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Air Toxics Exposure and Risk in the South Coast Air Basin

A dissertation submitted in partial satisfaction of the requirements of the degree Doctor of Environmental Science and Engineering

by

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ABSTRACT OF THE DISSERTATION

AIR TOXICS EXPOSURE AND RISK IN THE SOUTH COAST AIR BASIN

by

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Research has been conducted to quantify the magnitude of population exposure from point and area source emissions of twenty toxic air pollutants on an annual average basis in the South Coast Air Basin. Carcinogenic health risks due to those pollutants which are potential carcinogens were estimated through the measurement of ambient concentrations and the development and application of an urban air toxics exposure and risk assessment model.

The approach integrates ambient concentration, population distribution, and health risk data for individual chemical species into regional estimates of inhalation exposure, risk, and number of excess cancer cases. The enhanced Human Exposure Model can be used

to apportion the estimated number of excess cancer cases by source category and by pollutant and to identify high-risk chemical species and source categories. It can also be applied for the identification of high-risk locations and for the estimation of control measure effectiveness in reducing exposure, cancer risk and number of excess cancer cases.

A linear response relationship is assumed, and the exposure and risks associated with multiple sources and species of air toxics are considered additive. Risks were calculated only for inhalation of ambient air throughout a 70 year lifetime. Although there are uncertainties in estimating the absolute magnitude of cancer risk, the results of the modeling approach indicate the relative importance of the individual carcinogenic species and the relative contribution of individual source categories to the total risk from a specific pollutant.

The model was developed to be applied to other urbanized regions once the necessary input data on emissions, meteorology and population are developed for those areas.