STATE OF CALIFORNIA -- THE RESOURCES AGENCY
PETE WILSON, Governor

AIR RESOURCES BOARD
HAAGEN-SMIT LABORATORY
9528 TELSTAR AVENUE
EL MONTE, CA 91731-2990
PHONE: (818) 575-6800

Reference No. RS-91-01

April 23, 1991

TO: All Interested Parties

SUBJECT: Evaluation of Omstar additive D-1280X

Due to interest in the Air Resources Board's (ARB) evaluation of a fuel additive marketed by Omstar Products (D-1280X), a fact sheet has been prepared which delineates the salient points of this test project.

The ARB conducted a screening evaluation which included the use of two types of diesel fuel (commercial low sulfur and certification standard sulfur) and eight diesel-powered trucks supplied by the City of Los Angeles Department of Water and Power. Although the test project did not include a full contingent of diesel trucks representing the current on-road fleet, we believe that the statistical design was adequate to screen the effects of the additive.

Our final conclusions are that the use of D-1280X in diesel fuel can reduce hydrocarbon exhaust emissions, but for the other pollutants (particulates, oxides of nitrogen and carbon monoxide) and fuel economy the results of the study were statistically nonsignificant. Therefore definite conclusions regarding the effect of the additive on the other pollutants and fuel economy cannot be made. Smoke opacity tests were also not part of this study. This is noteworthy since one claim regarding D-1280X is that it will reduce exhaust smoke. We acknowledge a report prepared under ARB contract by Sierra Research, Inc., which contains their separate evaluation and critique of D-1280X. However, the official ARB results are published in a report dated June 1990, entitled "Evaluation of Omstar Diesel Additive D-1280X".

Please see the attached fact sheet for additional information regarding test project. If you have need for further information, please contact Rosalinda Castro, Manager of Aftermarket Parts Section, Mobile Source Division, at (818) 575-6848.

Sincerely,

R. B. Summerfield
Assistant Division Chief
Mobile Source Division

Attachment: D-1280X Fact Sheet

OMSTAR D-1280X FACTSHEET[1]

1. Is certification or approval by the Air Resources Board (ARB) required before an additive is sold in California?

No. The ARB does not certify or approve fuel additives to be marketed in California. If the fuel additive is registered with the Environmental Protection Agency and it does not contain any heavy metals or toxic compounds, it can be sold in California.

2. Does the ARB evaluate fuel additives?

Yes. The ARB is interested in any innovative system or new technology which could reduce vehicle emissions. The ARB has regulations that allow manufacturers of fuel additives to submit engineering evidence and data that support claims of reduced emissions. The ARB will review this information and may agree to perform additional testing. However, due to limited resources, only the most promising fuel additives are tested.

The extent of ARB's participation will depend on the potential emission reductions due to the additive. ARB's testing and evaluation is designed as a screening test to provide a quick analysis of the additive's effect on emissions and fuel economy. The ARB's test results and data cannot be used by the manufacturer for product endorsement.

3. Has the ARB tested the Omstar additive?

Yes. In 1987-1988 the ARB conducted a preliminary evaluation of the Omstar fuel additive (D-1280) utilizing a VW diesel passenger car and Ford heavy-duty diesel truck as the test vehicles. The results of the evaluation showed a significant reduction in hydrocarbon and particulate emissions when the additive was blended in standard sulfur diesel certification fuel. However, because of the small sample size, the ARB was unable to determine if the emission reductions were a result of the additive or due to other testing variables. Thus, a second phase of testing was conducted in late 1988 and early 1989. Eight GM heavy-duty diesel trucks (7500 to 8500 EIW) provided by the Los Angeles Department of Water and Power were tested using a new version of the Omstar additive (D-1280X).

---

1. This fact sheet has been prepared by the ARB to explain its policy regarding the evaluation of additives and to answer questions related to the Omstar D-1280X additive.

4. How were the phase-two vehicles tested?

The Federal Exhaust Emission Test Procedures (urban driving cycle) and Highway Fuel Economy Test Procedures (highway driving cycle) were used to determine the hydrocarbon (HC), carbon monoxide (CO), oxides of nitrogen (NOx), and particulate[2] emissions and fuel economy. The test protocol included duplicate emission testing of the vehicles at 500-mile increments of use (0, 500, 1000 and 1500 miles).

