State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-161
Relating to Exemptions under Section 27156
of the Vehicle Code

GALE BANKS ENGINEERING
TURBOCHARGER KIT MODEL NO. 6.9F FOR FORD HEAVY-DUTY VEHICLES
POWERED BY A 6.9 LITER INTERNATIONAL HARVESTER
HEAVY-DUTY DIESEL ENGINE

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the add-on turbocharger kit Model No. 6.9F manufactured by Gale Banks Engineering, 546 Duggan Avenue, Azusa, California 91702, using a Rotomaster turbocharger Model No. T04B with an A/R ratio of 1.0 has been found not to reduce the effectiveness of required motor vehicle pollution control devices and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1983 through 1986 model-year Ford Motor Company heavy-duty vehicles powered by a 6.9 liter International Harvester heavy-duty diesel engine.

Modifications to the OEM emission-related parts due to the installation of the turbocharger kit include an air cleaner assembly, a new 3" low-restriction muffler and 3" diameter exhaust pipe.

This Executive Order is valid provided that installation instructions for this device will not recommend tuning the vehicle to specifications different from those submitted by the device manufacturer.

Changes made to the design or operating conditions of the device, as exempted by the Air Resources Board, that adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of this device using an identification other than that shown in this Executive Order or marketing of this device for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of a kit shall not be construed as an exemption to sell, offer for sale, or advertise any component of a kit as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of this device may have on any warranty either expressed or implied by the vehicle manufacturer.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF THE GALE BANKS ENGINEERING TURBOCHARGER KIT FOR INSTALLATION ON FORD MOTOR COMPANY VEHICLES POWERED BY A 6.9 LITER INTERNATIONAL HARVESTER HEAVY-DUTY DIESEL ENGINE.

No claim of any kind, such as "Approved by Air Resources Board" may be made with respect to the action taken herein in any advertising or other oral or written communication.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

Section 43644 of the Health and Safety Code provides as follows:

> "43644. (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executed at El Monte, California, this 10th day of March, 1986.

K. D. Drachand, Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF GALE BANKS ENGINEERING'S ADD-ON TURBOCHARGER KIT MODEL NO. 6.9F FOR INSTALLATION IN FORD MOTOR COMPANY HEAVY-DUTY VEHICLES POWERED BY A 6.9 LITER INTERNATIONAL HARVESTER HEAVY-DUTY DIESEL ENGINE

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EVALUATION OF GALE BANKS ENGINEERING'S ADD-ON TURBOCHARGER KIT MODEL NO. 6.9F FOR INSTALLATION IN FORD MOTOR COMPANY HEAVY-DUTY VEHICLES POWERED BY A 6.9 LITER INTERNATIONAL HARVESTER HEAVY-DUTY DIESEL ENGINE

by

Mobile Source Division

State of California
AIR RESOURCES BOARD
9528 Telstar Avenue
El Monte, CA 91731

SUMMARY

Gale Banks Engineering (Banks) has applied for exemption from the prohibitions in Vehicle Code Section 27156 for their add-on turbocharger kit Model No. 6.9F designed for 1983-1986 Ford Motor Company heavy-duty vehicles which are powered by the International Harvester 6.9 liter heavy-duty diesel engine.

Banks has submitted a completed application and all the required information as well as comparative exhaust emissions data which shows that their kit does not have an adverse effect on the emissions from the vehicles described in the application.

The staff recommends that Banks be granted an exemption for their add-on turbocharger kit and that Executive Order D-161 be issued.

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I. INTRODUCTION

Gale Banks Engineering (Banks) of 546 Duggan Avenue, Azusa, California 91702, has applied for exemption from the prohibitions of Vehicle Code Section 27156 for their add-on turbocharger kit Model No. 6.9F for 1983-1986 Ford Motor Company heavy-duty vehicles powered by the 6.9 liter International Harvester heavy-duty diesel engine.

Banks has submitted a completed application, all the necessary information and comparative exhaust emissions data.

II. CONCLUSION

Based on the submitted information and the comparative exhaust emissions tests performed on a 1985 Ford F-250 heavy-duty diesel truck, the staff concludes that the installation of the Banks turbocharger kit Model No. 6.9F will not adversely affect exhaust emissions from the vehicles for which the exemption has been requested.

III. RECOMMENDATIONS

The staff recommends that Banks be granted an exemption for this turbocharger kit for use on 1983-1986 Ford Motor Company heavy-duty vehicles powered by the 6.9 liter International Harvester heavy-duty diesel engine and that Executive Order D-161 be issued.

