



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
RESEARCH TRIANGLE PARK, NC 27711

August 4, 1992

OFFICE OF  
AIR QUALITY PLANNING  
AND STANDARDS

**MEMORANDUM**

SUBJECT: Vegetable Oil Cooking

FROM: G. T. Helms, Chief  
Ozone/CO Programs Branch (MD-15)

TO: Air Branch Chief, Regions I-X

Several months ago, members of the food preparation and processing industry presented information to us concerning vegetable oil emissions from their cooking operations. This memo deals with the issue of whether or not these emissions should be considered as volatile organic compounds (VOC's) in the ozone nonattainment planning process. Generally, they should not.

Specifically, we have received inquiries from the Frito-Lay Company concerning whether emissions from deep fat frying operations with vegetable oil should be treated as particulates or VOC's. The company contends that such emissions are particulates and should be controlled as such.

Attached is a copy of an August 21, 1990 memorandum from John Calcagni to Region IV discussing vegetable oil. We concluded in this memo that, based on its very low volatility, vegetable oil should not be considered as a VOC in ozone nonattainment planning. Subsequently, the Environmental Protection Agency (EPA) ran Method 24 tests on vegetable oil samples to determine whether vegetable oil used in paints and coatings would be counted as a VOC by this method. There was no loss of vegetable oil during the Method 24 tests, thus vegetable oil is not measured as a VOC by this method.

Even after these tests, there remained a question about whether there would be VOC emissions from the deep fat frying processes using vegetable oil (i.e., does the frying process cause the higher molecular weight vegetable oil to break down to lower molecular weight compounds which might become volatile?). Also, could the food products being cooked, such as corn chips or potato chips, give off VOC's? To answer these questions, Frito-Lay has submitted a report to EPA entitled "Characterization of Industrial Deep Fat Fryer Air Emissions." A copy of this report is attached for your information.

This report presents data which Frito-Lay interprets to show that the actual VOC emissions from cookers are low, perhaps in the range of 0.25 to 0.5 tons/year from individual cookers in some situations. Nevertheless, Table 2 of the report gives nonmethane hydrocarbon emissions as high as 0.54 lb/hour for corn chips. This level could produce emissions of 2.4 ton/year for an individual cooker, if operation for 8,760 hours/year is assumed. Facilities tend to have 2 to 10 kettles, so VOC emissions could approach 24 tons/year at a large facility. This would be below the cut point for major non-control techniques guidelines sources in all but extreme areas (Los Angeles) which have a major source cutoff of 10 tons/year. However, this seems to be a worst case situation. Most of the emissions given in the report are much lower, almost an order of magnitude smaller.

It is Frito-Lay's contention that much of this material would be caught by a Method 5 sample train and, thus, should be considered to be particulate.

I think the conclusion to be drawn from this information is that VOC emissions from vegetable oil deep fat frying processes are generally low and, in most cases, appear to be below the cutoff levels to be considered as major VOC sources. In such cases, they would not require non-CTG RACT controls.

For further information, contact Bill Johnson at (919) 541-5245.

Attachment

cc: K. Berry  
J. Berry  
B. Judge, Region I  
P. Truchan, Region II  
C. Stahl, Region III  
C. Kemker, Region IV  
S. Rosenthal, Region V  
J. Tapp, Region VII  
J. Houk, Region VIII  
D. Lo, Region IX  
M. Lidgard, Region X

This response was coordinated with Kent Berry & Karen Catlett

Attachment



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
RESEARCH TRIANGLE PARK, NC 27711

August 21, 1990

**OFFICE OF  
AIR QUALITY PLANNING  
AND STANDARDS**

**MEMORANDUM**

**SUBJECT:** Interpretation of Volatile Organic Compound (VOC) Definition as Applied to Vegetable Oil

**FROM:** John Calcagni, Director  
Air Quality Management Division

**TO:** Winston A. Smith, Director  
Air, Pesticides, and Toxics Management Division, Region IV

This is in response to your June 19, 1990 memorandum to Gerald Emison concerning a request from Jefferson County, Kentucky, for a determination as to whether or not vegetable oil emissions would be considered VOC.

After examining the data and calculations presented by Frito-Lay for soybean vegetable oil, especially the extremely low vapor pressure (calculated by extrapolation to be about  $10^{-18}$  (to the negative 18 power) mm Hg at 21 degrees C) and large carbon number (approximately C (subscript 45)), it is our conclusion that such oils will tend to remain primarily in the condensed phase in the atmosphere, and thus will not be available to participate in the formation of photochemically-produced ozone. Therefore, such vegetable oil emissions should not be considered as VOC for the purpose of control programs for attaining the national ambient air quality standards for ozone.

I hope this information is helpful to you, and I appreciate the opportunity to be of service.