In the first phase, only diesel certification fuel was used. However, in the second phase both diesel certification fuel and commercial fuel were used. The diesel certification fuel contained standard sulfur (0.26-0.38 percent by weight) while the commercial fuel was low sulfur (0.01-0.02 percent by weight) which is typical of diesel fuel sold in the South Coast Air Basin. The eight heavy-duty diesel trucks were divided into the following test groups:

	Certification Fuel	Commercial Fuel
Vehicles with D-1280X	2 trucks	2 trucks
Vehicles without D-1280X	2 trucks	2 trucks

The four vehicles fueled without the additive were considered control vehicles. Control vehicles are used to generate test data that allow quantification of the effects of mileage accumulation as well other variables on the baseline fuel.

5. How does ARB evaluate results from emission testing of the additive?

The ARB performed a statistical analysis to determine the effect of the fuel additive on exhaust emissions and fuel economy. A change in vehicle emissions and fuel economy can be attributed to many parameters e.g. fuel additive, fuel type, mileage accumulation and the test vehicle. The analysis of variance method was used to separate these effects and their statistical significance. A 95 percent confidence level was used to determine the statistical significance of the various effects. This statistical hypothesis allows only a 5 percent chance that a significant effect (due to the additive) will be identified when actually it does not exist.

6. What were ARB's conclusions on Omstar D-1280X based on statistical analysis of the test results?

The results of ARB's statistical analysis of the four paired trucks (second phase) indicated that when D-1280X was blended with standard sulfur diesel fuel, a significant reduction in hydrocarbon emissions was evident on both urban and highway driving cycles. When the additive was blended with low sulfur diesel fuel, a significant reduction in hydrocarbon emissions was evident only on the highway driving cycle. All other test results, including fuel economy were statistically nonsignificant at the 95 percent confidence level.

---

2. Visible smoke (opacity) was not measured in the testing.

7. Based on results of the evaluation program, does the ARB plan additional testing of D-1280X?

No. Testing has confirmed a statistically significant reduction in HC emissions due to the use of D-1280X. Because diesels are a minor source of HC emissions, further evaluation of this effect is not warranted. With respect to the other pollutants and fuel economy, the results of our testing were statistically inconclusive. However, we examined the raw data to help us decide if testing a larger sample of vehicles should be performed. The raw data indicate little or no effect on NOx or particulate emissions, or fuel economy, from the use of D-1280X. Thus we concluded our limited testing resources should not be expended on further testing of the additive.

8. Omstar claimed that during ARB's first testing phase, up to 32 percent HC reductions and 26 percent particulate reductions were detected. Also, a statistical expert hired by the ARB estimated that under the second phase of testing, urban HC was reduced 43 percent and the additive had a significant effect on CO, particulates and NOx. Does the ARB agree with these claims?

The HC and particulate reductions of 32 and 26 percent respectively are raw data points taken from the emissions test results. Raw data points cannot be used in making general statements regarding emission reductions. The emission reductions may also be the result of other factors such as engine condition, mileage accumulation or other fuel parameters. Claims regarding emission reductions resulting from the use of the additive can only be made after the raw data have been statistically analyzed and the effect of the additive separated from these other factors.

The statistical expert, Mr. McAdams, performed an additional statistical analysis slightly different than ARB's. Mr. McAdams' analysis showed HC emissions reduced 43 percent under the urban cycle at a 95 percent confidence level. The ARB analysis showed a similar result, HC emissions were reduced 50 percent. Under Mr. McAdams analysis, CO emissions were also reduced. However since baseline HC and CO emissions from diesels are already relatively low and their contribution to air pollution is small, the magnitude of these reductions would have little impact on air quality. Mr. McAdams analysis also showed adverse impacts on particulate and NOx emissions at the 95 percent confidence level. On the urban driving cycle, the additive in commercial diesel fuel caused particulate emissions to increase. On the highway driving cycle, NOx emissions increased due to the additive in both the commercial and certification fuels. These increases were also detected by the ARB statistical analysis, however, only at lower confidence levels.