

## **ARB Staff Responses to Peer Reviews**

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### Don Lucas

Comment: page 3 paragraph 6.

In the charge of the Air Resources Board, The Environmental Policy Council must consider the emission of air pollutants, including greenhouse gases. However, there seems to be no or little discussion on this point in the documents provided.

Response:

The comment is noted and the report "Assessment of Emissions of Lubrizol's PuriNOx Water/Diesel Emulsion on Exhaust Emissions from Heavy-Duty Diesel Engines" has been updated to include a discussion on greenhouse gases.

Comment: page 4 paragraph 4

Ozone precursors are compared using the change in mass emissions for NOx and ROCs. The NOx decreases by 14% while the ROCs increase by 87%. However, the total mass emissions of NOx are higher, so for each ton of increased ROG emissions, the NOx will decrease by 3.4 tons. I caution against using either percentage changes or mass changes to evaluate the ozone forming potential from PuriNOx emissions. I would prefer that the changes be incorporated into a model that predicts ozone levels in the same targeted areas (South Coast and Sacramento), or at least discuss the directional change expected from the PuriNOx emissions. This could be done for each targeted area, or discussed in more general terms, such as NOx or hydrocarbon limited scenarios.

Response:

The discussion on ozone precursors in the report "Assessment of Emissions of Lubrizol's PuriNOx Water/Diesel Emulsion on Exhaust Emissions from Heavy-Duty Diesel Engines" has been updated to include a discussion on the directional change in ozone for the Sacramento Valley and South Coast air basins and in the context of NOx and hydrocarbon limited scenarios.

Comment: page 5 paragraph 6

While the potential for a release of the bulk additive is relatively small, transport by rail or tanker truck may not be as well controlled as the PuriNOx fuel itself, since the fuel will be used in centrally fueled facilities. The potential for a rail accident was recently revisited when the U.S. Supreme Court rejected California's attempt to bolster rail standards for a mountain grade in Siskiyou County near the Sacramento river that was the site of a chemical spill in 1991. While I agree that the greatest chance for spills will

be where the fuel is stored and distributed, the possibility of an accident outside these facilities is not zero. It might be useful to ask Lubrizol if they have any documents that consider accidents or release scenarios for their production facilities that are outside of California, where larger amounts of the additives are handled.

Response:

Based on Dr. Lucas's comment, Lubrizol will be requested to provide any documents that they have considered accidents or release scenarios for their production facilities that are outside California where larger amounts of additives are handled.

Comment: page 6 paragraph 6

There is a recognized need to standardize emission test methods and analytical test methods for diesel engines. While adoption of standards will require considerable effort and time (and is certainly outside the scope of this study), efforts should continue towards this goal.

Response:

Staff agree with Dr. Lucas that standardized emission test methods and analytical methods for diesel engines need to be further developed and are encouraging efforts towards achieving this goal.

Comment: page 7 paragraph 3

In the cover letter of this report, Lubrizol request that "Generation 1, Generation 2, and future related additive formulation utilizing chemical compositions fall within the scope of the multimedia comparative analysis ..." Given the differences in the formulation of Gen1 and Gen2 additive packages, and the scarcity of data from Gen2 fuels, I do not think that such a blanket approval should be granted, and that Lubrizol should discuss any changes in the formula(s) with the multimedia working group before being allowed to use another formula. Allowances for small changes in relative component levels could be made, but the introduction of any new chemicals should be reviewed.

Response:

Staff agree with Dr. Lucas and staff's recommendation for the Environmental Policy Council approval is for Gen1 and Gen2 additive formulations. Any change to the formulation that could cause a potential adverse impact to public health and environmental impact would require a further separate multi-media assessment.

## **Tom McKone**

Comment: page 5 paragraph 4

Based on my peer review of all relevant documents and correspondence, I believe there is sufficient information provided to support the recommendation of the multimedia working group that "limited and controlled use of PuriNOx as described in the multimedia assessment does not pose a significant adverse impact on public health and the environment." But I recommend that this statement be amended to say "... does not pose a significant adverse impact on public health and the environment relative to other clean diesel fuels approved for use in California."

Response:

Based on Dr. McKone's comment, staff has modified the reference statement to say, "Find that the limited and controlled use of PuriNOx as described in the multimedia assessment does not pose a significant adverse impact on public health and the environment as compared to California diesel fuel".

Comment: page 8 paragraph 2

The ARB found and other agencies confirmed that for both the Gen 1 and Gen 2 PuriNOx formulations, diesel PM emission are significantly reduced compared to CARB diesel. However, they did not consider how this reduction applies across the size distribution of PM. Is it uniform across the particle size distribution, skewed toward larger particles or skewed toward the fine or ultra-fine particles? The answer to this question has implications for the ultimate health benefits of this PM reduction.

Response:

Staff recognizes Dr. McKone's comment on particle size distribution and limited studies are available that compare the size distribution of PM. The studies are inconclusive partly because the methodology to measure ultra-fine particles are not sufficiently developed to obtain representative PM distribution differences between PuriNOx and CARB diesel fuel. Until better analytical techniques are available this cannot be done.

