



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

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REGULATION DEVELOPMENT BRANCH
U.S. EPA, REGION VI

MEMORANDUM

SUBJECT: Review of Chemical Mass Balance (CMB) Analysis for the Communities of Polson and Ronan, Montana

FROM: Tom Coulter, Environmental Scientist
Source Receptor Analysis Branch (MD-14)

TO: Mark Comp, Technical Representative
Air Planning Section, Region VIII (8AT-AP)

This is in response to the materials you sent to Edwin Meyer (SRAB) asking for assistance on questions associated with the CMB analysis for the two Montana communities. This memorandum summarizes the key points of our teleconference on May 2, 1991, which included Bob Stevens, Teri Conner and Chuck Lewis of the Source Apportionment Research Branch in AREAL. The following problems with the samples collected were identified:

1. There was considerable internal inconsistency between potassium (K) and the organic carbon (OC) components of the measured mass, assuming wood combustion to be a dominant source category (which is likely in the winter samples).
2. Flagging K as a fitting species in the CMB analysis was theoretically a good idea but its assay on glass or quartz fiber filters was problematic for at least two reasons: 1) x-ray fluorescence analysis will only work well for high atomic mass elements on such filters, and 2) high background concentrations and inter- and intra-filter differences for K on filter blanks were reported by the contractor Engineering Science (Section 3: CMB METHODOLOGY AND RESULTS).
3. The roughly half of the samples which were collected as TSP were not particularly useful in apportioning woodsmoke as a potential contributor because there is no upper cut point in particle size. The majority of the coarse fraction K is due to soil (road dust) and this would have had to be carefully "corrected" to infer woodsmoke K.

4. The high background levels of key indicator materials like aluminum (Al), silicon (Si) and calcium (Ca) (important for implicating road dust contribution) in filter blanks precluded the proper resolution of the road dust component.

In general, there was much difficulty in applying CMB analysis to such a small group of elements which were not sampled with this analysis in mind, and thus were themselves poorly analyzed.

We offered two specific recommendations:

1. Extract soluble K from the remainder of the quartz filters (if still available) and reanalyze using ion chromatography or atomic absorption spectrometry. The results may be applied to a literature equation to give a good answer for the OC component associated with woodsmoke.
2. Send a portion (e.g., 5" X 5") of the remaining quartz filters to R. J. Lee Co. so they can perform scanning electron microscopy analysis on individual particles to help better resolve the road dust component.

You said that you were going to check on the status of the filter custody, and make a decision as to how to proceed at this point.

I hope that our comments are useful; please feel free to call me at FTS 629-0832 or Bob Stevens at 629-3156 if you have questions or need more assistance with this problem.

cc: J. Dicke
E. Meyer
R. Stevens (MD-47)
J. Tikvart
D. Wilson

FY 91 MODEL CLEARINGHOUSE MEMORANDA

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