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Address Reply to:
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October 8, 1981

Mr. Joseph A. Tikvart, Chief
Source Receptor Analysis Branch (MD-14)
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711

Dear Mr. Tikvart:

Air quality modeling has become common practice for evaluating source impacts on various environments. These models require various input parameters for different modes of operation. The urban/rural determination is one option necessary for proper running of some models. Recent draft guidelines on air quality modeling have suggested the use of the Auer classification method for determination of urban or rural environments. The guidelines also suggest the application of the scheme within a three kilometer distance of each source. Although the Auer classification is one of the better schemes that has been devised, I have serious reservations about its use under all conditions.

My concerns deal mainly with the application of the Auer classification near sources of large heat fluxes; namely refineries. Auer (1978) stated,

> "Certain types of land use, when adjacently located, can effectively alter surface characteristics, landscape structure, heat source and retention, and evapotranspiration, thereby increasing the dimensions of what has been termed 'the urban area' in the literature on urban meteorology."

Auer based his scheme on variables such as mixing height, Aitken nuclei, potential temperature, specific humidity, equivalent potential temperature, specific energy, turbulence intensity, visibility, evaptranspirative surfaces and odors. Thus, the scheme is affected by many factors and then reduced to a generalized account involving simple land use. However, other areas of concern in the air pollution field are plume merging (Palmer 1979), plume behavior near large heat sources (Durrenberger & Zimmerman, 1981), structural interactions on airflow (Hosker, 1979, 1980; Huber, 1977, 1979), upwind surface roughness characteristics (Lettau, 1969), turbulent energies (Wilczak, 1981) and boundary layer inhomogeneity. These can influence and alter the classification of an area downwind of a source and cannot be adequately determined by simple surface land use within a 3 km distance. Although the land use 3 km downwind of a refinery may indicate a rural environment, the plume may behave and display properties of an urban environment (Shea & Auer, 1978).

The above refers to refineries only; however, further study may discover that the Auer classification is not always applicable to other types of sources as well. These problems lie in the fact that the scheme has been virtually untested for regulatory purposes at the present.

I would therefore like to recommend that the following be considered prior to the publication of modeling guidelines.

1. Allow that a range of 1 to 3 km be used in the classification. One kilometer could be used for large heat sources and other applicable cases. Although the final distance used may be arbitrary, personal investigation leads to the conclusion that a fixed 3 km distance will not always fit the situation.

2. Include a disclaimer which states that the Auer classification method of determining urban/rural status may not apply to all situations. The classification method should therefore be considered on a case-by-case basis.

3. The regional or state meteorologist/modeler should be contacted for further guidance on procedures concerning application to large areas.

These observations and recommendations are based on past work utilizing the Auer method and possible problems that I foresee with its use, as presently stated. The views are my own and do not necessarily reflect those of the State of Indiana.

I trust that my comments will be taken into consideration and that the final guidelines will be more appropriate for various modeling situations.

Sincerely,

Barry A. Smith

Barry A. Smith, Meteorologist
Modeling and Data Analysis Section
Air Pollution Control Division

BAS/sdp
cc: Dr. Dennis A. Trout ✓