



Air Resources Board



Matthew Rodriguez
Secretary for
Environmental Protection

Mary D. Nichols, Chairman
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Edmund G. Brown Jr.
Governor

December 27, 2012

Dear Researchers:

On November 30th, you received the California Air Resources Board's (ARB or Board) solicitation for draft research proposals for the 2013-2014 Annual Research Plan. This is an amendment to that solicitation, and includes the scope of work for one additional project not included in the original solicitation.

If you are interested in submitting a draft proposal to address any of the research topics described in the original solicitation or this amendment, please send an email to [Annalisa Schilla](mailto:Annalisa.Schilla@arb.ca.gov) by January 11, 2013, indicating your intent to submit, and submit your draft proposal no later than **January 31, 2013** through our proposal solicitation website at: <http://researchplanning.arb.wagn.org/>. Guidelines for developing your draft proposal are included in this amendment and the original solicitation package, and are available at the solicitation website. Please note that ARB's research budget is approximately \$5 million per year and typically supports 15-25 projects with two to three year durations. There is no specified minimum or maximum project budget, but typical budgets range from \$50,000-\$650,000. Projects that provide co-funding will be evaluated more favorably.

We expect to select proposals by late February for further refinement and review by the Board and its Research Screening Committee. Final proposals would be needed by April for our target of executed contracts by July 1, 2013.

Prospective investigators are encouraged to contact ARB staff for any clarification on these topics. If you have any questions, please contact Annalisa Schilla at (916) 322-8514 or aschilla@arb.ca.gov.

Sincerely,

/s/

Bart E. Croes, P.E.
Chief, Research Division

Enclosures

cc: Annalisa Schilla
Research Division

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.

California Environmental Protection Agency

UPDATE TO THE 2013-2014 SOLICITATION OF DRAFT RESEARCH PROPOSALS

Table of Contents

Additional Scope of Work.....	3
Air Quality Impacts of Low Vapor Pressure-Volatile Organic Compounds.....	4
Guidelines for Preparing and Submitting Draft Proposals.....	7
Proposal Preparation Guidelines	7
Proposal Submission Guidelines	8
EXAMPLE A: Sample Draft Proposal Title Page	9
EXAMPLE B: Sample Project Schedule	10
EXAMPLE C: Estimated Cost by Task	11

ADDITIONAL SCOPE OF WORK

AIR QUALITY IMPACTS OF LOW VAPOR PRESSURE-VOLATILE ORGANIC COMPOUNDS

I. OBJECTIVE

The objective of this project is to investigate the emissions of low vapor pressure-volatile organic compounds (LVP-VOCs) from consumer products and their impacts on air quality. It is intended to complement ARB's efforts to improve the inventory and modeling of VOCs. This project will advance our understanding of LVP-VOCs used in various consumer products, key physical and chemical properties, evaporation profiles under ambient conditions, partitioning between gas and particle phases once released in the atmosphere, and their ozone and organic aerosol formation potential. The results will provide necessary technical information for the California Air Resources Board (CARB) to better assess impacts of LVP-VOCs on ozone and secondary organic aerosol (SOA) formation and provide data to assess whether the exemption for LVP-VOCs in the Consumer Products Regulations should continue as is or be modified. The results can also be used to improve SIP ozone and PM_{2.5} modeling.

II. BACKGROUND

LVP-VOC is a chemical "compound" or "mixture" that has relatively low vapor pressure/high boiling point, and is defined by CARB Consumer Products Regulations (Title 17, California Code of Regulations, section 94508(a)). LVP-VOCs are ingredients used in some consumer product formulations to meet VOC limits because the CARB Consumer Products Regulations provide an exemption for LVP-VOCs. The LVP-VOC exemption was initially developed to exclude compounds that do not readily participate in ozone formation (i.e. resins, surfactants and other non-volatile organic compounds) and typically represented a small fraction of the overall composition of a formulated product. However, some recent laboratory testing indicates that certain LVP-VOCs may be present in the gas phase under ambient conditions. These findings are important because some LVP-VOCs have high Maximum Incremental Reactivity (MIR) values relative to ethane which represents the traditional bright line between photochemically-reactive and non-reactive VOC compounds. Therefore, the emissions of LVP-VOCs could have a significant impact on the formation of ozone. The rate and amount of a

LVP-VOC emitted into the atmosphere depends not only on the vapor pressure of the individual compound, but may also be affected by:

1. the type of product in which the compound is used,
2. the particular characteristics of the product's formulation and product form (i.e. aerosol, liquid, etc.), and
3. the way in which the product is actually used by consumers.

