State of California
AIR RESOURCES BOARD

**Final Statement of Reasons for Rulemaking,
Including Summary of Comments and Agency Responses**

PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE VERIFICATION PROCEDURE, WARRANTY AND IN-USE COMPLIANCE REQUIREMENTS FOR IN-USE STRATEGIES TO CONTROL EMISSIONS FROM DIESEL ENGINES

Public Hearing Date: March 23, 2006
Agenda Item No.: 06-3-2

I. GENERAL

On March 23, 2006, the Air Resources Board (ARB or Board) conducted a public hearing to consider amendments to the Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (Procedure), which are contained in title 13, California Code of Regulations (CCR), sections 2700 through 2710. The Staff Report: Initial Statement of Reasons for Rulemaking, entitled "Proposed Amendments to the Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines" (ISOR), was made available to the public beginning February 3, 2006. The ISOR, which is incorporated by reference herein, contains a description of the rationale for the proposed amendments. The Final Statement of Reasons for Rulemaking (FSOR) updates the ISOR by summarizing written and oral comments received during the 45-day public comment period.

Following the public hearing, the Board, by Resolution 06-9, adopted amendments to the Procedure that affect title 13, CCR, sections 2702, 2703, 2704, 2706, 2707, and 2709. The adopted amendments revise the Procedure's limit on emissions of nitrogen dioxide (NO_2) from diesel emission control systems, add provisions to enable more accurate and representative NO_2 measurements, and create new verification levels by which to classify verified systems. Other minor changes to the regulations relate to the requirements for verification extensions and design changes, the warranty report deadline, and the relationship between verification and other legal requirements. The authority and reference notes for each section were added to the Final Regulation Order, which was attached to the Form 400 Notice Publication/Regulations Submission Facesheet.

Economic and Fiscal Impacts. The Board determined that the proposed regulatory action will not create costs or savings, as defined in Government Code section 11346.5(a)(5) and (6), to any state agency or in federal funding to the state, costs or mandate to any local agency or school district whether or not reimbursable by the state

pursuant to part 7 (commencing with section 17500), Division 4, Title 2 of the Government Code, or other non-discretionary savings to local agencies.

The Board's Executive Officer has also determined that pursuant to Government Code section 11346.5(a)(3)(B) the regulations will not affect small business because use of the Procedure by businesses is purely voluntary. For those businesses that choose to use the Procedure to verify products and those businesses that already have verified products, any economic impacts will likely be positive because more products will be able to comply with the revised NO_2 emissions limit than the original one. Therefore, in accordance with Government Code section 11346.9(a)(5) no alternatives that would lessen the adverse economic impact on small businesses were considered.

Consideration of Alternatives. For the reasons set forth in the ISOR and this FSOR, the Board has determined that no alternative considered by the agency, or that has otherwise been identified and brought to the attention of the agency, would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective or less burdensome to affected private persons than the action taken by the Board.

II. SUMMARY OF COMMENTS AND AGENCY RESPONSES

At the March 23, 2006 hearing, both oral testimony and written comments were received from:

Dr. Joseph Kubsh – Manufacturers of Emission Controls Association (MECA)
Bonnie Holmes Gen – American Lung Association of California (ALAC)
Julian Imes – Donaldson Company, Incorporated

All of the oral testimony supported staff's proposal. The written submissions were comments on the proposed amendments and were received within the comment period. The ALAC comment letter was jointly submitted by Patricia Monahan of the Union of Concerned Scientists (UCS), Diane Bailey of the Natural Resources Defense Council (NRDC), and Bill Magavern of Sierra Club California (SCC).

Additional written comments were received from:

Kevin Brown – Engine Control Systems (ECS)
Marty Lassen – Johnson Matthey, Inc. (JM)
Michael Eaves – California Natural Gas Vehicle Coalition (CNGVC)

The ECS and JM letters supported staff's proposal in general, and the CNGVC letter expressed opposition. ECS also submitted a confidential comment letter. Staff took the confidential information in the letter into consideration and discussed the comments directly with ECS.

