

# Lawrence Berkeley National Laboratory

## Recent Work

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E&E Newsletter (February 1995)

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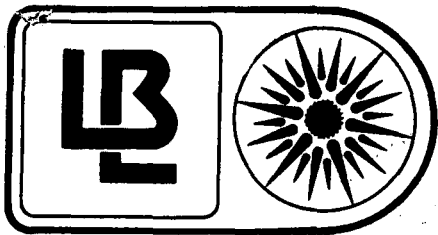
Schwartz, Lila

**Publication Date**

1995-01-25

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# NEWSLETTER

Lawrence Berkeley Laboratory  
Energy and Environment Division

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## \*A SUCCESS STORY FROM ENERGY EFFICIENT BUILDINGS\*

by John R. Girman

Current energy conservation strategies that would reduce ventilation in residential buildings may contribute to the buildup of indoor air contaminants, e.g., carbon monoxide, nitrogen dioxide, respirable particulates, radon, and organic compounds such as formaldehyde. Field studies of indoor air quality and the effects of reduced ventilation have been limited by the high cost of employing continuous monitors. Passive samplers capable of measuring daily or weekly integrated contaminant concentrations on-site without external power, accessories (e.g., pumps, chart recorders, etc.) or attendance of trained technicians, offer a promising solution.

The Ventilation and Indoor Air Quality Group (VIAQ) of the Energy Efficient Buildings Program has developed and validated a passive sampler for one important indoor pollutant: formaldehyde. Formaldehyde is an inexpensive chemical used as a component in the manufacture of many building materials and furnishings. Unfortunately many of these materials and furnishings release formaldehyde into the indoor air, subjecting occupants to the allergenic (and possibly carcinogenic) effects of formaldehyde.

The formaldehyde passive sampler developed by VIAQ consists of a sodium bisulfite-impregnated glass fiber filter placed in the bottom of a 10-cm long, capped glass vial. In contrast to traditional sampling methods for formaldehyde, the passive sampler doesn't require refrigeration, pumps, sampling lines, or a power supply. Nor does the sampler contain any hazardous material.

Use of the sampler is simple: it is uncapped, and then taped to a wall in the area to be sampled or attached to the lapel of the person to be monitored. The time and date are recorded. Because the sampler relies upon diffusion to supply formaldehyde to the sodium bisulfite

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sorbent, no further attendance is necessary until the sampling period, typically one week, is over. At the end of sampling period, the sampler is capped, the time and date are recorded on the sampler, and it is sent to the laboratory for analysis by the widely-used chromotropic acid method.

With the passive sampler, an integrated measure of the formaldehyde level can be obtained for \$10-15. In contrast, the traditional method would require a refrigerated sampler costing about \$800, a half-day's work by a trained technician to set up the sampler and another half-day to dismantle it, and the shipment of refrigerated samples. In addition, the obtrusiveness of the relatively large and noisy refrigerated sampler is eliminated.

The substantial advantage of the passive sampler for field studies is accomplished without a loss in accuracy. We recently a field study conducted in which the passive samples compared very favorably to the traditional refrigerated method for over twenty indoor environments.

About a third of the new energy-efficient houses we have sampled have had formaldehyde concentrations above the most stringent guidelines proposed or promulgated for indoor air (100 ppb). Thus, we believe the new sampler represents an important step in characterizing a significant problem. As an indication that others share this view, we note that this past summer the Canadian government purchased tens of thousands of these LBL-developed samplers from a newly-formed company that manufactures them in Berkeley. The samplers are being deployed to identify urea-formaldehyde foam-insulated houses with high formaldehyde concentrations.

Because of their low cost and ease of operation in the field, formaldehyde passive samplers will make possible large-scale IAQ studies, including: comprehensive field studies of IAQ in existing buildings to identify high-risk population groups and to quantify their exposure; epidemiological studies on air pollution; and studies assessing the impact of energy-conserving strategies on IAQ. Finally, the use of passive samplers will help to ensure that energy conservation programs by utilities or other agencies that reduce building ventilation will not adversely impact the health and safety of occupants.

### \*DIVISION NEWS\*

- The proposal for a National Center for Advanced Materials (NCAM) was recently reviewed by the Office of Management and Budget and by DOE construction officials. It is expected that funding for NCAM will be in the President's budget for FY84.

- Lab funding comes primarily from two appropriation bills, Interior & Related Agencies (fossil and conservation) and Energy & Water (everything else). The FY83 Interior bill has been passed, but the Energy bill is still before of the House and the Senate, each having "marked-up" its own version. To keep the government operating, a Continuing Resolution has established FY83 funding levels to be the same as FY82. This situation is causing problems for Lab programs (like Nuclear Science) that were counting on the increase in funding shown in the mark-ups. DOE may "reprogram" money from other areas in order to provide these programs with support above the FY82 level. The "other areas" include Solar and Energy Storage, where the FY82 level is above both the Senate and House mark-ups.
- Mark Levine and Ron Ritschard have been appointed as Deputy Program Leaders of the Energy Analysis Program. Both have been serving in leadership roles for the Program for some time. Congratulations and best wishes to Mark and Ron!

