

ITEM NO.: 11
DATE: May 26, 2000
CONTRACT NO.: 98-306

STAFF EVALUATION OF A DRAFT RESEARCH FINAL REPORT

TITLE: Improvement of Speciation Profiles for Aerosol Coatings

CONTRACTOR: California Polytechnic State University, San Luis Obispo

PRINCIPAL INVESTIGATOR: Professor Albert C. Censullo

AMOUNT: \$28,885

DURATION: 24 Months

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I. SUMMARY

ARB's emissions inventory is an estimate of the amount of pollutants emitted into the atmosphere from major source categories. While some emissions may consist of a single compound, many sources emit complex mixtures. These are represented in the emission inventory by speciation profiles. Speciation profiles provide the detailed chemical composition needed for modeling, attainment planning, and regulatory strategies. Speciation profiles are also increasingly used in source apportionment and source reconciliation studies and to estimate toxic emissions. Aerosol coatings produce a large portion of the emissions in the consumer product category, and better data concerning the identity and quantity of the organic species in these products is needed to determine their ozone-forming potential. Identifying the different chemical species in consumer products is also important for the ARB's Toxic Air Contaminant Control and Air Toxics "Hot Spot" programs.

This study determined the chemical speciation profiles of approximately 40 aerosol coating products and combined the individual profiles with speciation profiles

determined in an earlier contract to produce group profiles. These group profiles will provide supplementary information for ARB's emissions inventory. This project has improved ARB's hydrocarbon and air toxics emissions inventory and the resulting data will assist in the development of improved mid- and long-term consumer product control measures.

II. TECHNICAL SUMMARY

Objective

The overall objective of this proposal was to use sampling and analytical methods, developed by the principal investigator, to produce chemical speciation profiles for up to 40 aerosol coatings products. The results of this study combined with the profiles characterized in an earlier contract will allow detailed group speciation profiles to be generated and published.

Background

The emissions inventory (EI) is the foundation on which ARB's modeling, attainment planning, and regulatory strategies are based. One of the key components of the EI are the speciation profiles for different source categories. Speciation profiles provide the detailed chemical composition of emissions which is needed to accurately characterize the composition and chemistry of California's air. Speciation profiles are also increasingly used to estimate toxic emissions and in source apportionment and source reconciliation studies.

The ARB is required to develop plans for the control of organic compound emissions from consumer products. The Board requested that staff consider reactivity (ozone-forming potential) as part of the development of regulatory control plans for consumer products. In order to determine the ozone-forming potential of a consumer product, the identity of all of the volatile organic species in the product must be known. Since this study was originally begun, as part of the regulatory development process, the Stationary Source Division, with the cooperation of industry, has conducted a

detailed manufacturer survey of the composition of aerosol coatings marketed in California. The survey information collected from manufacturers will form the main basis used to develop speciation profiles for the various aerosol coatings, consistent with the regulatory data.

As a supplement to the data supplied to ARB by the manufacturers, this project conducted laboratory analysis of many of the most prevalent aerosol coating products. In an earlier contract, the methods for separating, sampling, and analyzing the various components of aerosol coatings (propellant, solvent, and solids) were developed, and approximately 50 individual products were analyzed. The analytical methods resulted in a very comprehensive identification of the chemical composition of the products. In the initial project, the number of products tested for some product categories was not large enough to guarantee that confidential proprietary product formulation information could not be derived from the equation profile. This occurred because the group profile of some of the categories was based on the testing of only one or two individual products. Results from additional products had to be added to the existing data so that each group profile was based on at least four individual products; thereby, ensuring the confidentiality of each individual product. The group speciation profiles produced in this study provide important additional information which supplement the data collected in ARB's survey.

Project Summary

The investigator selected the products to be evaluated after consulting with ARB staff. Efforts were made to choose products that were generally representative of the California marketplace. Products chosen included samples from waterborne, solvent borne, high solids, and lacquer categories.

Because the coatings samples were aerosols, the initial step was the capture and analysis of the propellant. After the propellant was removed, the liquid paint was analyzed using high resolution capillary gas chromatography with a flame ionization

detector. Mass spectrometry was used, as necessary, for identification and quantification of the coating components. The analytical methods identified and quantified over 98 percent of the total organic compounds. Species profiles were obtained for approximately 40 coating samples, including two binary component samples. These individual profiles were combined with the original profiles and arranged into group profiles, distinguished by coating type and carrier type.

III. STAFF COMMENTS

The final report has been reviewed by staff from the Research and Planning and Technical Support Divisions. The goal of this project, to develop speciation profiles for many different categories of aerosol coatings, has been clearly achieved. The information will be an important supplement to ARB's consumer products emission inventory. Since ARB's emission inventory is a public document, this work was a necessary enhancement to the previous study, so that ARB was able to avoid releasing potentially confidential information. The report clearly describes the experimental procedures.

An improvement requested by ARB staff is that each compound listed in the profiles be assigned its corresponding Chemical Abstracts Service (CAS) number, to facilitate proper identification of each chemical. Staff also found several minor typos in the report which need to be corrected and the report needs an Executive Summary.

IV. STAFF RECOMMENDATIONS

Staff recommends the Research Screening Committee accept this draft final report, subject to inclusion of appropriate revisions in response to the staff comments and any changes and additions specified by the Committee.