

## MEMORANDUM

SUBJECT: Inventory Issues for Comment Related to Locomotives and Marine Vessels

FROM: Locomotive and Marine Rulemaking Team  
Assessment and Standards Division, Office of Transportation and Air Quality

TO: Environmental Protection Agency (EPA), Air Docket A-2000-03; E-DOCKET  
OAR-2003-0190

DATE: June 22, 2004

As part of the development of our NPRM for control of emissions from new locomotive engines and new marine compression-ignition engines less than 30 liters per cylinder, we will be re-evaluating our marine diesel inventory with respect to Category 1 and Category 2 marine diesel engines and locomotives. We seek comment on the following inputs:

*Population of Category 2 vessels.* For U.S. flagged vessels, population estimates were constructed from the number of commercial ships greater than 100 gross registered tons listed in Lloyds Maritime Information System (LMIS) database of registered vessels. Cylinder displacement data were available for about 40 percent of the engines on these vessels, and of those vessels, 26 percent were Category 2 engines. This percentage was applied to all vessels in the database, resulting in an estimate of 1,426 vessels with Category 2 propulsion engines. An obvious concern with this approach is that it is not clear how inclusive LMIS is, particularly for non-ocean-going vessels. Also, the percentage of Category 2 vessels in the LMIS database was derived based on displacement information available for less than half the vessels. It was also assumed that all the emissions from these vessels occur in the U.S. airshed. The contribution of foreign ships operating in U.S. waters was calculated in part using cargo movements and waterways data.

For Category 2 vessels, we seek comment on the best approach for obtaining the population of these vessels that operate in U.S. waters. Can better estimates be obtained for the time spent within the U.S. airshed? Can reliable correlations between displacement and rated horsepower be developed in order to better categorize the LMIS database by Category? In addition, based on previous work conducted in support of the 1999 rulemaking, foreign ships operating in U.S. waters contribute only a small part (less than 5 percent) of the total inventory for these vessels. How can this be confirmed?

*Growth rate for Category 2 vessels.* In the supporting analysis for the 1999 rulemaking, an annual growth rate of 2 percent was estimated based on production and turnover in several recent years. We instead opted to use a more conservative growth rate of 1 percent that is more consistent with the Category 1 growth estimates. What is an appropriate growth rate for these vessels?

*Auxiliary engine population, size, and use on Category 2 and Category 3 vessels.* For the 1999 rulemaking, assumptions were made regarding the number of auxiliary engines used on Category 2 and Category 3 propulsion vessels. We seek comment on how many auxiliary engines are typically used on Category 2 and Category 3 propulsion vessels, and their rated horsepower or displacement.

*Spatial allocation for Category 1 and Category 2 vessels.* For Category 1 and Category 2 vessels, we only developed national estimates of emissions. No geographic allocation was done. For Category 3 vessels, inventory estimates were developed separately for vessel traffic within 25 nautical miles of port areas (called “in-port” emissions) and vessel traffic outside of port areas but within 175 nautical miles of the coastline (called “non-port” emissions). The in-port emissions were estimated for 120 commercial ports, so these can easily be allocated geographically. The non-port estimate was a national total and was not allocated geographically.

We seek comment on a number of issues related to emissions allocation for Category 1 and Category 2 vessels:

- Is it valid to assume that all Category 1 vessels will be operated in-ports? How should they be distributed among the 120 commercial ports?
- What is the best approach to distribute the national Category 2 emissions to in-port and non-port areas? Can some ratio to Category 3 vessels be used?
- What is the best approach to allocate non-port emissions to the county level? Currently, EPA’s National Emissions Inventory (NEI) allocates non-port emissions to the county level by applying county-specific waterway activity factors, expressed as thousand ton miles. Can this methodology be improved?
- Are the boundaries for in-port (25 nautical miles) and non-port (from port boundary to 175 nautical miles from shore) appropriate?

*Effect of grade and elevation on locomotive emissions.* The current emission factors used in the 1997 rulemaking do not account for grade or elevation. We seek comment on the availability of adjustment factors that could be applied to the available emission factors to account for these effects.

*Growth rate for locomotives.* We seek comment on the use of railroad distillate fuel consumption data as a reliable indicator of locomotive growth. Are fuel or other data available to develop growth rates by category?

*Contribution of steam locomotives.* Steam locomotives are typically not included in emission inventory estimates, as the population is believed to be very small. How can we confirm this?

*Spatial allocation for locomotives.* In the 1997 rulemaking, only national estimates were derived. No geographic allocation was done. EPA’s NEI allocates locomotive emissions to the

county level using county-specific railroad traffic data (in ton miles) from DOT. County borders are then overlaid with the U.S. railroad network to determine rail activity in each county. Emissions for the switch (also known as yard) category were spatially allocated to urban counties which had Class I railroad activity.

Can we improve on the methodology used in the NEI? In particular, are there county-level usage data for switch, commuter, and other categories of locomotives?

Comments may be submitted by one of the methods specified in the ANPRM.