IV. TURBOCHARGER KIT DESCRIPTION

The purpose of the Banks turbocharger system is to increase the power output of the engine by increasing the volumetric efficiency of it by compressing the intake charge to pressures above that of the atmosphere. This

increased pressure allows a greater charge density to enter the combustion chamber providing more oxygen for combustion. The maximum fuel delivery is slightly increased in order to maintain proper air-fuel ratios with the increased air flow from the turbocharger when it is providing positive manifold pressure (boost).

The major components of the system include a 1.0 A/R ratio Rotomaster Model No. T04B turbocharger, custom intake and exhaust tubing, air cleaner assembly, brackets, hoses and the hardware necessary to complete the installation.

Maximum positive manifold pressure is limited to 7 psig by the size of the turbine and the compressor. The maximum engine speed is regulated by the OEM fuel injection governor which is not modified by the installation of the kit. Therefore, by controlling maximum engine speed, maximum turbine speed and corresponding boost pressures are also controlled.

No OEM emission controls are removed or disconnected when the turbocharger kit is installed.

V. TURBOCHARGER KIT EVALUATION

Evaluation of the Banks turbocharger kit included analysis of all submitted information to confirm that it meets the requirements for the exemption as well as a comparison of the submitted exhaust emissions data.

The test vehicle was a 1985 Ford F-250 pick-up with an automatic transmission. Banks had requested in writing that the 1986 Ford heavy-duty diesel vehicles be included in the exemption. The certification documents show no difference between the 1985 and 1986 vehicles. For this reason the 1985 Ford truck was an acceptable test vehicle.

Banks performed baseline (unmodified) exhaust emissions tests at Olson Engineering using the "Test Program for Add-On Turbocharger Kits for Heavy-Duty Engines". Olson compiled the results of the steady-state tests in grams/mile (g/mi) rather than concentrations in parts/million (ppm) as specified in the "Test Program". Realizing the discrepancy, the staff determined that if the device test results were compiled in the same manner, the comparative value of the results would be retained.

After confirmatory baseline tests had been performed at the Haagen-Smit Laboratory, the vehicle was returned to Banks for turbocharger installation. The Olson device test results as compiled and submitted from Banks showed passing results. The results of the ARB confirmatory tests, however, showed failure. At this point a re-evaluation of the submitted device test data was performed and it was found that this data showed failure also. There was no correlation between the Olson g/mi data and the ARB ppm data so the vehicle was returned to Banks with notice of failure.

Upon further evaluation of all the test data, Banks determined that the inconsistencies in the test results could have been caused by a malfunctioning fuel injection pump. Therefore, Banks had the fuel injection pump inspected and calibrated at a qualified facility. Banks then performed additional device testing at a different independent laboratory, FCI International Testing, Inc. The test results were consistent so Banks performed post baseline tests. Upon analysis of the new test data, Banks determined that the back-pressure in the exhaust system was too great to allow the turbocharger to supply enough air to the engine to achieve optimum combustion with respect to emissions.

To solve the back-pressure problem, Banks designed a 3-inch diameter exhaust system to replace the OEM 2.5 inch diameter system. The new system includes all the tubing and a new 3-inch low-restriction muffler which are included in the kit.

After this modification, device tests were performed at FCI and showed passing results. Confirmatory testing was again scheduled and the test vehicle was delivered to the ARB laboratory. At this time, the ARB laboratory was experiencing difficulties with its new diesel exhaust gas analytical train. The vehicle was retained at the laboratory for 10 days, at which time it was determined that several weeks would be required to repair the laboratory's diesel train.

Because of this, the confirmatory testing was canceled and the FCI test data was the only comparative emissions test data used for the evaluation. The data are shown in the following table.

FCI Steady-State Test Results

Mode	Exhaust Emissions (ppm) HC	CO	NOx
Baseline Idle	11.8	20.0	123.0
Turbo Idle	13.3	20.0	107.0
Baseline 20 mph	14.8	20.0	95.0
Turbo 20 mph	16.3	23.3	83.3
Baseline 30 mph	17.7	31.5	101.0
Turbo 30 mph	19.2	36.6	81.0
Baseline 40 mph	20.7	56.7	127.0
Turbo 40 mph	20.0	61.5	122.0
Baseline 50mph	28.2	73.3	191.0
Turbo 50 mph	26.7	80.0	173.0
Baseline 55 mph	37.1	86.7	226.0
Turbo 55 mph	38.6	93.3	199.0

VI. DISCUSSION

The FCI steady-state test indicates that HC and CO emissions at some test points were slightly increased, however, the increases are only a few ppm which are well within the sensitivity limits of the instruments. The NOx emissions were decreased at every test point.

