  
MSCR-04-03-0000

Description  
Filter/Mount Assembly

Part Number  
MSCR-01-01-0700

Description  
Mototron Controller

MSCR-03-04-0000

Manual Fill Cap Assembly

MSCR-05-02-0000

Lower Body

MSCR-02-01-0700

Fuse Holder with Cap

MSCR-06-01-0200

Thermistor

MSCR-04-03-0100

Filter Assembly

MSCR-01-02-0000

Relay

MSCR-03-04-0100

Cap (w/ gasket)

MSCR-05-03-012

12 Volt Coil

MSCR-02-01-0800

Fuse - 20 Amp

MSCR-06-01-0500

Thermistor Plug (Drilled)

MSCR-04-03-0110

Housing (filter)

MSCR-01-02-0100

Powerview Display Unit

MSCR-03-04-0200

Gasket w/ton - cap

MSCR-05-03-0024

24 Volt Coil

MSCR-02-01-2000

Pin - Standard Conn.

MSCR-06-02-0100

Thermistor Boss

MSCR-04-03-0120

Element (filter)

MSCR-01-02-0100

Powerview Display Unit

MSCR-03-04-0300

Lanyard Wire

MSCR-05-03-0100

Bobbin

MSCR-02-10-1000

Mototron Wiring Harness

MSCR-06-03-0000

Blk. pressure sensor/hose assy

MSCR-04-03-0200

3/8" Tee

MSCR-01-02-0200

Bracket - Display Unit

MSCR-03-04-0400

Lanyard Clamp

MSCR-05-04-0000

O-ring (coil)

MSCR-06-03-0100

Wiring Harness

MSCR-06-03-0100

Blk. pressure sensor assy

MSCR-04-03-0300

Spacer

MSCR-01-02-0300

Mount Screw - Display Unit

MSCR-03-05-0000

Level Sensor Assembly

MSCR-05-05-0000

O-ring (lower body)

MSCR-02-10-2000

Assembly Connector

MSCR-06-03-0110

Blk. pressure sensor

MSCR-04-03-0400

Hex hd cap screw

MSCR-01-02-0400

Hex Nut - Display Unit

MSCR-03-05-0020

Level Sensor Connector assy

MSCR-05-06-0000

Bottom plate

MSCR-02-10-0300

20' Motobus Extension Cable

MSCR-06-03-0200

Hose Assembly

MSCR-04-03-0500

lockwasher

MSCR-03-05-0100

Level Sensor (w/ gasket)

MSCR-05-07-0000

Retaining nut

MSCR-02-10-0310

Ext. Cable w/ resistor

MSCR-06-03-0300

Extra long elbow

MSCR-04-03-0600

Reducing Bushing 3/8" to 1/4"

MSCR-03-05-0200

Hex Soc. Cap Scr. Level Sensor

MSCR-05-08-0000

Thermal shield

MSCR-02-10-0400

Relay Connector

MSCR-06-03-0400

Female Connector

MSCR-04-03-0700

Pipe nipple (close nipple)

MSCR-03-05-0300

Flat Washer - Level Sensor

MSCR-05-09-0000

Injector Gasket

MSCR-02-10-0410

Relay Terminals

MSCR-06-03-0500

Backpressure snubber

MSCR-04-03-0800

Male Push-On Elbow

MSCR-03-06-0000

Drain plug (3/8" NPT)

MSCR-05-10-0008

Orifice Plate .005 X .005

MSCR-02-10-0100

Motobus Hub

MSCR-06-04-0000

Injector Mounting Assembly

MSCR-04-03-0900

Hose Swivel - Male

MSCR-03-07-0000

Drain plug (1" NPT)

MSCR-05-10-0008

Gasket Seal

MSCR-02-10-0010

Motobus Connector

MSCR-06-04-0100

Bracket - Injector Mount

MSCR-04-03-1000

Pressure Sensor (Urea)

MSCR-03-08-0000

Elbow (3/8" X .62)

MSCR-05-10-0008

Valve (finished)

MSCR-02-10-0011

Motobus Terminator

MSCR-06-04-0200

Stud - Injector mount

MSCR-04-03-1100

Hose Assembly

MSCR-03-09-0000

Label

MSCR-05-10-0008

Spring, Valve

MSCR-02-10-0012

Motobus Conn Terminal

MSCR-06-04-0300

Hex Nut - Injector mount

MSCR-04-03-1110

Hose (feet)

MSCR-03-10-0000

Stationary Breather

MSCR-05-14-0000

Restrictor Orifice .025

MSCR-02-10-0013

Motobus Conn Wire Seal

MSCR-06-04-0400

Washer - Injector mount

MSCR-04-03-1120

Hose End - Female

MSCR-03-11-0000

Heater Assembly

MSCR-05-15-0000

Shim

MSCR-02-10-0014

Motobus Conn Cavity Plug

MSCR-06-05-0000

Nox Mount Assembly

MSCR-04-03-1200

Straight Connector #6 to #4

MSCR-03-12-0000

DC/DC Converter

MSCR-05-15-0000

Mobile Breather

MSCR-02-10-0015

Dummy Plug

MSCR-06-05-0100

Nox Boss (Sensor Mount)

MSCR-04-03-1300

Hose Assembly - injector - #4

MSCR-03-13-0000

1/2" X 1/2" FNPT 90° Elbow

MSCR-05-16-0000

1/2" X 1/2" FNPT 90° Elbow

MSCR-02-10-0016

Murphy to Motobus Cable Assy

MSCR-06-05-0200

Nox Plug

MSCR-04-03-1400

Hose Assembly - injector - 90

MSCR-03-13-0200

1/2" to 3/8" Reducer

MSCR-05-16-0000

1/2" to 3/8" Reducer

MSCR-02-12-0100

Bus to key on and CAN

MSCR-06-07-0000

Back press Sensor Boss

MSCR-04-04-0100

Gear Pump

MSCR-03-14-0000

1/4" Ball Valves

MSCR-05-16-0000

3/8" Ball Valves

MSCR-02-13-1000

24 to 12 volt conversion jumper

MSCR-06-08-0000

Load Sensor

MSCR-04-04-0200

Motor

MSCR-03-15-0000

3/8" Ball Valves

MSCR-05-16-0000

3/4" to 1/2" Reducer

MSCR-02-14-1000

Main Assembly

MSCR-06-10-0000

Weld Kit

MSCR-04-04-0215

Filter to adapter screws #4x1/2"

MSCR-03-16-0000

Ceramic Ferrits for studs

MSCR-05-16-0000

3/4" to 1/2" Reducer

MSCR-02-14-1100

Exceptions to main harness

MSCR-06-11-0000

Humidity Sensor

MSCR-04-04-0220

Loctite Coating

MSCR-03-17-0050

1/4" X 3/4" studs

MSCR-05-17-0000

1/4" X 3/4" studs

MSCR-02-14-1200

CAN 12V power, gnd assemblies

MSCR-06-11-1100

Humidity Sensor Connector

MSCR-04-04-0230

2" Hose Clamps

MSCR-03-17-0100

1/4" X 3/4" studs

MSCR-05-17-0100

1/4" X 3/4" studs

MSCR-02-14-1300

General Harness (1) pwr.gnd assemblies

MSCR-06-11-1200

2.2K Ohm Resistor

MSCR-04-04-0240

3" Hose Clamps

MSCR-03-17-0200

1/4" X 1" studs

MSCR-05-17-0200

1/4" X 1" studs

MSCR-02-14-1400

stationary box 12v harness

MSCR-06-11-1200

MSCR-04-04-0250