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Arnold Schwarzenegger
Governor

TO: Honorable Board Members

FROM: James N. Goldstene
Executive Officer

DATE: October 27, 2009

SUBJECT: INFORMATION REGARDING THE PM2.5 MORTALITY STAFF REPORT

I am writing regarding our efforts to ensure the validity of the scientific basis of the ARB report "Methodology for Estimating Premature Deaths Associated with Long-term Exposures to Fine Airborne Particulate Matter in California" (PM2.5 Mortality staff report) in light of concerns about the professional credentials and honesty of Hien Tran, the lead staffer for compiling the report. This issue was raised in testimony at the September Board meeting during the consideration of the Research Plan for the 2009-10 Fiscal Year.

In summary, a rigorous independent scientific peer review was conducted prior to the report's release, and the report was later re-reviewed in light of the concerns about Mr. Tran's role. The report is a compilation of published, peer reviewed health research -- not original research on health effects. Nevertheless, Mr. Tran's representations about his credentials were damaging to the integrity of ARB's mission, and disciplinary actions have been taken. All of the reviewers found that the report conclusions were well founded and properly supported. Further information on how we addressed these issues and reached this conclusion is presented below.

General Background

The PM2.5 Mortality staff report was used to update estimates of premature deaths that could be avoided by reducing exposure to particulate matter (PM), including diesel PM. ARB staff previously estimated that diesel PM was responsible for 2200 deaths in year 2000. This was based on diesel PM exposures in a 1998 report reviewed by the California Environmental Protection Agency's (Cal/EPA's) Scientific Review Panel and a 6% increase (uncertainty interval of 2% to 11%) in all-cause mortality for a 10 $\mu\text{g}/\text{m}^3$ increase in PM2.5 based on a major 16-year nationwide study of 319,000 individuals by Professor Arden Pope of Brigham Young University (BYU) and colleagues published in a peer-reviewed article in 2002. The 6% increase was in alignment with the findings of the United States Environmental Protection Agency (U.S. EPA) and other organizations. A peer-reviewed publication in 2005 for the Los Angeles subset (22,905 individuals) of

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the national study by Pope and colleagues found a 17% increase (uncertainty interval of 5% to 30%). In March 2006, the Board asked staff to review all available evidence on the relationship between PM2.5 and premature death. A draft report was presented to the Board and public on May 22, 2008 and concluded a 10% (uncertainty interval of 3% to 20%) increase in all-cause mortality for a 10 $\mu\text{g}/\text{m}^3$ increase in PM2.5. The PM2.5 Mortality staff report was finalized October 24, 2008, and ARB staff now estimate that diesel PM was responsible for 3,500 deaths in year 2005.

Last December, it was alleged by Professor James Enstrom of the University of California at Los Angeles that Mr. Hien Tran did not hold a doctorate in statistics from University of California at Davis, as was claimed in a letter from Cal/EPA Secretary Linda Adams to Dr. Stanley Young of the National Institute of Statistical Sciences. We immediately investigated this allegation and found that Mr. Tran did not have a doctorate degree from University of California at Davis, as Mr. Tran had led us to believe. We did verify that Mr. Tran holds a Master of Science degree in statistics from University of California at Davis, had completed all of the requirements for advancement to candidacy for the Ph.D. degree program, and was considered by his advisor to be a current student.

Overall Efforts to Determine the Scientific Credibility of the PM2.5 Mortality Study

The PM2.5 Mortality staff report went through three levels of formal, independent, external peer review before the report was finalized, and did not rely upon the health research or original work of ARB staff. However, in light of the concerns about Mr. Tran's credentials and honesty, in late April we asked all ten advisors and external reviewers (identified below) to re-review the report. Seven of them responded within three weeks and confirmed their original comments on the report. Two additional reviewers did the same this month. Despite continued attempts, we have not heard from the tenth reviewer. Two of our advisors recommended that we independently reproduce any calculations done by Mr. Tran, but, since he had not done any original work, this was not possible. The calculations in the report were actually performed by other ARB staffers using standardized, publicly available U.S. EPA software. For the reasons summarized below, we continue to be confident of the validity of the conclusions of the PM2.5 Mortality staff report.