The rates of volatilization of LVP-VOCs in different formulations of consumer products and the fate of those LVP-VOCs are not well characterized. Moreover, the ambient concentrations of LVP-VOCs are affected by both the rate and extent of release from emission sources and may be affected by the rate of removal through a variety of competing processes including disposal down the drain, atmospheric reactions, dry deposition and formation of SOA. The formation of SOA will contribute to ambient PM_{2.5} levels while reducing the contribution of LVP-VOCs to ozone formation. Further understanding of the partitioning of LVP-VOCs and their reaction products between gas and particle phases in the atmosphere will provide useful information for ozone and SOA model development. Research efforts, including emission tests, chamber studies, ambient measurements, and fugacity modeling are needed to further understand the role of LVP-VOCs on ozone and SOA formation and to improve modeling for SIPs. This project will be developed to address these knowledge gaps in LVP-VOC emissions and atmospheric processes that lead to ozone and SOA formation.

III. SCOPE OF WORK

This project will investigate the volatility of the most common LVP-VOCs used in consumer products and their partitioning between gas and particle phases once emitted into the atmosphere. The LVP-VOCs of interest will be determined in consultation with CARB, SCAQMD, and other interested stakeholders. Research results will be used to evaluate the impacts of LVP-VOCs on air quality and provide information to assess whether the existing LVP-VOC exemption should be modified. Proposals which address a single task will be considered. Potential tasks include:

- Investigate the ambient rates of volatilization of LVP-VOCs, such as glycols, glycol ethers and hydrocarbon solvents used in various product forms of consumer products sold in California (e.g., cleaners, detergents, personal care products, automotive

maintenance products) used in various applications. The investigation should include testing of pure analytes and fully formulated consumer products. Consumer product categories and product forms will be determined in consultation with CARB, SCAQMD, and other interested stakeholders.

- Conduct laboratory chamber studies on selected LVP-VOCs and products formulated with LVP-VOCs to investigate the atmospheric ozone and particulate matter impacts of LVP-VOCs. The goal would be to compare impacts of a particular compound used in a formulated product with that of the impacts of the LVP-VOC emitted in its pure form. If appropriate, develop emission factors to account for the amounts that do not affect air quality. Part of this task would be to determine if these materials exhibit vapor phase photochemistry due to thermal degradation from the high temperatures at which they are injected into the chamber.
- Investigate the environmental fate of LVP-VOCs in selected consumer products when they are disposed down the drain including the downstream emissions that may occur at water treatment or solid waste facilities and, if appropriate, determine emission correction factors to account for the amount that is not emitted into the air (e.g. down-the-drain factors).

IV. DELIVERABLES

- Quarterly Progress Reports
- Final Report
- Additional deliverables to be determined in consultation with ARB

V. TIMELINE

It is anticipated this project will be completed in no more than 36 months from the start date depending upon the scope of work.

GUIDELINES FOR PREPARING AND SUBMITTING DRAFT PROPOSALS

PROPOSAL PREPARATION GUIDELINES

The technical proposal portion of the draft proposal should be clear and concise, no more than approximately 25 pages in length. To conserve paper, please use single or one-and-a-half spacing. The technical proposal should be paginated as a stand alone document using the “Page xx of xx” format in the top right corner.

The technical proposal must include the following parts:

- Title page. The purpose of this page is to provide in one location information needed by our administrative staff. It must contain all of the following items (see [Example A](#)):
 - the title of the draft proposal
 - the name of the principal investigator
 - a statement that the draft proposal was prepared for ARB’s Research Division
 - the name and address of the university
 - the date of the draft proposal
 - check box if proposed research uses human or animal subjects
- Table of contents.
- Abstract. A one-page abstract of the proposed research briefly summarizing the main points of the various sections of the draft proposal.
- Introduction. Several paragraphs should be dedicated to explaining the relevance of this project. This section should include a brief description of research that has been conducted or is currently underway by the applicant and others in areas related to the draft proposal.
- Objectives. Describe the objectives of this project and how the results will be beneficial to ARB.
- Technical plan. This shall include at least the following topics:
 - A description of experimental techniques or research methods to be employed, including requirements for test specimens, laboratory animals, or human subjects.
 - A discussion of the major tasks to be conducted and how those tasks will be performed. Provide sufficient detail to allow technical reviewers to compare your proposal to others submitted in response to the same project solicitation. This section should demonstrate that adequate facilities and appropriate equipment are available to complete the project and describe protocols to ensure quality control and quality assurance.
 - A data management plan that identifies the data to be collected, the sample size required to assure statistical validity of the data, equipment or instrumentation that will be used, and approach to addressing quality assurance of the data.

