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June 30, 2003

To Whom It May Concern:

The following submittal represents a summary of Mack Trucks, Inc.'s progress in implementing the following programs in accordance with the Consent Decree .

### **REQUIREMENTS FOR ON-ROAD HDDEs**

All developmental work on the Mack Trucks EPA 02 Project, for Paragraph 20 of Consent Decree, to bring into production product that meets the required emissions standards, effective October 1, 2002, has been completed.

### **COMPLIANCE AUDITING AND IN-USE TESTING**

#### ***In-Use Testing Program:***

In compliance with Section VIII B. In-Use Testing Program of the Consent Decree, Mack Trucks has implemented a program to ensure that diesel engines manufactured or modified by Mack meet the requirements of the Consent Decree when driven under conditions which can reasonably be expected to be encountered during normal vehicle operation and use, and also to evaluate the effectiveness of other design changes aimed at reducing emissions. Three of the four Phases have been completed

Phase I and Phase II:

All the work and other required items required by the Consent Decree and Settlement Agreement for Phases I and II of this program have been completed and approvals received as required.

The Phase III report has been submitted to U.S. EPA.. In addition, EPA has been provided with the actual Phase III In-use testing data from West Virginia University.

Mack Trucks has begun initial stages of vehicle selection for Phase IV testing. The incorporation of EPA approved ECU parameters in MEMS data acquisition is in process.

## **ADDITIONAL INJUNCTIVE RELIEF**

### ***Low NOx Rebuild Kit Status:***

In compliance with Section IX, B. Low NOx Rebuild Program of the Consent Decree, Mack Trucks Inc. implemented a program to reduce NOx emissions from Mack's Model Year 1994 and later MHDDE and HHDDE Pre-Settlement Engines by providing Low NOx rebuild kits for these engines. Since the inception of the program, Mack is reporting that 971 kits have been installed through May 2003.

### **Additional Injunctive Relief / Offset Projects**

#### ***1. NOx Incentive Plan: Paragraph 84 of the Consent Decree***

In accordance with Paragraph 84 of the Consent Decree, Mack Trucks, Inc. has removed 112,500 tons of excess NOx out of the air by reducing these emissions from pre-settlement engines, and by producing engines with lower than required emissions from Model Year 2000 through 2002 engines. A revised Scope of Work is being developed to address the remaining 25% reduction in NOx to a total required 150,000 tons of excess NOx removed.

#### ***2. California Offset Plan: Paragraph 85(a) of the Consent Decree***

The Phase I development work has been completed and has resulted in the certification of a natural gas-fueled engine family to the 2.5 g/bhp-hr NOx+NMHC and 0.05 g/bhp-hr PM limits for this phase of the program.

The Phase II development work has been completed and has resulted in the certification of a natural gas-fueled 425 hp engine family to the 2.5 g/bhp-hr NOx+NMHC and 0.05 g/bhp-hr PM limit.

The Phase III development work has also been completed and has resulted in the certification of a natural gas-fueled 425 hp engine family to the 2.0 g/bhp-hr NOx+NMHC and 0.05 g/bhp-hr PM limit.

Since the engines developed for Phase III also met the requirements for Phase II, Mack intends to fulfill the placement requirements for both Phases with Phase III engines. Customer acceptance of Phase II and III placements vehicles remains dependent upon resolution of the reliability problems experienced with Phase I type vehicles. The plan is to place two vehicles in service by the end of 2003, two vehicles by the end of first quarter 2004, and two additional vehicles by the end of the second quarter, 2004.

Phase IV: Mack Trucks, Inc. is in the final stages of signing a contract with NREL, which will result in supplementary funding for development technologies to improve engine efficiency.

