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**QUALITY ASSURANCE AUDITS FOR THE ARB SPONSORED
CARBONACEOUS SPECIES METHODS COMPARISON STUDY**

AT CITRUS COLLEGE, GLENDORA, CA

August 12-21, 1986

EXECUTIVE SUMMARY

ARB Contract # A5-148-32

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C O M B U S T I O N E N G I N E E R I N G

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EXECUTIVE SUMMARY

The results of a series of quality assurance tasks performed by EMSI in support of the ARB sponsored Carbonaceous Species Methods Comparison Study conducted at Citrus College, Glendora, CA in August 1986 are summarized in this document. These QA oriented tasks included:

- o audits of flow rates for all samplers deployed in the nine day field study;
- o preparation of carbonaceous reference materials for an interlaboratory round robin study; and
- o analysis of the above reference materials as well as 20% of the ambient particulate samples collected by each of the study participants for both organic and elemental carbon.

In addition, EMSI operated several ARB PM-10 Hi-vol samplers during the field study and analyzed these samples for organic and elemental carbon to serve as part of the larger ambient aerosol data base being assembled by ARB's field manager for this project, Dr. Susanne Hering of UCLA.

This report describes the methodology employed by EMSI to perform the various tasks and presents the results of these different tasks. Nowhere does this report indicate that there is a "correct" methodology for measuring ambient carbonaceous particulate material. Rather, the results from the interlaboratory round robin exercise that have been provided to EMSI through Dr. Douglas Lawson of the ARB are summarized here in this report to emphasize both the differences as well as the similarities that exist for data generated by 12 different analytical laboratories. Likewise, EMSI's results for ambient samples collected by other field participants should be considered preliminary due to (a) the limited number of samples analyzed by EMSI, and (b) our limited knowledge of the actual sampling conditions for these samples.

Audits of the different sampler flow rates for the most part agreed within 10% of the nominal flow rates reported by each participant. The

major exceptions involved two PM-10 samplers operated by the University of Riverside, a pair of peroxide samplers operated by Texas Tech, the UCLA peroxide sampler and two filter pack samplers operated by Atmospheric Environment Service of Canada.

Precision for the two collocated ARB PM-10 Hi-vol samplers operated by EMSI was excellent. The standard error for these collocated samplers for 18 12-hour sampling periods was 4.9% for organic carbon and 8.5% for elemental carbon. Based on triplicate analyses of the same sample, the average standard deviation was $0.5 \mu\text{g}/\text{cm}^2$ for organic carbon and $0.4 \mu\text{g}/\text{cm}^2$ for elemental carbon.

Overall, the agreement between laboratories for the total carbon content of the carbonaceous reference materials prepared by EMSI was quite good. The major exception is the Oregon DEQ; their values were at least 30% lower than all other laboratories. On the other hand, the organic carbon to elemental carbon ratio for the different reference materials varied significantly from one laboratory to another. The largest differences occurred for samples derived from sampling automotive exhaust and woodsmoke.

Based on our results for a limited subset of ambient samples collected by other participants during this study, it appears that most of the particulate elemental carbon was less than $1 \mu\text{m}$ aerodynamic diameter. On the other hand, particulate organic carbon appeared to be bimodal with 50% less than $1 \mu\text{m}$ and 50% between $1 \mu\text{m}$ and $2.5 \mu\text{m}$.