

DRAFT RESEARCH PROPOSAL COST ESTIMATES

1. Principal Investigator

To be determined. Possibilities: McKennis at Florida; Battelle; Oak Ridge.

2. Short title of study

Preliminary chemical analytical studies in preparation for determination of exposure of (smokers and) nonsmokers to environmental cigarette smoke.

3. Proposed starting date

To be determined

4. Estimated time to complete

One year

5. Brief description of specific research aims.

The research being proposed here is a preliminary study in preparation for determination of exposure of (smokers and) nonsmokers to environmental cigarette smoke. The specific aims are:

a. To define the growth and decay of environmental cigarette smoke under several representative environmental conditions. This would include a limited time smoke production to measure a typical growth and decay; and a continuing smoke production to reach a steady state for up to 10 or more hours after attainment of the steady state.

b. To determine effect of aging of environmental cigarette smoke on the concentration of nicotine therein. This information would reveal whether growth and decay curves for nicotine and environmental cigarette smoke are parallel, both for limited time smoke production and continuing smoke production. Nicotine would be a suitable tracer for environmental cigarette smoke if growth and decay curves are parallel.

c. To determine fate of nicotine in environmental cigarette smoke. Sidestream smoke, the major component of environmental cigarette smoke, contains about 10% nicotine as it emerges from the cigarette. Some workers claim that the nicotine content of the smoke aerosol decreases as it remains in the air. It would be of interest to determine the nature of this decrease, and the extent, if any. Is it a chemical change or a volatilization from the smoke particle. And if it is

a chemical change, is any of the nicotine being converted to cotinine, and to what extent.

d. To determine the relationship between total nicotine intake in humans and the total cotinine accumulation in their urine. This determination could be made with environmental cigarette smoke using a limited number of human subjects exposed to representative concentrations of environmental cigarette smoke of known concentrations of nicotine. It is understood that specific aims a, b, and c set forth above will have been completed before these determinations are started.

Successful completion of specific aims a, b, c, and d set forth above would establish that total accumulation of cotinine in urine is a reliable index of exposure of humans to cigarette smoke. One could then proceed to use cotinine in urine as a measurement of exposure of (smokers and) nonsmokers to environmental cigarette smoke.

6. Working Hypothesis

Nicotine is the major constituent of environmental cigarette smoke. Upon inhalation nicotine is transferred into the blood stream and then the major portion is converted into cotinine and is excreted into the urine. Cotinine is relatively stable in the urine. Measurement of the total cotinine in the urine would be a measurement of exposure to environmental cigarette smoke.

7. Experimental Design and Procedures

A room, 8-foot height, 15 feet by 30 feet, would be representative of some working or social environmental situations. The room would be equipped with ventilators to change the air over a considerable range. Equipment would be provided to generate sidestream and mainstream smoke using a mix of commercially available cigarette brands. A piezobalance (TS1 Model 3500) can be used to sample the environmental smoke that would be generated. The portable instrument developed by the Stanford Research Institute under SRI Project 4931 could also be used for collection of samples of aerosol and for nicotine determinations.

Facilities and equipment described above would enable determination of cigarette smoke over the desired range, i.e. 0 to 2000 $\mu\text{g}/\text{m}^3$. Nicotine in smoke and cotinine in urine and in smoke, if any, would be determined by vapor phase chromatography or other suitable means.

8. Budget

The research program suggested here could be carried out either at a university or at a private research institute at a somewhat higher cost. Cost estimates for both possibilities are given below.

8A. Suggested University Budget	Annual Rate	% of Time	Base Salary Cost	Fringe 20%	Base Salary + Fringe
a. Salaries					
Principal Investigator	50,000	10	5,000	1,000	6,000
Research Associate	25,000	100	25,000	5,000	30,000
Technical Assistant	18,000	100	18,000	3,600	21,600
				Salary and Fringe	57,600
b. Consumable supplies					7,000
c. Equipment					
Purchase/smoke collection device					8,000
d. Other expense					
Travel			1,000		
Rental of chromatography equipment			2,000		
Secretarial Service			1,000		
					4,000
e. Overhead					
50% of a + b + c + d (76,600)					38,300
			Total Budget		
			or \$115,000 as a rounded amount		\$114,900

8B. Suggested Budget at a Private Research Institute
such as Microbiological Associates

a. Labor Costs	Annual	%	Labor	Labor	
Salaries	<u>Rate</u>	<u>of</u>	<u>Dollars</u>	<u>Dollars</u>	<u>With</u>
		<u>Time</u>			<u>Merit</u>
					<u>Increase</u>
Project Director	45,000	15	6,750		7,290
Analytical Chemist	25,000	100	25,000		27,000
Technical Assistant	18,000	100	18,000		19,450
Secretary	12,000	8	960		1,060
				Total Labor Cost	<u>54,800</u>
b. Other Direct Costs					
1. Materials, Equipment			15,000		
2. Travel			1,000		
3. Rental			3,000		
4. Laundry			1,000		
5. Data Processing			5,000		
6. Central Office Services			<u>2,000</u>		
					<u>27,000</u>
c. Total Direct Cost (a+b)					81,800
d. Overhead 38% of c					<u>31,200</u>
Overhead and total direct cost					113,000
e. Administration costs 23% of d					<u>26,000</u>
				Total Cost	\$139,000
f. Fixed fee					<u>16,000</u>
g. Total Price					\$155,000