State of California
AIR RESOURCES BOARD

Updated Informative Digest

PUBLIC HEARING TO CONSIDER REQUIRING CERTAIN CALIFORNIA LIGHT- AND MEDIUM-DUTY VEHICLES TO BE SUBJECT TO FEDERAL TIER 2 EXHAUST STANDARDS, AND ADOPTING ADDITIONAL EXHAUST EMISSION STANDARDS FOR HEAVY-DUTY GASOLINE VEHICLES AND ENGINES

Sections Affected: Amendments to title 13, California Code of Regulations (CCR), section 1961 and the incorporated "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," and section 1956.8 and the incorporated "California Exhaust Emission Standards and Test Procedures for 1987 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles." Adoption of the incorporated new "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles."

Amendments Affecting Light- and Medium-Duty Vehicles

Background – The California LEV I and LEV II Programs. The Air Resources Board (ARB or Board) adopted the second phase of its Low-Emission Vehicle (LEV II) program for passenger cars, light-duty trucks and medium-duty vehicles following a November 1998 hearing. These regulations are a continuation of the original Low-Emission Vehicle (LEV I) program adopted in 1990. Both the LEV I and LEV II regulations include three primary elements: (1) tiers of exhaust emission standards for increasingly more stringent categories of low-emission vehicles, (2) a mechanism requiring each manufacturer to phase-in a progressively cleaner mix of vehicles from year to year with the option of credit banking and trading, and (3) a requirement that a specified percentage of passenger cars and lighter light-duty trucks be ZEVs, vehicles with no emissions.

The LEV I regulations. The LEV I program established four low-emission vehicle categories to which a car or light truck could be certified: Transitional Low-Emission Vehicle (TLEV), Low-Emission Vehicle (LEV), Ultra Low-Emission Vehicle (ULEV) and ZEV. The medium-duty vehicle categories are LEV, ULEV, Super Ultra Low-Emission Vehicle (SULEV) and ZEV. Vehicles could also be certified to the preexisting “Tier 1” exhaust emission standards. Each low-emission vehicle category has a progressively more stringent standard for exhaust emissions of nonmethane organic gas (NMOG), a precursor of ozone pollution. For example, passenger car LEVs and ULEVs have to meet standards for NMOG that are respectively about one-third and one-sixth of the corresponding 1994 Tier 1 standard. The identical LEV and ULEV standard for oxides of nitrogen (NOx) represents a 50% reduction from the 1994 Tier 1 NOx standard.

All cars have been subject to the same low-emission vehicle standards, regardless of weight. However, heavier light-duty trucks and medium-duty vehicles were allowed to have greater emissions for a given low-emission vehicle category. There were two weight categories for light-duty trucks (LDT1 and LDT2) and four weight categories for medium-duty vehicles (MDV2, MDV3, MDV4 and MDV5).

Under LEV I, each year a manufacturer may produce cars and LDT1s certified to any combination of emission categories – TLEV, LEV, etc. – as long as its full model line meets the annual NMOG fleet average requirement. The required fleet average NMOG emissions level starts at the Tier 1 level for the 1994 model year. It then becomes incrementally more stringent through the 2003 model year, when the level for cars and LDT1s was derived from a potential mix of 75% LEVs, 15% ULEVs and 10% ZEVs. The heavier light trucks in the LDT2 category are subject to numerically higher fleet average NMOG emissions requirements reflecting the numerically higher TLEV, LEV and ULEV standards and the absence of a ZEV requirement for these vehicles. Medium-duty vehicles have separate requirements based on a percent phase-in schedule. The standards for chassis-certified medium-duty vehicles are phased in between the 1998 and the 2004 model years, at which point a manufacturer is required to certify at least 60% LEVs and 40% ULEVs.

The LEV II regulations. The LEV II amendments include three major interrelated exhaust emissions elements. The first is restructuring the light-duty truck category so that all former light-duty trucks, and all former medium-duty vehicles having a gross vehicle weight (GVW) of less than 8,500 lbs., will generally be subject to the same exhaust emission standards as passenger cars. Only vehicles having a GVW of 8,500-14,000 lbs. would remain as medium-duty vehicles in LEV II. These include the heaviest SUVs and pickup trucks, such as the Ford Excursion and Dodge Ram 2500.