First, we only used scientific publications from the open peer-reviewed literature. We considered 78 peer-reviewed scientific journal articles (including Professor Enstrom's publication) and eight reports from the National Academies of Science, the U.S. EPA and the World Health Organization. We did not include secondary literature, such as books or opinion pieces.

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Second, we received comments throughout the process, including review of the final report, from three advisors: Professor Jonathan Levy of Harvard University, Professor Arden Pope of BYU, and Dr. Bart Ostro of Cal/EPA's Office of Environmental Health Hazard Assessment. They publish frequently in the areas of air pollution and statistical relationships with premature death, the main subject of our report, and concurred with our findings.

Third, our draft report was reviewed following the Cal/EPA external scientific peer review guidelines for independent review. In this process, the University of California at Berkeley Institute of the Environment selects the peer reviewers without input from staff. Candidates were accepted as reviewers only if their disclosure information showed they had no conflict of interest related to the report. The six reviewers identified by University of California at Berkeley and selected by the Cal/EPA Project Director to review the proposed methodology in the PM_{2.5} Mortality staff report were: Dr. Jeff Brook from Environment Canada, Professor Mark Eisner of University of California at San Francisco, Professor Richard Flagan of the California Institute of Technology, Professor Alan Hubbard of University of California at Berkeley, Professor Joel Kaufman of the University of Washington, and Professor Joel Schwartz of Harvard University. Collectively, their expertise is based on research in the areas of chronic obstructive pulmonary disease related to air pollution, statistical analysis of epidemiological data, particle formation and measurements in air, air quality risk management, air pollution and daily mortality associations, and epidemiology. They all concurred with our basic conclusions.

In addition, the report went through several levels of informal internal review. Linda Tombras Smith, a Ph.D. in Chemistry (with a Biochemistry thesis topic) from University of California at San Diego with lead experience on PM and other major ambient air quality standard reviews, oversaw the entire project and reviewed all versions of the report. Dr. Smith was Mr. Tran's direct supervisor.

At the request of the Engine Manufacturers Association, the diesel PM exposure estimates were reviewed by Professor Philip Hopke of Clarkson University. Professor Hopke was supportive of the basic conceptual framework of ARB's approach and thought the results were reasonable. He asked for a clear statement of assumptions and some additional information. These were included in the final report.

At the request of Board Chairman Mary Nichols, ARB staff convened a panel of worldwide PM health effects experts to discuss two important aspects of the staff report, the threshold of PM_{2.5} health effects and the linearity of the dose-response relationship. Participants included U.S. EPA, Environment Canada, the World Health Organization, the Chairs of U.S. EPA's Clean Air Scientific Advisory Committee and Cal/EPA's

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Scientific Review Panel, the Health Effects Institute, and several internationally recognized academic researchers. There was general concurrence on the issues discussed.

Actions to Address the Improper Claim by Mr. Tran of a Doctorate from UC Davis

Mr. Tran recognized the gravity of his actions and voluntarily took a two-level demotion that removed him from management responsibilities. He was reassigned to another group and is no longer involved in health impact analyses. The Research Division pursued an adverse action that resulted in a 60-day suspension without pay, which Mr. Tran served in the spring. This action took into consideration that there is no evidence that Mr. Tran's work was affected or in error and possession of a doctorate was not required for his position or projects.

Conclusion

In conclusion, the PM2.5 Mortality staff report underwent a rigorous and independent peer review that went well beyond the norm, and we continue to stand behind the results and the methodology that is used to calculate the premature deaths avoided with ambient PM2.5 reductions. ARB staff continues to fully support the use of the report's findings in our programs to reduce PM2.5 and diesel PM.

On a related issue, we are increasing our requirement to confirm credentials for new employees, and existing employees seeking promotions.

If you have any questions, please contact me at 916-445-4383 or jgoldstone@arb.ca.gov, or contact Bart Croes, Chief of the Research Division, at 916-323-4519 or bcroes@arb.ca.gov.

cc: Bart E. Croes, P.E.
Chief, Research Division

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