Below is a summary of each objection or recommendation made regarding the proposed regulatory actions, together with an explanation of how the proposed action was changed to accommodate each objection or recommendation, or of the reasons for making no change. The comments have been grouped by topic wherever possible. Comments not specifically directed towards the rulemaking or to the procedures followed by ARB in this rulemaking are not summarized below.

A. Limit on Emissions of NO_2

1. Comment: The Coalition does not feel that relaxing the NO_2 standard is warranted given CARB's recognition that some control devices on the market are capable of meeting the current NO_2 slip requirement of 20%. The creation of a "Level 3 Plus" category is in recognition that some manufacturers are exactly where CARB wants them to be regarding performance of their particulate matter (PM) control technologies. Designation of "Plus" performers without requiring this technology to be used is just a smokescreen to accept lesser performance from other manufacturers. CARB's staying the course with its existing regulations will do more to push manufacturers into compliance than relaxing the standards until 2009. (CNGVC)

   Agency Response: While it is true that three Level 3 diesel retrofit systems would comply with the 20 percent NO_2 emissions limit due to take effect January 1, 2007, they are suitable for use in a limited number of applications. Staff believes that many manufacturers of retrofit systems will not be able to comply with the January 1, 2007, NO_2 emissions limit and will be driven from the market unless it is amended. If the NO_2 limit is not amended soon to allow for the use of more control devices, the use of effective diesel PM controls will be curtailed after January 1, 2007. In turn, Californians will realize significantly fewer health benefits because the health risk posed by increased PM emissions outweighs the health risk posed by potential NO_2 emission increases that may occur if the proposed amendments take effect. Staff believes that manufacturers will have considerable incentives to comply with the amended standard. Please see the discussion in the ISOR at pages 12 through 20, which is incorporated by reference in this Response.

B. Plus Level Classifications

2. Comment: We believe that the Plus level designation doesn't need to apply only to systems that comply with the 2009 NO_2 emission limit ahead of schedule. We would suggest that if a system could control crankcase emissions in addition to tailpipe emissions that it also receive the Plus designation. (Donaldson)

   Agency Response: The Plus system was specifically designed to identify systems that are compliant with the 2009 NO_2 standard. The system distinguishes low-NO_2 systems from other systems and gives air quality regulators a tool with which to further mitigate emissions of NO_2 as necessary. Including crankcase emissions in the consideration of Plus level designations would only confuse end users as to

whether or not a system is compliant with the 2009 NO_2 standard. None of the proposed amendments in this rulemaking were intended to address how the Procedure considers or characterizes diesel PM emission reductions.

3. Comment: We recommend that CARB implement a "plus" designation for traps that do not increase any NO_2. CARB's current proposal would allow traps that meet the 2009 NO_2 requirement early to be labeled as a "plus" control. However, given the health impacts of increased NO_2, we believe only traps that hold NO_2 levels constant should be granted the "plus" designation. (ALAC, UCS, SCC, NRDC)

   Agency Response: Adopting a definition for the Plus designation that requires diesel particulate filters (traps) to cause no increase in NO_2 emissions would exclude low-NO_2 catalyzed filters from the Plus designation. This would be undesirable because although the catalyst used by such filters increases emissions of NO_2, it also effectively reduces emissions of toxic polyaromatic hydrocarbons, other hydrocarbons, and carbon monoxide. Therefore, low-NO_2 technology should be eligible for the Plus designation. Also, if only those filters that do not increase emissions of NO_2 were to qualify for the Plus designation, the only verified technology that would qualify is the uncatalyzed, plug-in filter. This would be undesirable because, while these filters do not increase emissions of NO_2, neither do they reduce emissions of hydrocarbons and carbon monoxide nearly as well as catalyzed filter technology.