- If applicable, a description of proposed human or animal subjects, including criteria for inclusion/exclusion, overview of recruitment plans, and need plans for Institutional Review Board (IRB) approval.
- References to publications describing similar work done by applicant(s) or others.

The proposal package must also include:

- Project schedule
 - List each task specified in the technical plan. Addressing each task, display the estimated timespan, with beginning and ending dates, of each individual task over the life of the contract. If tasks are extensive, they may be subdivided. Denote progress review meeting dates and dates of deliverables such as the draft final report (see [Example B](#)). Keep in mind that the draft final report must be provided to ARB six months prior to the contract end date in order to allow time for review by ARB staff and RSC.
- Curricula vitae or résumés of the key scientific personnel.
- Preliminary cost proposal.
 - Include the estimated cost breakdown by task (see [Example C](#)). Note that ARB's research budget is approximately \$5 million dollars per year and typically supports 15-25 projects with 2 to 3 year durations. There is no specified minimum or maximum project budget, but most project budgets range from \$50,000-\$650,000. Projects that provide co-funding will be evaluated more favorably.

PROPOSAL SUBMISSION GUIDELINES

- All materials comprising the draft proposal must be consolidated into a single Microsoft Word or Adobe pdf file.
- To submit your draft proposal, please visit our proposal submission website to upload your file: <http://researchplanning.arb.wagn.org/>.

EXAMPLE A: SAMPLE DRAFT PROPOSAL TITLE PAGE

Page 1 of xx

DRAFT PROPOSAL

Concentrations of Volatile Organic Compounds in Urban Homes

Principal Investigator:
Joanna Phillips

Prepared for:

State of California Air Resources Board
Research Division
PO Box 2815
Sacramento CA 95812

Prepared by:

University of California, Davis
One Shields Avenue
Davis, CA 90210
(888) 555-4433

August __, ____

Check if applicable:

Animal subjects _____

Human subjects _____

EXAMPLE B: SAMPLE PROJECT SCHEDULE

PROJECT SCHEDULE

Task 1: Purchase equipment

Task 2: Install equipment

Task 3: xxxxx

Task 4: xxxxx

Task 5: xxxxx

Task 6: Draft final report

Task 7: Amend final report

	MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
TASK																
1																
2																
3																
4																
5																
6																
7																
		m	p			m		p		m				dm		F

p = Quarterly progress report

d = Deliver draft final report (to be submitted 6 months prior to contract expiration)

f = Deliver final report

m = Meeting with ARB staff

EXAMPLE C: ESTIMATED COST BY TASK

Task	Labor	Employee Fringe Benefits	Subs, Consultan ts	Equip	Travel Subsist	EDP	Copy Print	Mail Phone Fax	Materials and Supplies	Analyses	Misc.	Overhead	Total
1	\$4,200	\$1,260	\$0	\$5,200	\$4,240	\$0	\$15	\$5	\$25	\$0	\$0	\$840	\$15,785
2	\$5,000	\$3,000	\$5,430	\$0	\$0	\$0	\$45	\$60	\$34	\$0	\$0	\$2,000	\$15,569
3	\$10,000	\$1,500	\$0	\$0	\$0	\$450	\$10	\$10	\$66	\$365	\$0	\$1,000	\$13,401
4	\$8,000	\$102	\$0	\$72	\$340	\$0	\$5	\$10	\$52	\$1,024	\$0	\$68	\$9,673
5	\$4,500	\$1,350	\$0	\$0	\$0	\$0	\$10	\$10	\$52	\$0	\$0	\$900	\$6,822
6	\$340	\$2,400	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$245	\$1,600	\$4,585
	\$32,040	\$9,612	\$5,430	\$5,272	\$4,580	\$450	\$85	\$95	\$229	\$1,389	\$245	\$6,408	\$65,835