Comment: page 8 paragraph 4

The Lubrizol report in particular and even some of the Cal-EPA reports, either directly state or imply that the purpose of the multimedia evaluation is to demonstrate that a release of PuriNOx fuel will not have an adverse impact compare to ULSD. But other Cal-EPA reports tend to focus on the impact of using PuriNOx as a fuel. I think it is important that this issue is addressed consistently among the reports. That is, it should be clearly stated that the multimedia evaluation is used to demonstrate that the use of

PuriNOx and its associated infrastructure will not have an adverse impact on human health and the environment relative to competing technologies.

Response:

Staff recognizes Dr. Mckone's comment and emphasizes that the multimedia evaluation is used to demonstrate that the use of PuriNOx and its associated infrastructure will not have an adverse impact on human health and the environment relative to California diesel fuel.

## **OEHHA Responses to Peer Review**

# Office of Environmental Health Hazard Assessment



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## MEMORANDUM

**TO:** Catherine Witherspoon  
Executive Officer  
California Air Resources Board

**FROM:** George V. Alexceff, Ph.D., D.A.B.T. *David M. Siegel for*  
Deputy Director for Scientific Affairs

**DATE:** March 22, 2004

**SUBJECT:** SCIENTIFIC PEER REVIEW OF PURINOX™ MULTIMEDIA EVALUATION

Staff of the Reformulated Fuels Assessment Program in the Office of Environmental Health Hazard Assessment (OEHHA) have read the reports of the University of California expert panel convened for scientific peer review of the California Multimedia Working Group's evaluation of impacts of the use of PuriNOx™ fuels in California. The information reviewed by the panel included confidential information submitted by Lubrizol Corporation on PuriNOx™ fuels and the OEHHA document, *Staff Report on Health Impacts of PuriNOx™ Generation 1 and Generation 2 Additive Packages and Diesel Fuels*, evaluating the submitted information.

The peer reviewer's comments in most cases supported the evaluations, conclusions and recommendations in the OEHHA staff report. One exception was the opinion of Dr. Hanspeter Witschi disagreeing with the recommendation that testing for nitrosamines in PuriNOx™ combustion emissions be required. The basis for the OEHHA recommendation is the presence of confidential proprietary components of PuriNOx™ diesel fuels that are plausible nitrosamine precursors and that are not components of diesel fuel meeting current ARB specifications. These components were not identified in the OEHHA staff report because their identification would violate the agreement on product components confidentiality. However, following receipt of Dr. Witschi's report, the plausible precursors have been identified, in confidential communications to members of the Peer Review Panel, that support our contention for the need of this testing.

California Environmental Protection Agency

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Dr. Witschi also stated the opinion that the inhalation exposure study of PuriNOx™ combustion emissions submitted to U.S. EPA was adequate. OEHHA staff agrees that the study was technically adequate, but finds that the interpretation of the results is limited by the lack of a concurrent control group, with exposure to the diesel fuel used to blend the tested PuriNOx™ fuel, in the study. Dr. Witschi expressed the view that, OEHHA staff should have compared toxicity observed following inhalation exposure to PuriNOx™ emissions to toxicity observed following inhalation exposure to conventional diesel emissions in previously conducted studies. OEHHA staff also agree that such a comparison can be useful, but staff can not comment with confidence on whether PuriNOx™ emissions are more or less toxic than conventional diesel emissions without data from a properly conducted concurrent test.

One Peer Review Panel member, Dr. Thomas McKone commented that, "there was a limited effort to look at the PuriNOx components in terms of their multimedia behavior," and recommended a "systematic and well-calibrated multimedia fate assessment." OEHHA staff agree with this comment and support the goal of identifying and using satisfactory methodology for systematic multimedia fate assessment for future reformulated fuel evaluations.

A second limitation noted by Dr. McKone is that "The evaluation reports prepared by Lubrizol and the State lacked any systematic effort to consider uncertainty and the impact that inadequate and incomplete information has on the confidence that should be placed on the finding" of the Multimedia Working Group. OEHHA staff support the goal of a "systematic effort to consider uncertainty" in comparative multimedia impact assessments.

Dr. McKone also commented that "ARB found and other agencies confirmed that for both the Gen 1 and Gen 2 PuriNOx formulations, diesel PM emission are significantly reduced compared to CARB diesel. However, they did not consider how this reduction applies across the size distribution of PM" (particulate matter). OEHHA staff are concerned with the possibility that ultra fine particles less than 50 nm in diameter are more toxic than larger particles. However, OEHHA staff are at present unable to evaluate relationships between fuel formulations and diesel particle size because current technology used for quantifying diesel PM does not quantify ultra fine particle mass and because a dose-response assessment for ultra fine particles has not been developed by OEHHA.

OEHHA staff and management are very appreciative of the work that the ARB has done as lead and coordinator of Multimedia Working Group assessments of reformulated fuels. I would like to thank ARB staff for their assistance to our staff.



Catherine Witherspoon, Executive Officer  
March 22, 2004  
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If you or your staff have any questions regarding this memorandum, please contact Dr. Page Painter by telephone at (916) 327-1094 or by email at: [ppainter@oehha.ca.gov](mailto:ppainter@oehha.ca.gov).

cc: Page Painter, Ph.D., M.D., Chief  
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