California Environmental Engineering
ENVIRONMENTAL TESTING LABORATORY
1061 N. GROVE ST. ANAHEIM, CA 92806
(714) 630-8555 FAX (714) 630-8014

July 26, 1989

Ms. Lillian Kawasaki
Director of Environmental Management
Harbor Department, Port of Los Angeles
425 S. Palos Verdes Street
San Pedro, CA 90733-0151

RE: Final Report on results of opacity testing conducted on the vessel, Condor, using Omstar D1280X fuel additive.

Dear Ms. Kawasaki,

California Environmental Engineering (C.E.E.) conducted smoke opacity tests requested by the Port of Los Angeles on the Motor Vessel Condor. All tests were conducted on number one auxiliary diesel engine, using #2 diesel fuel with Omstar D1280X fuel additive. The Wager 650 Opacity Meter was used on all tests. All tests were conducted by Larry Swiencki, Manager of C.E.E. and Greg Long an independent emission consultant. The tests were observed by Detrich Allen, Environmental Scientist from the Port of Los Angeles.

The test procedure originally intended to be used was the New Jersey peak opacity test procedure used in testing diesel trucks. After two preliminary tests we found this procedure inadequate for testing this engine. The main reason being the low RPM operation of the auxiliary engine (1200 RPM). We found when the load was applied the RPM only dropped to 900 RPM. After discussion amongst Ms. Allen, Mr. Long and myself we decided to create our own test procedure. The following is the procedure used for all tests with the approval of the Port of Los Angeles.

1. The engine was brought up to normal operating speed (1200 RPM) with the equipment on line as indicated by the number (1) one on attachment A.

2. At the command to load, the equipment indicated by the number (2) two on attachment A was energized.

3. The opacity reading was taken at 0 minutes upon load introduction and a stop watch started. See attachment B, column 1.

4. The next opacity reading was taken when the engine returned to normal operating RPM (1200 RPM). See attachment B, column 2. A recovery time was also noted at this time.

(continued)

5. After five (5) minutes of operation another opacity reading was taken. See attachment B, column 3.

6. The load added in number two (2) above was then taken off line. The opacity lenses cleaned and ready for the next test. Column one (1) "0" time opacity was then subtracted from coumn three (3) to give us net opacity. See attachment B, column 4.

7. Items one (1) thru six (6) were then repeated fifteen times.

The enginemen recorded the exhaust stack temperature, cylinder head temperatures, water temperature, the kilowatts, voltage and cycles for each test.

After all readings were recorded and entered into our computer, we determined the mean opacity of the fifteen tests. We then discarded the readings furthest from the mean in each direction (high and low). The remaining thirteen readings were then averaged to get the average net opacity percentage. See attachment B. In the comment section we also noted the color of stack smoke, exhaust stack temperature and average engine stabilization time in seconds.

The diesel fuel was supplied by General Petroleum with low sulfer content, cetane 40 and a flash point of 150°. The Omstar D1280X additive was added to each barrel of fuel in the appropriate amount under the supervision of C.E.E. manager, Larry Swiencki. The fuel was then pumped into the ship's fuel tanks, after the baseline tests were conducted.

The Opacity Test Summary Sheet (Attachment C) shows the percent reduction from baseline of the stabilized load capacity (55%), the five minute net opacity (63%), the recovery time (74%) and the exhaust temperature (46%).

The Opacity Test Summary Graph (Attachment D) shows the percent reductions of the net opacity readings.

The engine Temperature Profile (Attachment F) shows the average engine temperatures per test in graph form.

California Environmental Engineering's test results indicate that the Omstar D1280X fuel additive does reduce smoke, which in theory indicates a reduction in particulates. During our tests we also noticed that the head and exhaust stack tempreatures were reduced. We feel that this reduction in theory means a better fuel burn and possibly a reduction of (NOx) oxides of

nitrogen. The engine recovery time was reduced from six (6) seconds to one point five eight (1.58) seconds. This indicates that the engine had less friction internally, therefore producing more usable horsepower. These conclusions can be drawn in theory only. C.E.E. feels that a more comprehensive analytical test, measuring Carbon Monoxide (CO), Oxides of Nitrogen (NOx), Hydrocarbons (HC), Sulfer Dioxide (SO_2), and Particulates would benefit all concerned in determining the acutal emission reductions caused by the Omstar D1280X fuel additive. C.E.E. feels that any product or device that aids in reducing emission levels in the Port of Los Angeles and South Coast Air Basin needs to be explored in an effort to clean up the air quality and meet the Federal att[redacted]t standards required by the Federal Government. If there are any questions please call Larry Swiencki at (714) 630-8555.

sincerely,

Larry Swiencki

Larry Swiencki
Manager
California Environmental Engineering

LS/tg