State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

ERRATA

STAFF REPORT: INITIAL STATEMENT OF REASONS SUPPLEMENTAL REPORT

PROPOSED DIESEL PARTICULATE MATTER CONTROL MEASURE FOR ON-ROAD HEAVY-DUTY RESIDENTIAL AND COMMERCIAL SOLID WASTE COLLECTION VEHICLES

Public Hearing Date: September 25, 2003
Date of Supplement Report: August 8, 2003
Release date for Errata: August 15, 2003

This errata corrects statements in the Supplemental Report related to the calculation of premature deaths avoided and the U.S. Environmental Protection Agency's costs for deaths avoided. The corrected statements within the Supplemental Report follow. The underlined text, with the exception of the caption "Primary Diesel PM," indicates where text has been revised. The balance of the Supplemental Report is otherwise the same as released on August 8, 2003.

The corrected Supplemental Report replaces the version posted to the Air Resources Board's rulemaking WebPages on August 11, 2003.

Release date for errata and corrected report:
August 15, 2003

Errata

On page 3 of the executive summary, paragraphs 2 and 3 are replaced with these paragraphs:

> In the Staff Report, we estimated that cancer risk from diesel particulate matter (PM) would be reduced by a factor of ten in the highest exposure areas as a result of this rule. For this supplemental staff report, staff has analyzed the effect of diesel PM emissions reductions on premature deaths. ARB estimates that eighty premature deaths will be reduced by year 2020. Prior to 2020, cumulatively, it is estimated that three deaths would be avoided by 2006, thirty-six deaths avoided by 2010, and sixty-six by 2015.
>
> The estimated present value of cost of control per premature death prevented, or life saved, is $900,000 based on attributing half of the cost of controls to reduce diesel PM. Compared to the present value of $4.2 million to $5.9 million using U.S. EPA's value of avoiding one death, this rule is a very cost-effective mechanism of preventing premature deaths caused by diesel PM.

On pages 7 and 8, these paragraphs are replaced with the following language:

> Primary Diesel PM**.** Lloyd and Cackette (2001) estimated that, based on the Krewski *et al.* (2000) study[1], diesel $PM_{2.5}$ exposures at level of 1.8 $\mu g/m^3$ resulted in a mean estimate of 1,985 cases of premature deaths per year in California. The diesel PM emissions corresponding to the direct diesel ambient population-weighted PM concentration of 1.8 $\mu g/m^3$ is 28,000 tons per year (CARB 2000). Based on this information, we estimate that reducing 14.11 tons of diesel PM emissions would result in one fewer premature death (28,000 tons/1,985 deaths). Comparing the $PM_{2.5}$ emission before and after this regulation, the proposed regulation is expected to reduce emissions by 2,260,000 lbs. (or 1,130 tons) at the end of year 2020, and therefore prevent an estimated eighty premature deaths by year 2020. Prior to 2020, cumulatively, it is estimated that three deaths would be avoided by 2006, thirty-six deaths avoided by 2010, and sixty-six by 2015.

[1] Although there are two mortality estimates in the report by Lloyd and Cackette (2001) – one based on work by Pope *et al.* (1995) and the other based on Krewski *et al.* (2000), we selected the estimate based on the Krewski's work. For Krewski *et al.,* an independent team of scientific experts commissioned by the Health Effects Institute conducted an extensive reexamination and reanalysis of the health effect data and studies, including Pope *et al*. The reanalysis resulted in the relative risk being based on changes in mean levels of $PM_{2.5}$, as opposed to the median levels from the original Pope *et al.* study. The Krewski *et al*. reanalysis includes broader geographic areas than the original study (63 cities vs. 50 cities). Further, the U.S. EPA has been using Krewski's study for its regulatory impact analyses since 2000.

If we multiply 14.11 tons of diesel PM emissions by the average present value of cost-effectiveness of $32 per pound (or $64,000 per ton), the estimated cost of control per premature death prevented is about $900,000 in 2002 dollars. The U. S. EPA has established $6.3 million (in year 2000 dollars) for a 1990 income level as the mean value of avoiding one death (U.S. EPA 2003). As real income increases, the value of a life may rise. U.S. EPA further adjusted the $6.3 million value to $8 million (in 2000 dollars) for a 2020 income level. Assuming that real income grew at a constant rate from 1990 and will continue at the same rate to 2020, we adjusted the value of avoiding one death for the income growth. Since the control cost is expressed in 2002 discounted value, accordingly, we discounted values of avoiding a death in the future back to the year 2002. In U.S. EPA's guidance of social discounting, it recommends using both three and seven percent discount rates (U.S. EPA, 2000a). Using these rates, and using the annual avoided deaths as weights, the weighted value of reducing a premature future death discounted back to year 2002 is $4.2 million at seven percent discount rate, and $5.9 million at three percent. The cost per death avoided because of this proposed regulation is 4.7 to 6.6 times lower than the U.S. EPA's benchmark for value of avoided death. This rule is, therefore, a cost-effective mechanism to reduce premature deaths that would otherwise be caused by diesel PM emissions without this regulation.

On page 9, paragraph 3 is replaced with the following text:

If we multiply 669 tons of NOx emissions by the average present value of cost-effectiveness of $1.29/lb ($2,580 per ton) (see Section IX), the estimated cost of control per premature death prevented is about $1.7 million. This value is again lower than the U.S. EPA's present value of a life by 2.5 to 3.5 times.

On pages 21 and 22, beginning with the last paragraph on page 21, the text is replaced with the following language:

As discussed earlier in section III.E.5.a., this rule is also estimated to cost $900,000 per premature death prevented, or life saved. Staff estimates that, on average, the reduction in diesel PM emissions because of this rule will result in the prevention of eighty premature deaths by year 2020. Compared to present value of the U.S. EPA's value of avoiding one death at $4.2 million to $5.9 million, this rule is a very cost-effective mechanism of preventing premature deaths caused by diesel PM.