4. Comment: The Plus designation should not be used to redefine the Best Available Control Technology (BACT). (JM, Donaldson, ALAC, UCS, SCC, NRDC)

   Agency Response: Staff clarified at the public hearing that neither the current Procedure nor the proposed amendments define BACT, and instead only define new levels by which to categorize verified systems. Whether the Plus levels ultimately may be designated as BACT or not will depend on individual incentive programs or fleet regulations that are not part of this rulemaking.

5. Comment: JM would encourage ARB to continue to verify product on a level basis without regard to NO_2 enabling competitive technologies to compete on a fair playing ground. (JM)

   Agency Response: Formally recognizing systems with lower NO_2 emissions can be useful in reducing NO_2 emissions from retrofitted diesel vehicles and equipment. The Plus levels provide air quality regulators with another piece of information that they may consider, but are not required to consider, when they craft plans for meeting the air quality needs of a given region. See also the response to Comment 4, which is incorporated by reference here.

C. Additional Pre-Conditioning Requirements

6. Comment: ECS requests Board confirmation that paragraphs two and three of Section 3.3 of the ISOR outline distinct amendments for the pre-conditioning of new and aged units respectively. (ECS)

   Agency Response: This comment is not specifically directed at the proposed rulemaking. Nevertheless, we confirm that paragraph two clearly describes pre-conditioning requirements for new units and paragraph three clearly describes pre-conditioning requirements for aged units. Specifically, the 25 to 30 hour pre-conditioning procedure for new units does not apply to aged units or to units retrieved from the field for in-use compliance testing. This distinction is also clearly expressed in the regulatory text being added in title 13, CCR, section 2706(a)(4).

7. Comment: ECS requests that staff still be allowed to accept other pre-conditioning procedures (i.e. 2007 new engine certification procedures) for new and aged units if such procedures are equally or more stringent as supported by engineering arguments. ECS recommends to the Board that ARB staff should be allowed to accept alternative pre-conditioning requirements to facilitate introduction of future new emission control strategies or in cases where other procedures may be more cost effective for the manufacturer but equally or more stringent than the proposed amendment. (ECS)

   Agency Response: The consideration of alternative procedures is unnecessary. Based on conversations with ECS, staff believes that the comment is motivated by a misunderstanding that the 25 to 30 hour pre-conditioning procedure applies to all units that are tested. Staff has already clarified (see response to Comment 6) that this procedure is limited to only the new unit an applicant must test, not the aged unit or the multiple in-use compliance units that must also be tested.

   The 25 to 30 hour pre-conditioning procedure staff proposes already provides considerable flexibility. The applicant may choose to repeat one of several standard test cycles as described on page D-1 of the ISOR. Both transient and steady-state test cycles are accepted. A single cycle is prescribed only if an applicant chooses to pre-condition on a chassis dynamometer, which staff expects to be rarely used. Applicants have the additional option of conducting two forms of steady-state high-load operation for up to 10 hours of the 25 to 30 hour period.

   In addition to being unnecessary, allowing the consideration of additional alternatives to the proposed pre-conditioning options would slow application review time and could further reduce the comparability of NO_2 emissions data from one system to another. As described on pages 11 and E-1 of the ISOR, the additional pre-conditioning requirements apply to systems whose NO_2 emissions could be influenced by the amount of soot and ash present in the system at the time of testing. Allowing an even greater variety of pre-conditioning procedures than those proposed in the ISOR would allow new units to be placed in a more diverse range of

states prior to testing. This would make the test results ultimately received from units tested under these more diverse conditions less reliable and comparable because the conditions they may have been tested under are more diverse and difficult to relate to one another. Having more alternatives moves further away from the ideal of all units being in the same state prior to testing and reduces staff's ability to compare the performance of different systems in a meaningful way.