Second, the Board adopted new LEV II standards for the LEV, ULEV and SULEV categories which are more stringent than the corresponding LEV I standards in several respects. Most importantly, the NOx standard for LEV and ULEV cars was reduced by 75% compared to LEV I. The Board eliminated the car and light truck TLEV standards after the 2003 model year; it concluded that the more stringent standards for the remaining vehicle emission categories could be met by a full range of gasoline and alternative fuel vehicles, making it inappropriate to allow substantially higher NOx and particulate levels to assure availability of diesel cars and light trucks. The overall LEV II emission standards for medium-duty vehicles were tightened to be substantially equivalent in stringency to the light-truck standards (although numerically higher).

Manufacturers are generally required to phase-in certification of vehicles to the LEV II emission standards in place of the LEV I standards between the 2004 and 2007 model years. Car and current light truck models are to be certified to the LEV II standards at a rate of at least 25/50/75/100% during 2004-2007, although alternative plans can be approved. A manufacturer of vehicles classified as medium-duty under both LEV I and LEV II (8501-14,000 lbs. GVWR) must phase-in at least one test group a year to the LEV II standards, with full compliance by 2007. Vehicles that are medium-duty under

LEV I but will be in the light truck category under LEV II do not have to be certified to the LEV II standards until the 2007 model year, when 100% compliance is required.

Third, the LEV II regulations provide for continuing yearly reductions in the annual fleet average NMOG requirement from the 2004 through 2010 model years. The 2010 level for cars and LDT1s was derived from a possible mix of 18% LEVs, 47% ULEVs, 25% SULEVs and 10% ZEVs. LEV II changes the required mix of medium-duty LEVs and ULEVs to at least a 40/60 starting with the 2004 model year. Because of the stringent LEV II NOx standards, most of the LEV II emission benefits are NOx reductions.

The Federal Tier 2 Program. On December 21, 1999, the U.S. Environmental Protection Agency (U.S. EPA) issued its Tier 2 regulations, which establish new more stringent exhaust emission requirements for all U.S. light- and medium-duty vehicles not subject to the California standards, starting with the 2004 model year. They are contained in 40 CFR Part 86 Subpart S. Although differing in several respects from the California program, the regulations were designed to be compatible with LEV II and to allow harmonization of federal and California vehicle technology. The Tier 2 regulations establish 10 different emission standard "bins" for cars and light trucks that function in the same manner as the vehicle emission categories (e.g., LEV and ULEV) in the California program. The emission levels for some federal bins fall between those for California's vehicle emission categories, and the least stringent bins allow emissions greater than is allowed for any California LEV II emission category. It is expected that moderately well-controlled diesel engines in SUVs and pickup trucks could meet the federal Tier 2 standards for the least stringent bins.

The Tier 2 regulations employ a fleet average requirement for NOx instead of NMOG. When phase-ins are complete in the 2009 model year, all of the vehicles subject to the LEV II standards for cars and light trucks, along with heavier "medium-duty passenger vehicles" (MDPVs) such as the Ford Excursion, will have to meet a fleet average NOx requirement of 0.07 gram per mile (gm/mi) for each manufacturer. In earlier years there are "interim non-Tier 2" fleet average NOx requirements that must be met by various vehicle categories. All 2004 and later model-year cars, light-trucks and MDPVs must be certified to one of the Tier 2 bins (including an eleventh bin for pre-2008 MDPVs only). There are also mechanisms for early banking of NOx credits.

U.S. EPA's "heavy light-duty truck" category, or HLDT, is equivalent to what California has called MDV2 and MDV3 – the vehicles that are treated as medium-duty vehicles under LEV I but as light-duty trucks under LEV II. Under Tier 2, none of these vehicles can be certified to a NOx standard greater than 0.6 g/mi after the 2003 model year. During the 2004-2006 model years an increasing proportion (25/50/75%) are grouped with the manufacturer's MDPVs and made subject to an "interim non-Tier 2" fleet average NOx requirement of 0.20 g/mi. They do not all become subject to the Tier 2 fleet average NOx requirement of 0.07 g/mi until the 2009 model year.

The Board's New Regulatory Action. Although the LEV II program is ultimately more stringent than Tier 2, U.S. EPA's treatment of the HLDT category during 2004-2006 is

significantly more aggressive than under LEV II. Instead of adopting interim requirements or a graduated phase-in, the ARB chose to allow manufacturers to focus most resources on developing emission control systems to meet the LEV II light truck standards. This meant the vehicles could be certified to 120,000 mile LEV I NOx standards of 0.6 g/mi (for MDV2) and 0.9 g/mi (for MDV3) until the 2007 model year when the LEV standard for these vehicles will be 0.07 g/mi. In estimating the emission impacts of the LEV II program, the ARB staff projected that manufacturers would in practice certify at least one model to the LEV II light-duty truck standards each year to avoid excessive workload demands for the 2007 model year. But now that manufacturers will be required to make progressively cleaner federal HLDTs during 2004-2006 under Tier 2, the Board has adopted new amendments to assure that these cleaner vehicles are marketed in California.