### \*FROM BATS TO BUILDINGS\*

#### An Interview With Ronald Ritschard, Biologist The Energy Analysis Program

- E&E: Ron, could you tell us how you came to study Biology?
- Ron: I grew up in a small town, Gresham, Oregon. I was a typical high school student--very interested in sports. In my family it was almost unheard of to go to college. When I was 18 my parents gave me a suitcase.
- E&E: A suitcase?
- Ron: Yes, meaning they felt I was old enough to move out--it's a European tradition; my parents are from Switzerland.
- E&E: So what did you do?
- Ron: I made one of my biggest mistakes. I joined the Marines and was in the service from 1954-1957. I spent 18 months in Korea, working on air-ground communication. It wasn't a complete waste, since I decided to enroll in Air Traffic Controller School. Then during the summer before Controller School, I joined a summer baseball league with some old friends, and managed to break my leg so badly that it was in a cast for eight months.

E&E: So you couldn't go to Air Traffic Controller School?

Ron: Right. I figured that since I had the G.I. Bill I might as well use it. I entered Portland State University as a liberal arts major. It was terrible. I was on crutches. Always late for class. In fact, I ran up about \$300 worth of parking tickets, because I just couldn't get around the campus very well. It was embarrassing-- my brother was a captain on the police force, and I ended up washing police cars to work off my fine.

E&E: It doesn't sound like you were a dedicated biologist yet.

Ron:" That comes later. After a few more coincidences. I got fed up with Oregon, so I moved to southern California, where I enrolled in a junior college. There was a requirement of one year of Biology. The course was taught by an amazing teacher. I became completely fascinated with the subject. In fact, I realized that all through childhood I had been a biologist-- raising tadpoles, repairing owls' wings. So I ended up with a BA in Biology. I then enrolled in Oregon State University to study bats. But at that time people were realizing that bats were great carriers of rabies. So I changed to Marine Biology, and the study of radiation effects. I received my doctorate in 1965.

E&E: Did you stay in Oregon?

Ron: No, I became an Associate Professor at Cal Poly, San Luis Obispo, but I was usually somewhere else doing research. In 1973 I came to LLL to study the effects of tritium on marine organisms. This was apparently a hot political issue, since it had implications for the siting of nuclear power plants on the California coast. Funding was cut off.

E&E: Were you surprised?

Ron: Yes, I guess I was. I had thought that national laboratories were more insulated from the pressures that cause private research outfits to direct their research. At any rate, at Livermore I was part of a group that had set up an artificial tide pool to study the uptake of radioactive materials. During this period I began to interact with Will Siri and other LBL researchers who were working on a regional studies program.

E&E: What was that?

Ron: It was an effort, in the wake of the oil crisis, to study the present and future energy use in an entire geographic region. Different development scenarios would be defined, and the consequences examined.

E&E: These technology assessments are a long way from wading through a tide pool, or tending an aquarium.

Ron: I had to really shift gears when I entered this field. But you know, I had always been a "community ecologist," interested in interdisciplinary work and outreach to the public. Also, I felt that it was important that someone with biological training should act as the interface between research biologists and the decisionmakers who needed their data when deciding on regional development and energy use.

E&E: Could you elaborate on that?

Ron: Typically biological data is collected by researchers following their own interests. They often are unaware of the type of data needed by decisionmakers, and are many times not interested in presenting their data so that it is useful to decisionmakers. The other side of the coin is the frequent lack of technical staff to organize and evaluate available data in the various governmental agencies making decisions in a region. For example, I was involved in setting up a small program to study the ecology of the San Francisco Bay. In some ways it was very frustrating. I think we failed to put together an information network that coordinated the needs and efforts of both researchers and governmental policymakers. Who makes decisions about the development of the Bay? There's tremendous overlap between the jurisdictions of the many agencies. In other words, regional development involves very complex ecological phenomena, for which we often can't even set up an effective coordinated program of research and policymaking.

E&E: When did you come to LBL?

Ron: In 1976. I worked on the San Francisco Bay study, and for about four years on a Technology Assessment of the Coastal Zone.

E&E: These were new areas of study at LBL weren't they?

Ron: Not only new areas, but different methods. This was applied research, usually interdisciplinary, and often funded to meet relatively short-term information needs. When I first became interested in interdisciplinary research, as an associate professor, I was warned against it, if I wanted tenure. I think there is a feeling that such research must be of lower quality than traditional research within one historically developed field. There may be a kernel of truth in this prejudice, based on the problems you can run into when using someone else's data, rather than the results of your own research. Another aspect involves the increased difficulties of peer review of research that is multidisciplinary. You need review by experts in several fields.

E&E: What role do you see for such research at a national laboratory?