D. Test Engine Requirements

8. Comment: ECS does not support this amendment as written and asks the Board to either reject the proposed 15% NO_2 limit for test engines, or, alternatively, the Board could direct ARB staff to conduct further study in this area and delay implementation of this requirement until 2009. ECS has been advised by ARB staff that the current proposed 15% NO_2 limit for test engines represents two standard deviations from the average of data reviewed by staff to date. ECS advises the Board that basing a limit on this criterion does not adequately address issues related to the variability in engine-out NO_2 emissions observed from identical test engines. (ECS)

   Agency Response: The NO_2 emissions limit for test engines helps to ensure that the increase in NO_2 emissions caused by a system during emissions testing is representative of the system's propensity to form NO_2. If a test engine has unusually high baseline NO_2 emissions, it is conceivable that an emission control system could increase the NO_2 fraction by a smaller increment than if the baseline NO_2 level had been lower, all other variables being equal (such as residence time, temperature, soot loading, etc). With a higher initial concentration of NO_2 (the reaction product) and a lower initial concentration of nitric oxide (NO) (one of the reactants), a lower overall oxidation rate of NO could result. Therefore, testing a single engine with high NO_2 may not reveal the effect of a system on more typical diesel engines (see the discussion on pages B-2 and B-3 of the ISOR.

   ECS points out that the limit as stated does not address issues related to how a given test engine's NO_2 emission level may vary over time. We agree that an engine with variable NO_2 emissions over time can pose a problem if at one point in time it is acceptable for verification testing but at another time it is not. ECS gave two examples of engines with which this would have been the case. An applicant could incur a significant financial loss if an engine's NO_2 emissions were found to exceed 15 percent on the day its product was scheduled to be tested. While this potential risk is unfortunate, it is acceptable given the importance of ensuring a sound determination regarding the propensity of a system to increase NO_2 emissions. An incorrect determination can potentially result in many thousands of in-use diesel engines being retrofit with a high-NO_2 system, thus adversely impacting air quality.

E. Modeling

9. Comment: Staff has indicated that it has modeled the impacts of the relaxed regulation and has deemed the environmental degradation minor. The Coalition

recently became aware of a July 2005 CRC report (Project E-55/59 Phase 2 Final Report, July 12, 2005) that indicates that in-use oxides of nitrogen (NOx) emissions from heavy duty trucks are much higher than anticipated given the lower engine certification requirements that have been implemented over the years. The Coalition questions whether these much higher in-use NOx emissions have been factored into the NO_2 modeling effort as the higher in-use emissions documented in the report will substantially change NO_2 modeling results. (CNGVC)

Agency Response: To model regional air quality impacts, staff used the 2003 State Implementation Plan (SIP) emissions inventory for the year 2010. Although the 2003 SIP inventory does not use the specific results of the recent study that CNGVC cites, it nevertheless does account for the higher in-use NOx emissions from heavy-duty trucks (the so-called "off-cycle" NOx emissions) using similar, earlier studies as a basis.

10. Comment: The Coalition also questions whether the NO_2 modeling reflects the roadside emissions modeling for congested urban areas as ground level NO_2 emissions have been found to be a factor in London where PM traps are common. Did the modeling also look at the NO_2 impacts on the interior of school buses (as PM retrofits are a high priority for the Clean School Bus Program)? (CNGVC)

    Agency Response: Staff analyzed several near-source or “micro-scale” NO_2 exposure scenarios: driving on a diesel-dominated freeway (the 710), riding in a self-polluting, filter-equipped diesel school bus, and following behind a filter-equipped diesel school bus. All three scenarios are applicable to an urban setting with the latter two being universally applicable. Even for a simultaneous occurrence of all three scenarios, staff found that the 1-hour ambient air quality standard for NO_2 is not exceeded when using retrofits that meet staff’s proposed NO_2 emissions limit. Note that both of the school bus scenarios examined NO_2 concentrations in the cabin. The analysis of the scenario involving a vehicle following behind a filter-equipped school bus relied on actual exhaust dilution measurements that were made from inside one school bus following another school bus (see the discussion on pages 19 and 20 of the ISOR.

    Virtually all of the filters in London are designed to maximize the production of NO_2 and were never subject to any NO_2 restrictions. Staff found the design used in London to have some of the highest NO_2 emissions of any retrofit on the market and does not expect the same situation to occur in California.