The initial tests showed failure of the turbocharger kit, however, Banks determined the cause of the failure and corrected it. The new data generated at FCI demonstrates compliance with the requirements for the exemption.

FILE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 6 1986

OFFICE OF
AIR AND RADIATION

Mr. Jack Schwendener
Gale Banks Engineering
546 Duggan Avenue
Azusa, California 91702

Dear Mr. Schwendener:

Thank you for your letter of March 21, 1986 concerning the installation of your aftermarket turbocharging system on Ford heavy-duty vehicles. You enclosed a copy of the California Air Resources Board (CARB) Executive Order D-161 which applies to 1983-1986 model year Ford heavy-duty vehicles powered by a 6.9 liter International Harvester heavy-duty diesel engine.

Section 203(a)(3)(A) of the Clean Air Act (Act), as amended, prohibits any person from removing or rendering inoperative any emission control device or element of design installed on or in a motor vehicle or motor vehicle engine prior to its sale and delivery to an ultimate purchaser, and prohibits a dealer or manufacturer from knowingly removing or rendering inoperative any such device or element of design after such sale and delivery and the causing thereof. The maximum civil penalty for a violation of this section is $10,000.

Section 203(a)(3)(B) of the Act prohibits fleet operators and persons engaged in the business of servicing, repairing, selling, leasing, or trading motor vehicles or motor vehicle engines from knowingly removing or rendering inoperative any emission control device or element of design installed on or in a motor vehicle or motor vehicle engine after its sale and delivery to the ultimate purchaser and the causing thereof. The maximum civil penalty for a violation of this section is $2,500.

Mobile Source Enforcement Memorandum No. 1A (copy enclosed) sets out the policy of EPA with regard to enforcement of the tampering prohibition in pertinent part as follows:

"1. Unless and until otherwise stated, the Environmental Protection Agency will not regard the following acts, when performed by a dealer, to constitute violations of section 203(a)(3) of the Act:

* * *

(b) Use of a nonoriginal equipment aftermarket part or system as an add-on, auxiliary, augmenting, or secondary part or system, if the dealer has a reasonable basis for knowing that such use does not adversely affect emissions performance;

* * *

3. For purpose of clauses (1b) and (1c), a reasonable basis for knowing that a given act will not adversely affect emissions performance exists if:

(a) the dealer knows of emissions tests which have been performed according to testing procedures prescribed in 40 CFR 85 [now 40 CFR 86] showing that the act does not cause similar vehicles or engines to fail to meet applicable emission standards for their useful lives (5 years or 50,000 miles in the case of light-duty vehicles); or

(b) the part or system manufacturer represents in writing that tests as described in (a) have been performed with similar results; or

(c) a Federal, State or local environmental control agency expressly represents that a reasonable basis exists. (This provision is limited to the geographic area over which the State or local agency has jurisdiction.)"

The term "dealer" in Memorandum 1A applies to new car dealers, fleet operators, and persons engaged in the business of servicing, repairing, selling, leasing, or trading motor vehicles or motor vehicle engines.

CARB determined that a reasonable basis exists that the installation of Gale Banks Engineering turbocharging kit No. 6.9F on Ford heavy-duty vehicles powered by a 6.9 liter International Harvester heavy-duty diesel engine does not adversely affect emissions performance, and has issued Executive Order D-161 to that effect. EPA accepts the determination of CARB as satisfying the reasonable basis criteria of Mobile Source Enforcement Memorandum No. 1A regarding the use of Gale Banks Engineering turbocharging kit No. 6.9F on 1983-1986 model year Ford heavy-duty vehicles powered by a 6.9 liter International Harvester heavy-duty diesel engine. Acceptance of the CARB determination is extended to the use of these systems in any of the States and is not limited to California.

This determination does not constitute a certification, accreditation, approval, or any other type of endorsement by the EPA of any claims concerning pollution control or any other alleged benefits of the turbocharging kits. No claim of any kind, such as "Approved [or certified] by Environmental Protection Agency", may be made with respect to the action taken herein in any advertising or other oral or written communication. Furthermore, this determination is subject to all the limitations set out in California Executive Order D-161.

EPA has expressly reserved in 4(b) of the memorandum the right to proscribe, in the future, an act such as the installation of certain devices, as prohibited by the Federal tampering prohibition. Such proscription, if appropriately published, would be deemed conclusive that such an act will adversely affect emissions performance and the use of the affected device would, therefore, constitute a violation of section 203(a)(3) of the Act.

I hope this sufficiently responds to your request. If not, please contact Mr. Robert Greco of my staff at (202) 475-8838.

Sincerely yours,

Richard G. Kozlowski
Director
Field Operations and Support Division

Enclosure