Charbroiling Activity Estimation: Exploratory Analysis

Work Plan, Schedule, and Budget – Public Research Institute, SFSU
15 March 1999

Introduction

Charbroiling and deep fat frying of foods is performed throughout California. In some regions, such as Southern California or the Denver, Colorado area, emissions from commercial meat cooking operations appear to be substantial contributors to regional particulate matter (PM) emissions. These emissions may play a role in exceedances of the $PM_{2.5}$ Federal air quality standards.

The emissions from charbroiling and cooking activities are a complex mix of organic and inorganic compounds. Recent studies have quantified the emission levels from representative cooking operations and equipment types, and have begun to identify the particulate, gaseous, and semi-volatile components of the emissions. With this information available, the next step is to quantify the number of commercial establishments performing cooking, where they are located, the quantities of meat cooked using charbroiling and deep fat frying, and how the amount of meat cooked varies daily and within a year. This information will allow air quality planners to identify the significance of commercial cooking emissions as they prepare air quality attainment plans.

1. Project Objectives

The objectives of this study are:

- to develop a method for estimating spatially and temporally resolved activity data for commercial meat cooking and deep fat frying operations throughout California, and
- to collect sufficient detailed activity and source mapping data to generate a temporally and spatially specific emission inventory for commercial cooking sources in California.

This is an exploratory and developmental study to generate estimates of charbroiling and deep-fat frying activity in California. The project will first develop an estimation methodology for a limited geographical region and will then attempt to expand this methodology to a statewide basis. The approach will incorporate use of GIS technology and commercially available facility siting data. This data will be augmented with available land use data, socio-economic data, limited survey data, and industry supplied data (if available). Because of the known difficulty of performing this project, as well as the limited previous work

done in this area and the limited funding available, the project will proceed in stages so that decisions at each point about how to proceed can be based on the assessment of information developed in the preceding stage.

2. Tasks

Task 1 - Literature Search

Search for the most recent and best agency-sponsored studies and academic research literature, both published and unpublished, on levels of charbroiling and deep fat frying activity (throughput) and its spatial and temporal distribution.

Task 2 - GIS Compilation of Sites - Database

Develop a compilation of sites that charbroil and deep-fat fry (restaurants and other establishments), geocoded for GIS. We will begin with commercially available databases and evaluate their completeness for this study. If needed, other sources of information such as industry groups will be pursued. The Bay Area will be geocoded first to establish the methodology, then provided sufficient information is available, the facilities throughout the entire state will be mapped using the best available data..

Task 3 - Characteristics of Sites - Database

a) Identify and classify sites by the type of cooking being performed and equipment used, e.g. under-fired broiler, conveyor broiler, deep-fat frying.

b) Develop a database of establishment attributes based on parameters such as establishment size (e.g. number of employees), land-use type, and socio-economic characteristics of areas in which establishments are located.

Task 4 - Activity Data - Database

a) Develop contacts with academics who study the industry and with industry representatives to assist in developing activity data.

b) Seek data on throughput by establishment or type of establishment and by area: amounts of meat and other foods charbroiled and deep-fat fried. Summarize existing literature and trade data on throughput and the relationship between throughput, size, land-use type, and socio-economic characteristics of areas.

Task 5 - Modeling/Estimation Trials

a) Using collected activity data, model and attempt estimation of throughput on the basis of size and type of establishment, land-use type, and socio-economic characteristics of areas.

b) Attempt estimation of establishment size and type on the basis of land-use type and socio-economic characteristics of areas.

c) With CARB participation, assess adequacy of estimation method and results for a limited geographical region. With CARB concurrence, proceed with the following tasks using proposed methods for entire state.

Task 6 - Pilot Survey

If inadequate activity data are available from existing sources, design and pilot a survey approach to estimation of throughput, with maximum feasible cooperation from industry. The objective of the pilot survey is to gauge the feasibility, adequacy, and cost of a survey approach to estimation of throughput.

Task 7 – Preliminary Activity Estimates

Using the best available data, prepare county specific estimates of the quantity of meat commercially cooked, by type of equipment if possible, and of the quantities of foods that are commercially deep fried. Compare these estimates with other sources of data such as the South Coast Air Quality Management District. Attempts will be made to associate activity data with land use and other data to more completely spatially allocate cooking activity within each county. Results will be provided both as tables and GIS based maps. The GIS maps will be provided to a 4 km x 4 km grid resolution for selected urban regions if available data supports this level of resolution. Other regions of the state will be provided at either 10k or 40k grid resolution, or, with CARB approval, some other representation will be used to show activity levels, such as market size.

Task 8 - Prepare Draft Final Report

The draft report will document the data, describe the methodology used to obtain it, and summarize the estimates generated. Characteristics of the database will be described. Data tables and maps showing estimates of charbroiling and deep fat frying activity throughout the state will be provided. Limitations and shortcomings of the existing data will be described and recommendations for future improvements will be provided.

Task 9 - Prepare Final Report

The final report will be completed upon CARB review of the draft final report.

3. Schedule

Project duration 10 months

Task	*Date*	*Approximate Invoice and payment*
Project Start / invoice	June 1, 1999	**$16,000**

Tasks 1-2 complete, Tasks 3-4 ongoing	End of July (month 2)	
Tasks 3-4 complete, Task 5 ongoing	End of September (month 4)	
Progress report due / invoice		**$16,000**
Task 5 status update	End of October (month 5)	
Task 5 complete, Tasks 6-7 ongoing	End of December (month 7)	
Draft final report due / invoice	End of January (month 8)	**$16,000**
Receive ARB comments on draft final report	End of February 2000	
Final report due – Project complete / invoice	End of March	**$4,008**
TOTAL		**$52,008**

4. *Personnel*

Michael Potepan, Prof of Economics, Principal Investigator
James W. Newton, Prof of Psychology / Acting Director, PRI (Feb-July 1999)
Rufus Browning, Prof of Political Science / Director, PRI, (on leave Feb-July 1999)
Jerry Davis, Assoc Prof of Geography / Director, California State University GIS Center at SFSU (GIS consultant)
Hailin Qu, Assoc Prof of Hospitality Management (food service industry consultant)
Graduate student: To be hired.

Contacts

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5. *Budget*

See attached proposed budget by class of expenditure and principal staff.

Estimated budget by task

Tasks 1-5	$23,513
Tasks 6-9	$28,495
Total	$52,008