# UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
## REGION 5

DATE: **JAN 22 1993**

SUBJECT: Nonmethane Organic Compounds (NMOC) and Nitrogen Oxides ($NO_x$) Monitoring Required for the Empirical Kinetic Modeling Approach (EKMA) for Nonattainment Areas in Ohio

FROM: George Czerniak, Chief
Air Enforcement Branch (AE-17J)

TO: Joseph A. Tikvart, Chief
Source Receptor Analysis Branch, TSD   (MD-14)


This memorandum concerns the use of the nonmethane organic compounds to nitrogen oxide ratio ($NMOC/NO_x$) monitoring data for the Empirical Kinetics Modeling Approach (EKMA) modeling.  According to the September 18, 1991, memorandum from William Laxton and John Calcagni, Office of Air Quality Planning and Standards (OAQPS), entitled "Modeling Requirements Implied by the 1990 Clean Air Act," nonattainment areas are required to use $NMOC/NO_x$ monitoring data that were collected during the period between 1987 and 1991.  If data were not available during that period, monitoring data should have been collected during 1992 and those values should be used.

In Ohio, the Toledo, Dayton, and Cleveland areas are designated as moderate nonattainment areas for ozone.  As such, the Ohio Environmental Protection Agency (OEPA) plans to model these areas with EKMA.  However, post 1986 $NMOC/NO_x$ monitoring data were collected only in Cleveland. The OEPA has requested guidance as to an acceptable methodology to determine $NMOC/NO_x$ ratios for use in the Toledo area (no monitoring data available), and the Dayton area (monitoring data available from 1986). The 1987-1989 design values for Toledo and Dayton were 0.140 parts per million (ppm) and 0.143 ppm, respectively.

One option for Ohio is to collect $NMOC/NO_x$ data during the summer of 1993.  However, the State Implementation Plan (SIP) revisions for moderate ozone nonattainment areas are required by November 1993.  If Ohio waited for the 1993 data, the SIPs for Toledo and Dayton would be late.  Also, no funds have been allocated to Ohio for additional monitoring.  Therefore, Region 5 recommends the following:

> For Toledo, Ohio should employ the default ratio which was recommended by the United States Environmental Protection Agency (USEPA) for the 1982 SIPs.  This ratio is 9.5/1, and is a composite of $NMOC/NO_x$ data which were collected in several cities across the United States.  With this default value, Ohio can use EKMA to

compute volatile organic compound (VOC) control estimates following the guidance in "Procedures for Applying City-Specific EKMA", EPA-450/4-89-012. Without day-specific measurements of NMOC, $NO_x$, and carbon monoxide, Ohio cannot reliably compare predicted peak ozone concentrations with observed data, and adjustments to the inputs to EKMA would not allowed. Given the use of the default ratio, OEPA should be able to meet the statutory deadline for the Toledo SIP. The use of the default for the November 1993 SIP, does not preclude Ohio from collecting NMOC/$NO_x$ in Toledo during the summer of 1993, using the city-specific data in EKMA, and submitting a revision to the November 1993 SIP at a later date.

For Dayton, the 1986 monitored NMOC/$NO_x$ ratio can be adjusted to reflect the modeling case year through the use of Mobile 4.1. The adjustment assumes that mobile sources have the dominant impact on the monitored data. This is reasonable because the monitor was located in the central business district. The adjustment scheme is as follows:

Ohio should estimate the hydrocarbon and $NO_x$ emissions on a typical summer day due to the mobile sources present in 1986. Similarly, Ohio should estimate hydrocarbon and $NO_x$ emissions on a typical summer day from the modeling case year mobile sources. The hydrocarbon to $NO_x$ ratios can then be calculated. The monitored NMOC/$NO_x$ ratio should be multiplied by the ratio of the Mobile 4.1 modeling case NMOC/$NO_x$ to the Mobile 4.1 1986 NMOC/$NO_x$. For example, if the monitored NMOC/$NO_x$ ratio was 6/1, the Mobile 4.1 1986 NMOC/$NO_x$ ratio was 7/1, and the Mobile 4.1 modeling case NMOC/$NO_x$ ratio was 8/1, the adjusted monitored ratio would be:

$$(6/1) * [(8/1)/(7/1)] = 6.9/1.$$

Region 5 is requesting concurrence from the Model Clearinghouse on these methods of estimating NMOC/$NO_x$ ratios for the Toledo and Dayton areas. OEPA will use the ratios in EKMA analyses to support the November 1993 SIP revisions, which are required for moderate ozone nonattainment areas.

If you have any questions or comments, please contact Rebecca Calby at (312) 886-6065 or Richard Schleyer at (312) 353-5089.