The amendments provide that, whenever a manufacturer federally-certifies a 2004 or subsequent model-year passenger car, light-duty truck or medium-duty vehicle model to a federal Tier 2 emissions bin that is more stringent than an applicable California emissions category and does not have an identical California emission counterpart, the equivalent model in California will have to be certified either to a more stringent California emissions category or to the federal standards for the Tier 2 emissions bin. There is an exception for clean fuel fleet vehicles, and a manufacturer may opt to use the mechanism for 2003 or prior model-year vehicles.

Model equivalency will be determined based on whether the federal model is identical to the California with respect to manufacturer, make and model, cylinder block configuration (L-6, V-8 etc.), displacement, combustion cycle, transmission class, aspiration method and fuel. Comparative stringency will be based on the combined NMOG plus NOx standards for 100,000 or 120,000 miles. For purposes of compliance with the fleet average NMOG requirements and calculating vehicle emission credits, the vehicles will be considered to be certified to the next less stringent LEV II vehicle emissions category. The manufacturer will still be required to meet other applicable California emissions and phase-in requirements, such as evaporative emission standards, on-board diagnostics, emissions warranty, and California emission labels; however, a 2004 or earlier model-year vehicle in the federal heavy light-duty truck or medium-duty passenger vehicle classes may at the manufacturer's option be subject to the federal requirements for evaporative emissions and OBD II.

Since the Tier 2 program allows manufacturers to build higher-emitting SUVs and pickup trucks as long as their emissions are offset by cleaner cars, the ARB staff expects manufacturers may at times certify federal vehicles with especially low emissions. The amendments would assure that equivalent California models would have the same emissions performance. The Tier 2 requirements may also trigger some lower-emitting MDPVs in the 2004-2006 model years, and these vehicles would also be covered.

The amendments also include several minor changes to the LEV II provisions to correct errors and update the certification language consistent with the Tier 2 requirements.

For example, the amendments eliminate unintended instances where requirements for small volume manufacturers are more stringent than those for other manufacturers. As with LEV I, small volume manufacturers will be allowed to delay implementation until the end of the phase-in years.

Amendments Affecting Heavy-Duty Gasoline Vehicles and Engines

On July 31, 2000, U.S. EPA issued new regulations reducing the exhaust emission standards for non-methane hydrocarbons (NMHC) plus NOx from heavy-duty Otto-cycle (gasoline) engines (over 8,500 pounds GVW) from 4.0 grams per brake horsepower-hour (g/bhp-hr) to 1.0 g/bhp-hr. Although the existing California 2003 and later model standard of 2.5 g/bhp-hr is more stringent than the preexisting federal standard, California would benefit by adopting the new federal 1.0 g/bhp-hr standard. Therefore, the Board has also adopted amendments that harmonize California's standards for these engines with the more stringent emission standards now being required federally.

There are three compliance options in the federal rule that allow a manufacturer to select the best approach for its product line. Option 3 has been designated as the primary NMHC plus NOx standard at 1.0 g/bhp-hr and is scheduled for introduction with the 2005 model year. The other two options allow manufacturers to delay compliance with this standard by certifying to an interim emission level in the 2003 or 2004 model years but at a less stringent level of 1.5 g/bhp-hr. The Board has adopted all of these options with a few minor adjustments.

Although the federal regulations treat all heavy-duty engines over 8,500 pounds GVW as one category, the California regulations divide these engines into two categories – one for engines used in incomplete medium-duty gasoline vehicles 8,500 to 14,000 pounds GVW and another for engines used in all gasoline vehicles over 14,000 pounds GVW. The new federal standards apply to both categories of engines for NMHC and NOx. However, the Board has retained the existing California medium-duty carbon monoxide (CO) standard of 14.4 g/bhp-hr be retained for ULEVs, and has adopted new standards of 0.5 g/bhp-hr NMHC + NOx, 7.2 g/bhp-hr CO, and 0.025 g/bhp-hr formaldehyde for optional medium-duty SULEV engines.

Finally, the amendments reorganize the test procedures that govern the certification of heavy-duty Otto-cycle engines. The amendments follow the approach used in the earlier revisions to the test procedures for light- and medium-duty vehicles, tracking the organizational structure of the federal certification procedures to make it easier for manufacturers to compare them.