Ron: Personally, I think it is very important that a proportion of the effort at the national labs be dedicated to interdisciplinary environmental research. Both because the research addresses problems vital to our health and well-being, and because it is crucial that there be centers of technical expertise, beholden to no special-interest groups, to conduct and evaluate the research.

E&E: What sort of work are you doing now?

Ron: The Energy Analysis Program has a narrower focus now. We're looking more at energy efficiency and demand analysis, and less at environmental assessment. In large part this is due to recent changes in emphasis at the Federal level. To answer your question more specifically, I am now tracking energy flows through buildings rather than through marine ecosystems. The overall process, of course, is much the same--since we are all students of thermodynamics, aren't we?

by Jeff Kessel

## \*TRIPS, CONFERENCES, AND PRESENTATIONS\*

### December

- Max Sherman chaired the session on Air Infiltration was at the ASHRAE/DOE Conference on Thermal Performance of the Exterior Envelopes of Buildings II held in Las Vegas.

### January

- Max Sherman chaired the Leakage Standards Committee at the ASHRAE 1983 Semiannual Meeting, held in Atlantic City.



## \*BABY BOOM\*

Trying to live up to her name, Meghana Gadgil (which means born in the clouds) arrived on a cloudy 17 of November, bringing a lot of sunshine to her parents, Anjali and Ashok.

One of the few to do so, little Adam Koonce showed up right on schedule--that is, according to Debby's prediction. Debby insisted that Adam would be born on her father's birthday, December 31, and that is exactly when he was born. Congratulations, Buck and Debby!

Brett Weahunt Webster made his debut November 30, weighing in at 9 pounds 4 ounces, and according to his parents, Tom Webster and Chris Weahunt, arriving three weeks late. Brett is very healthy and doing well, waiting for some hair to keep his head warm.

Kirsten Leigh Coolaham only kept Cynthia and Bruce waiting for a couple of extra days, arriving in time for the Christmas holidays on December 9.

Jeff and Joan were expecting an '82 model, but Jill Lauren Harris decided to make Uncle Sam happy instead and arrived on January 5. Although Jill was a healthy 8 pounds 2 ounces at birth, she did not outdo her older sister who weighed in at 9 pounds when she was born.

## \*AWARDS\*

- With much pleasure, Elton Cairns announced the decision of the Committee for the LBL Internship Program at the E&E Christmas Party. This year's intern is Buck Koonce of the Energy Efficient Buildings Program. Buck will begin the Program on March 31, when he begins classes at Cal State Hayward. While working on his B.S. in Computer Science, he will work part-time for LBL, and will receive full pay.
- Adam Tom, a summer Lab Coop student with the EPOB group last summer, is one of six recipients of the LBL Achievement Rewards for College Scientists Foundation scholarship (ARCS) for the 1983-84 academic year. Adam is a student at UCB in the Electrical Engineering Department.

**\*ANNOUNCEMENT\***

The 1983 Performance Appraisal forms will be sent out March 1, which is still a couple of months away. However, some of the 1982 appraisals have not yet been received. Please return any 1982 appraisals you may still have now.

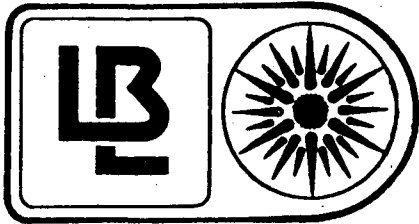
**\*RECENT REFEREED JOURNAL ARTICLES\***

"Energy Impacts of a Municipal Conservation Policy," Dietz, Thomas and Edward L. Vine, Energy, Vol. 7, No. 9, pp. 755-758 (1982).

"The Thermal Radiance of Clear Skies," Berdahl, Paul and Richard Fromberg, Solar Energy, Vol. 29, No. 4, pp. 299-314 (1982).

PUB-432 1-83/285 This work was supported by the U.S. Department of Energy under Contract Number DE-AC03-76SF00098.  
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WEEKLY SEMINAR SERIES  
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| FEBRUARY 1  | RICHARD DURST, NBS<br>"OVERVIEW OF STRATEGIES FOR THE<br>CHARACTERIZATION OF ORGANIC COMPOUNDS" |
| FEBRUARY 15 | ART ROSENFELD, LBL<br>"CHINA: DIALOGUES ABOUT ENERGY EFFICIENT<br>BUILDINGS"                    |
| MARCH 8     | ROBERT HUGGINS, STANFORD UNIVERSITY<br>"SOME MATERIAL ASPECTS OF HIGH PERFORMANCE<br>BATTERIES" |
| MARCH 15    | S. D. KULKARNI, LLNL<br>"APPLICATION OF COMPOSITE FLYWHEEL TECHNOLOGY<br>FOR ENERGY STORAGE"    |
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REFRESHMENT WILL BE SERVED AT 3:45 P.M.

For further information, please call Rolf Mehlhorn, 642-4445 or Maya Osowitt, 486-5297  
UC faculty and students, LBL staff and invited guests are welcome