

State of California
AIR RESOURCES BOARD

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RESEARCH PROPOSAL

Resolution 09-18

February 26, 2009

Agenda Item No.: 09-2-2

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WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code sections 39700 through 39705;

WHEREAS, a research proposal, number 2665-263, entitled "Environmental Exposures in Early Childhood Education Environments," has been submitted by the University of California, Berkeley; and

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the U.S. Environmental Protection Agency has agreed to provide in-kind support; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

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Proposal Number 2665-263 entitled "Environmental Exposures in Early Childhood Education Environments," submitted by the University of California, Berkeley, for a total amount not to exceed \$417,496.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

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Proposal Number 2665-263 entitled "Environmental Exposures in Early Childhood Education Environments," submitted by the University of California, Berkeley, for a total amount not to exceed \$417,496.

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BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed \$417,496.

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I hereby certify that the above is a true and correct copy of Resolution 09-18, as adopted by the Air Resources Board.

/s/

Monica Vejar, Clerk of the Board

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ATTACHMENT A

“Environmental Exposures in Early Childhood Education Environments”

Background

In California about 1.1 million children aged five and under attend preschools or childcare facilities. By kindergarten, half of all California children have attended a licensed childcare facility. Recent studies have shown that early childhood education environments may contain lead, pesticides, and other allergens, but there is little information on children’s exposure to other toxic chemicals in these environments. Such chemicals include volatile organic compounds (VOC), many of which are known carcinogens or reproductive toxins. They also include semi-volatile organic compounds (SVOC) and perfluorinated compounds, which are emerging concerns because many of these are known or suspected reproductive, developmental, or respiratory toxins.

SVOCs also persist in the environment; they do not readily degrade. SVOCs are more challenging and expensive to study than VOCs because these chemicals partition between the air and surface dust. Air and dust are both important sources of exposure because children are exposed to SVOCs by multiple routes. In addition to inhaling SVOCs, children can be exposed through dermal and oral routes by crawling or sitting on contaminated surfaces or by playing with contaminated toys. SVOCs of concern include phthalates, which are plasticizers; polybrominated diphenyl ethers (PBDE), which are used as flame retardants; perfluorinated compounds; tris phosphate flame retardants; constituents of Firemaster 550®; and pesticides. Some data exist on children’s exposure to environmental contaminants in K-12 schools, and a few studies have looked at children’s exposure to pesticides, lead, and allergens in U.S. child care centers. However, little concentration data have been collected on exposures in early childhood education facilities, especially for phthalates, PBDEs, and perfluorinated compounds.

Objective

The objective of this project is to quantify the levels of VOCs, aldehydes, acetone, phthalates, PBDEs, tris phosphate flame retardants, constituents of Firemaster 550®, perfluorinated compounds, PM, pesticides, and lead in indoor air and dust in 40 early childhood education facilities located in urban and agricultural communities. These results will be compared to exposure and health risk benchmarks in order to identify the pollutants that warrant further research or mitigation.

Methods

The investigators will visit 40 early childhood education facilities and will collect air and dust samples, which will be analyzed for a selected set of pollutants. The investigators will collect VOCs in multisorbent tubes. Formaldehyde, acetaldehyde, and acetone will be collected on silica gel cartridges coated with 2,4-dinitrophenyl-hydrazine (DNPH). SVOC air samples will be collected on cartridges containing a glass fiber filter backed by a polyurethane foam plug. SVOC dust samples will be collected from floor dust via vacuum sampling. In addition, the amount of lead present in the dust samples will be

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quantified. PM10 and PM2.5 will be collected on Teflon filters, which will be weighed to obtain integrated measurements of PM. The investigators also will collect time-resolved measurements of ultrafine particles using a condensation particle counter.

All air and dust samples will be analyzed by external laboratories. Lawrence Berkeley National Laboratory and Battelle Memorial Institute will analyze most of the samples. The U.S. Environmental Protection Agency (U.S. EPA) has offered to analyze all 40 dust samples *gratis* for perfluorinated compounds and PBDEs.

In order to identify exposure risk factors for all of the target pollutants, the investigators will carry out a facility inspection and will develop and administer a questionnaire to the childcare providers. In order to obtain exposure estimates for both urban and rural locations, 20 of the facilities will be located in Alameda County (urban) and 20 in Monterey County (rural). Since approximately 60 percent of children attend center-licensed facilities, 12 (60 percent) of the selected facilities in each county will be center-licensed facilities and eight will be home-based facilities. Prior to beginning the full study, a pilot study will be conducted in two facilities, one urban and one rural. The results of the pilot study will be used to finalize the questionnaire, the facility inspection form, and the standard operating procedures prior to beginning full-scale sampling.

