07/01/1983 VOC480701831

Category: 48 — General VOC Issues

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR MICHIGAN 43105

Office of
Air, Noise and Radiation

July 1, 1983

MEMORANDUM

SUBJECT: Estimating the Benefits of Fuel Volatility Controls

FROM: Charles L. Gray, Director
Emission Control Technology Division

TO: Air Programs Branch Chiefs
Regions 1 — 10

Several states are considering implementing volatility controls as a way of lowering evaporative emissions from mobile sources and achieving needed hydrocarbon reductions. We have received several inquiries concerning how to estimate emission reductions attributed to volatility controls. The purpose of this memorandum is to explain how these emission reductions should be estimated.

A state must first run MOBILE3 to determine a base year emission factor (and resultant inventory) for hydrocarbon emissions. All of the "normal" local inputs can be used, such as speed, temperature, registration distribution, trips per day, miles per day, etc. These normal inputs are discussed in the User's Guide to MOBILE3. Next, the state must determine the baseline volatility level of fuel sold in that state in the time period in which volatility controls are envisioned. Sources of data on local volatility levels are the yearly surveys by the Motor Vehicle Manufacturers Association (MVMA), the National Institute for Petroleum and Energy Research (NIPER), and local oil companies.

Lastly, the state must obtain from EPA the evaporative emission estimates corresponding toe the volatility levels before and after controls. These are then used in MOBILE3 to estimate the different hydrocarbon emission factors associated with each volatility level. The benefit attributed to volatility controls is the difference in these emission factors. These concepts are illustrated in the following example for light-duty gasoline vehicles (LDGVs). The benefits for other gasoline vehicle types are estimated in the same manner.

Suppose a state knows that the local RVP level of gasoline sold in the summer months is 10.5 psi, and would like to estimate the benefits of reducing that volatility level to 9.0 psi. The state must first run MOBILE3 with the

"as released" evaporative emission rates, and then obtain new evaporative emission rates from the EPA that correspond to the 10.5 psi fuel and the 9.0 psi fuel. MOBILE3 is then rerun with 10.5 psi evaporative emission rates, and then the 9.0 psi rates. The non-methane hydrocarbon emission factor outputs for all mobile sources for these three sets of evaporative emission rates are shown in Table 1. Default inputs have been assumed. It should also be noted that the evaporative emission rates at 10.5 psi and 9.0 psi cannot be input into ONE-TIME DATA, the user must manually edit Block Data Subprogram 9 (hot soak) and 11 (diurnal emissions). The model year groups for each vehicle type, however, are the same as in the block data.

The first line in Table 1 shows the MOBILE3 NMHC emission factor for LDGVs. This must be used to establish a base year inventory prior to volatility controls. The MOBILE3 nominal fuel volatility level is 11.5 psi. The second and third lines show the MOBILE3 emission rates at 10.5 and 9.0 psi. The volatility credit is calculated as the difference in these two emission factors, or 0.18 g/mi. If a percent benefit is needed, the credit in line 4 is divided by the MOBILE3 emission rates as released (11.5 psi), and not the 10.5 psi emission rate. The percent benefit for this example is 7.1%.

We realize that many areas of the country have local RVP levels significantly below the 11.5 psi assumed in MOBILE3. However, those areas can also have significantly higher temperatures than the 60 to 84 degree F range assumed in our evaporative test procedure. We are conducting additional testing to study the effects of fuel volatility and temperature on evaporative emissions. In the meantime, the above technique must be used to establish credits for volatility control programs. If you have additional questions on this, call me (374-8404) or Tom Darlington (374-8473).

cc: R. Wilson, OMS

Table 1

NMHC Emission Factors For LDGvs
MOBILE3, 10.5, 9.0 RVP

Line	Input Evaporative Emission Rates	Jan 1, 1988 NMHC (g/mi)
1	MOBILE3* as released (11.5 psi)	2.54
2	MOBILE3* w/10.5 psi rates	2.31
3	MOBILE3* w/9.0 psi rates	2.13
4	2-3	0.18
5	Benefit (0.18/2.54)	7.1%

* Inputs used were 75 degrees F, 19.6 mph, 20.6/27.3/20.6 operating mode percentages.