## **ADDITIONAL INJUNCTIVE RELIEF**

### **3. Selective Catalytic Reduction : Paragraph 85(b) of the Consent Decree**

All ten SCR-equipped vehicles were placed at customer fleets in mid-2002. Eight are located at United Parcel Service in Stratford, CT and two are located at New York City Department of Sanitation. Urea consumption rates are being reported on a weekly basis for each truck. Three trucks have been tested at West Virginia University using their portable chassis dynamometer and laboratory-grade emissions analyzers. A report from WVU will be available in July. The funded portion of this project will conclude in mid-2004 after a second round of WVU emissions tests. Continuation of SCR operation after mid-2004 must be decided by customer fleets. NESCAUM will quantify emissions reduced during the project.

### **4. Particulate Aftertreatment : Paragraph 85(b) of the Consent Decree**

150 vehicles have been retrofitted with diesel oxidation catalysts in 2002 and 2003. These vehicles are refuse trucks located at New York City Department of Sanitation and several Waste Management sites throughout New England. DOCs require no maintenance and will remain in service for the life of the vehicle or device. NESCAUM will confirm that all devices were installed as planned and quantify the emissions reduced during the project

35 vehicles are to be retrofitted with passively-regenerating catalyzed diesel particulate filters. Currently six trucks have been retrofitted with mixed success. Exhaust temperatures were datalogged at candidate fleets for the DPF supplier to approve applications. Supplier selected trucks are to be retrofitted with DPFs formulated for standard diesel fuel and DPFs formulated for ultra low sulfur diesel fuel. Three DPFs were installed on trucks using standard diesel fuel and three were installed on trucks using ULSD fuel. Two DPFs have failed on trucks using standard diesel. This has called to question the selection process and the supplier is currently analyzing the failed units. Project leaders are considering reorienting the selection criteria toward only fleets using ULSD fuel. These issues will result in the project continuing into 2005. NESCAUM will confirm the installations and quantify the emissions reduced during the project.

## ADDITIONAL INJUNCTIVE RELIEF

### **5. Ultra-low In-cylinder Emissions Engine: Para 85 (c) of the Consent Decree**

*Summary of APCRS (Amplified Piston Common Rail System) project to date:*

The APCRS project has evolved from fuel injection hardware developed by Bosch and evaluated on their flow bench test stand , to a system that has since been adapted to the Mack PLN (pump-line-nozzle), high swirl cylinder head, non-EGR, E7 engine. Early work at Mack involved machining modifications to the PLN cylinder heads to accept the common rail injector arrangement. A mock-up engine was built to help determine how to best locate and mount components including the rail and the amplifier piston modules; to determine the routing and proper sizing of injection tubes (from the supply pump to rail to amplifiers to nozzles); to incorporate leak-off tubes and associated accumulators ; to adapt various modifications required to the front timing gear arrangement for the gear driven fuel pump; to fabricate various heat shields to protect the amplifiers . Additionally a wiring harness was fabricated that was designed to incorporate two modules to control the fuel system and a third module managing engine functions.

After finalization of the mock-up, a test engine was built and installed in a test cell capable of steady-state and transient emissions testing. This engine consists of high swirl cylinder heads, no EGR; 800 bar fuel rail; amplification capabilities that are 2.8 times rail pressure. Initial engine start-up occurred on April 29 with Bosch engineers present at Mack. Start-up was excellent with no fuel leaks and only a few minor wiring anomalies and software problems, which were resolved. Since then testing has included a regimen of various test points throughout the engine operating range to evaluate the functionality of the system on a 6 cylinder engine. We are thoroughly evaluating the functionality of this fuel system, determining any limitations as well as durability issues, and assessing repeatability of performance and emissions data. Currently we are trying to resolve a vibration related problem that has caused several injection tube failures (between the supply pump and rail) – this has greatly disrupted test activity. Strain gauge testing is currently in progress to design brackets to eliminate these failures.

A test matrix across the engine operating range has been planned to evaluate performance and emissions data, plus at a later date include heat release traces, to use to evaluate the APCRS system and the flexibility it provides in rate shaping and other injection strategies for ultra low emissions. To date this testing has just begun, and will take several months to complete.

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On Behalf of Mack Trucks, Inc.

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