Expected Results

This contract will provide comprehensive data on the levels of VOCs, aldehydes, acetone, SVOCs, particulate matter, and lead in the air and dust in early childhood education centers. Levels of some of the contaminants are expected to exceed standards and guidelines for exposure and health.

Significance to the Board

The results from the proposed study will provide ARB with valuable exposure data and health risk information on a number of compounds that are known or suspected reproductive, developmental, or respiratory toxicants, most of which have not been studied in early childhood education environments. The study will provide data on a number of semivolatile and volatile organic compounds that are toxic air contaminants (TAC), and will be useful in informing ARB on whether additional regulation of these TACs is needed in order to protect children. The PM data may also be useful in future revisions to ambient air quality standards for PM.

Contractor:

University of California, Berkeley (UCB)

Contract Period:

27 Months

Principal Investigator (PI):

Asa Bradman, Ph.D.

Contract Amount:

\$417,496

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Cofunding:

U.S. EPA will analyze all 40 dust samples for perfluorinated compounds and PBDEs gratis.

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Basis for Indirect Cost Rate:

The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:

Dr. Bradman, the principal investigator, has not previously conducted work for ARB; however, he is well respected for his successful completion of several major studies of children's exposure to environmental agents. Since 1998, Dr. Bradman has served as the Associate Director of the University of California, Berkeley Center for Children's Environmental Health Research, which aims to understand and prevent exposures to environmental toxins in children of low income families in the Salinas Valley. He serves as director of the Center's Exposure Assessment Study. He also serves as co-director of the Center for the Health Assessment of Mothers and Children of Salinas Laboratory Core. Dr. Bradman has extensive experience studying children's exposure to SVOCs, particularly pesticides. His experience and expertise will contribute greatly to ARB's understanding of children's environmental exposures.

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Prior Research Division Funding to UCB:

| Year | 2008 | 2007 | 2006 |
|---------|-----------|-------------|-------------|
| Funding | \$483,986 | \$1,377,484 | \$1,607,398 |

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BUDGET SUMMARY

Contractor: University of California, Berkeley

ENVIRONMENTAL EXPOSURES IN EARLY CHILDHOOD EDUCATION ENVIRONMENTS

DIRECT COSTS AND BENEFITS

| | | | |
|-----|------------------------------------|-----------------------------|-----------|
| 1. | Labor and Employee Fringe Benefits | \$146,517 | |
| 2. | Subcontractors | \$167,392 | |
| 3. | Equipment | \$ 1,500 | |
| 4. | Travel and Subsistence | \$ 4,464 | |
| 5. | Electronic Data Processing | \$ 0 | |
| 6. | Reproduction/Publication | \$ 1,400 | |
| 7. | Mail and Phone | \$ 1,600 | |
| 8. | Supplies | \$ 14,050 | |
| 9. | Analyses | \$ 1,840 | |
| 10. | Miscellaneous | <u>\$45,803¹</u> | |
| | Total Direct Costs | | \$384,566 |

INDIRECT COSTS

| | | | |
|----|-------------------------------------|-------------|-----------------|
| 1. | Overhead | \$ 32,930 | |
| 2. | General and Administrative Expenses | \$ 0 | |
| 3. | Other Indirect Costs | \$ 0 | |
| 4. | Fee or Profit | <u>\$ 0</u> | |
| | Total Indirect Costs | | <u>\$32,930</u> |

TOTAL PROJECT COSTS **\$417,496**

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¹ Miscellaneous costs include full fee remission for one graduate student during the first and second fiscal years (\$20,991), rent for off-campus offices located in Berkeley (\$14,059) and Salinas (\$4,488), \$75 education supply coupons for each of the participating facilities (\$3000), General and Employment Liability (\$848), and reimbursement for childcare facilities to cover the costs of having employees work overtime as a result of the study and for use of the facilities resources, such as electricity.

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Attachment 1

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Battelle Memorial Institute

Description of subcontractor's responsibility: Battelle Memorial Institute will assist in sampling and conduct laboratory analyses for flame retardants, phthalates, perfluorinated compounds, and pesticides in air, and selected flame retardants, phthalates, and pesticides in dust.

COSTS AND BENEFITS

- 1. Sampler preparation, analysis of 45 air samples and 15 quality control samples for phthalates, tris phosphate flame retardants, and Firemaster 550® flame retardants at \$646.93 per sample (Effective cost per sample is \$485.20). \$29,112
- 2. Sampler preparation, and analysis of 45 air samples and 15 quality control samples for polybrominated diphenyl ethers (PBDEs) at \$501.64 per sample. (Effective cost per sample is \$376.23). \$22,574
- 3. Sampler preparation and analysis of 20 air samples plus 12 quality control samples for perfluorinated compounds (PFCs) at \$781.40 per sample. (Effective cost per sample is \$488.38). \$15,628
- 4. Analysis of 40 dust samples and 12 quality control samples for phthalates, tris phosphate flame retardants, and Firemaster 550® flame retardants at \$502.95 per sample. (Effective cost per sample is \$386.89). \$20,118
- 5. Analysis of 20 dust samples and 40 air samples for pesticides \$11,782

TOTAL PROJECT COSTS **\$99,214¹**

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¹ Battelle will provide their services on a fee-for-service basis. Both direct and indirect costs are included in the costs listed above.

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Attachment 2

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Lawrence Berkeley National Laboratory

Description of subcontractor's responsibility: Lawrence Berkeley National Laboratory will assist in sampling and conduct laboratory analyses for VOCs, aldehydes, and particles.

DIRECT COSTS AND BENEFITS

| | | |
|---------------------------------------|-----------------------|----------|
| 1. Labor and Employee Fringe Benefits | \$ 8,376 | |
| 2. Subcontractors | \$ 0 | |
| 3. Equipment | \$ 0 | |
| 4. Travel and Subsistence | \$ 0 | |
| 5. Electronic Data Processing | \$ 0 | |
| 6. Reproduction/Publication | \$ 0 | |
| 7. Mail and Phone | \$ 0 | |
| 8. Supplies | \$ 4,730 ¹ | |
| 9. Analyses | \$ 0 | |
| 10. Miscellaneous | \$ 1,194 | |
| Total Direct Costs | | \$14,300 |

INDIRECT COSTS

| | | |
|--|----------|---------|
| 1. Overhead | \$ 8,054 | |
| 2. General and Administrative Expenses | \$ 0 | |
| 3. Other Indirect Costs | \$ 0 | |
| 4. Fee or Profit | \$ 0 | |
| Total Indirect Costs | | \$8,054 |

TOTAL PROJECT COSTS **\$22,354**

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¹ Supplies include chemicals required to carry out analyses of volatile organic compounds (VOCs, \$2,750), cartridges for sampling VOCs (\$780), a size-selective particle sampler (\$500), equipment repair contingency (\$500), and miscellaneous lab supplies (\$200).

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Attachment 3

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: U. S. Environmental Protection Agency
National Exposure Research Laboratory

Description of subcontractor's responsibility: U. S. EPA's National Exposure Research Laboratory will conduct the laboratory analyses for PBDEs and PFCs in house dust samples from all participating childcare facilities. This work will be provided at no cost to the contract.

DIRECT COSTS AND BENEFITS

| | | | | |
|-----|------------------------------------|----|----------|-----|
| 1. | Labor and Employee Fringe Benefits | \$ | 0 | |
| 2. | Subcontractors | \$ | 0 | |
| 3. | Equipment | \$ | 0 | |
| 4. | Travel and Subsistence | \$ | 0 | |
| 5. | Electronic Data Processing | \$ | 0 | |
| 6. | Reproduction/Publication | \$ | 0 | |
| 7. | Mail and Phone | \$ | 0 | |
| 8. | Supplies | \$ | 0 | |
| 9. | Analyses | \$ | 0 | |
| 10. | Miscellaneous | \$ | <u>0</u> | |
| | Total Direct Costs | | | \$0 |

INDIRECT COSTS

| | | | | |
|----|-------------------------------------|----|----------|------------|
| 1. | Overhead | \$ | 0 | |
| 2. | General and Administrative Expenses | \$ | 0 | |
| 3. | Other Indirect Costs | \$ | 0 | |
| 4. | Fee or Profit | \$ | <u>0</u> | |
| | Total Indirect Costs | | | <u>\$0</u> |

TOTAL PROJECT COSTS \$0

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Attachment 4

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Clinica de Salud de Valle Salinas

Description of subcontractor's responsibility: _Jose Camacho is an environmental sampling technician who has collected air and dust samples in numerous previous studies._ He will oversee sampling in Monterey County as a subcontractor with Clinica de Salud de Valle Salinas. His duties will include assisting in sampling in Alameda County, review of Spanish translations of inspection and questionnaire forms, participant recruitment, outreach, and reporting of the results to Spanish speaking participants.

DIRECT COSTS AND BENEFITS

| | |
|---------------------------------------|-------------|
| 1. Labor and Employee Fringe Benefits | \$ 37,022 |
| 2. Subcontractors | \$ 0 |
| 3. Equipment | \$ 0 |
| 4. Travel and Subsistence | \$ 0 |
| 5. Electronic Data Processing | \$ 0 |
| 6. Reproduction/Publication | \$ 0 |
| 7. Mail and Phone | \$ 0 |
| 8. Supplies | \$ 0 |
| 9. Analyses | \$ 0 |
| 10. Miscellaneous | <u>\$ 0</u> |
| Total Direct Costs | \$37,022 |

INDIRECT COSTS

| | |
|--|----------------|
| 1. Overhead | \$ 3,702 |
| 2. General and Administrative Expenses | \$ 0 |
| 3. Other Indirect Costs | \$ 0 |
| 4. Fee or Profit | <u>\$ 0</u> |
| Total Indirect Costs | <u>\$3,702</u> |

TOTAL PROJECT COSTS \$40,724

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Attachment 5

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Geri Kavanagh (Consultant)

Description of subcontractor's responsibility: Geri Kavanagh has worked as a field laboratory manager in previous children's exposure studies in Monterey County. Ms. Kavanagh will assist in implementing sampling protocols in Monterey County, and assure appropriate sample collection, processing, labeling storage, tracking, and shipping.

DIRECT COSTS AND BENEFITS

| | | |
|---------------------------------------|----------|---------|
| 1. Labor and Employee Fringe Benefits | \$ 1,500 | |
| 2. Subcontractors | \$ 0 | |
| 3. Equipment | \$ 0 | |
| 4. Travel and Subsistence | \$ 0 | |
| 5. Electronic Data Processing | \$ 0 | |
| 6. Reproduction/Publication | \$ 0 | |
| 7. Mail and Phone | \$ 0 | |
| 8. Supplies | \$ 0 | |
| 9. Analyses | \$ 0 | |
| 10. Miscellaneous | \$ 0 | |
| Total Direct Costs | | \$1,500 |

INDIRECT COSTS

| | | |
|--|------|-----|
| 1. Overhead | \$ 0 | |
| 2. General and Administrative Expenses | \$ 0 | |
| 3. Other Indirect Costs | \$ 0 | |
| 4. Fee or Profit | \$ 0 | |
| Total Indirect Costs | | \$0 |

TOTAL PROJECT COSTS **\$1,500**

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Attachment 6

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Victoria Leonard (Consultant)

Description of subcontractor's responsibility: Victoria Leonard, RN, Ph.D., will review proposed sampling protocols, questionnaires, and inspection forms. She will advise on outreach and participant recruitment methods, and assist in explaining study results to those providers who request it.

DIRECT COSTS AND BENEFITS

| | | | | |
|-----|------------------------------------|----|----------|---------|
| 1. | Labor and Employee Fringe Benefits | \$ | 3,600 | |
| 2. | Subcontractors | \$ | 0 | |
| 3. | Equipment | \$ | 0 | |
| 4. | Travel and Subsistence | \$ | 0 | |
| 5. | Electronic Data Processing | \$ | 0 | |
| 6. | Reproduction/Publication | \$ | 0 | |
| 7. | Mail and Phone | \$ | 0 | |
| 8. | Supplies | \$ | 0 | |
| 9. | Analyses | \$ | 0 | |
| 10. | Miscellaneous | \$ | <u>0</u> | |
| | Total Direct Costs | | | \$3,600 |

INDIRECT COSTS

| | | | | |
|----|-------------------------------------|----|----------|------------|
| 1. | Overhead | \$ | 0 | |
| 2. | General and Administrative Expenses | \$ | 0 | |
| 3. | Other Indirect Costs | \$ | 0 | |
| 4. | Fee or Profit | \$ | <u>0</u> | |
| | Total Indirect Costs | | | <u>\$0</u> |

TOTAL PROJECT COSTS **\$3,600**

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