## DISCLAIMER

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NEWSLETTER

Editor: Jeffrey Kessel
50A - 4112
Ext. 5001

Lawrence Berkeley Laboratory

# Energy and Environment Division

## ★ Division News ★

- The first trailers are due to arrive in the Building 90 parking (sic) lot on the twenty-third of this month. Other units (some triples, some quads) are scheduled to arrive at one week intervals thereafter.

*Howie Smith* (50A-4109) is involved in planning parking at LBL. He mentioned that there is often parking available along the shoulder of the road near the 88" Cyclotron, and that in about one month, there will be additional parking along the road (to become one-way) between buildings 71 and 90; and along Cyclotron Road between buildings 61 and 72. Howie is interested in receiving suggestions (#%*&!!!*∗¢xx!, and furthermore, @%##&*∗!!X!#%) about areas where parking can be expanded or started.

- *Barbara West* reports that there is no definite information from DOE on 189 deadlines at this time. Presumably the final versions will again be due in the Division Office in February.

- Little did *Bob Budnitz* know when he ventured from LBL to work at the Nuclear Regulatory Commission, that the NRC's funding would be stopped by President Carter's veto of the water projects appropriation bill. There will have to be a continuing resolution by Congress to fund the NRC.

- Titles of articles for the 1978 Energy & Environment Division's Annual Report should be submitted by the end of this month. The draft articles are due by December 15. Details of this procedure have recently been mailed out to prospective authors.

## ★ Trips, Conferences, and Presentations ★

- *Rollie Otto* presented a paper on fundamental energy properties of aqueous solutions at elevated temperatures and pressures to the Pacific Conference on Chemistry and Spectroscopy in San Francisco.

- *John Harte* will give the keynote address, "Energy and Water," at the 14th Annual American Water Resources Association Conference in Orlando, Florida, on November 6.

- *Don Levy* will join *John Harte* to present an invited talk, "Making Microcosms an Effective Assessment Tool," at the Symposium on Microcosms in Ecological Research, to be held in Augusta, Georgia, on November 8.

- *Susan Schwartz* presented a paper at the 176th National Meeting of the American Chemical Society in Miami Beach. Susan's paper dealt with a computerized databank on hydrogen sulfide emissions.

- *Metin Lokmanhekim* and *Fred Winkelmann* are travelling to Edinburgh, U.K., to attend a meeting of the International Energy Agency. They will present the results of a DOE-1 computer analysis of the energy use of the Avonbank building. These results will be compared both with analyses made by other researchers using different computer programs, and with measured data from the building.

## ★ New Employees ★

- *Robert Richardson*, a Professor of Physics at New York University, will be spending his sabbatical leave working with *Sam Berman* on LBL's window and lighting programs.

- *Linda Schuck* will be working as an Energy Policy Analyst/Economist with *Art Rosenfeld's group*. Linda, with an MBA from Stanford University, has previously carried out corporate market penetration studies for energy conserving building materials, and was at one time the Director of Ecology Action of the Mid-Peninsula.

- *Robert Selleck*, a joint faculty appointment with UCB where he is a Professor of Sanitary Engineering, will be joining *Phyllis Fox* to conduct leaching and absorption studies with spent oil shale.

- *Patricia Smith*, a student of Landscape Architecture at UCB, will be working as a GSRA with *Ron Ritschard* and *Robert Twiss*, doing research on the land-use implications of solar energy utilization.

- *Stanton Smith* will be working as an economist in the Regional Studies group. Stanton comes to LBL from the California State Energy Commission, where he was involved with planning electrical generation facilities in California. Prior to this, Stanton worked in international industrial development.

- *Benjamin Stitt*, entering UCB as a graduate student in Nuclear Engineering, will be working as a research technician in the ventilation group at LBL. He will be concerned with developing instruments for measuring the presence of radon gas and radon daughters. These substances, present in many building materials, may prove to attain harmful concentrations in energy-efficient buildings where the air exchange rates are held low in order to conserve fuel.

- *Mehdi Tavana*, having passed the last year as a visiting scholar in the Department of Chemical Engineering at UCB, is joining LBL to work with *Sid Phillips* on the computer-based geothermal energy data file. Before coming to UCB on sabbatical leave, Mehdi was Assistant Professor of Chemical Engineering at the Abadan Institute of Technology, Iran.

- *Edward Vine*, working on his thesis in Ecology at U.C. Davis, will be working as a GSRA with *Paul Craig* and *Mark Levine* doing research on distributed energy systems in California.

• *Rodger Young*, with an M.Sc. in Organic Chemistry from UCB, will be working with the ventilation project's mobile laboratory, used to monitor indoor air environments.

• Meanwhile, back in the Division Office, there are some more new faces. *Linda Jacobs-Curletto* will be working with *Barbara West* and her Merry Band of Budgeteers. *Sharran Zeleke* joins the Division Office Staff to work with *Maria Ossa* and *Dottie Bottini* on personnel matters. Sharran previously worked with the Energy Analysis program. And we send our best wishes to *Jan McQuillan*, who transferred to the Earth Sciences Division.

The following interview is with *Hal Rosen*, a member of *Tića Novakov's* Atmospheric Aerosol Research Group.

E&E: Hal, looking down at Berkeley from LBL, we often see a yellow-brown haze stretching across the Bay. What is it?

Hal: A similar sight confronts viewers in cities around the world. You are looking at small particles suspended in the air which scatter light very effectively and cause these hazy conditions. The main constituents of these particles are carbon, sulfur, and nitrogen species; but the origin of these particles is poorly understood and is now a matter of a national debate which will have considerable impact on control strategies.

*"The ozone layer is falling! The ozone layer is falling!"*

E&E: Can you give us a historical picture of strategies against air pollution?

Hal: Visible smoke was the first problem noticed. It was greatly reduced through better combustion technology and use of cleaner fuels.

E&E: Well, what about the white plumes coming out of smokestacks along the Bay?

Hal: That's probably just water vapor. Most of the primary particles emitted by factories, homes, and vehicles are too small to be visible. After reducing these smoke emissions, it was found that there were still a lot of particles in the air; so people investigated ways that gaseous emissions could be converted by sunlight into particulates and the concept of photochemical smog came into being. This concept led to the idea that one could control both the gaseous and the particulate air pollution problem by controlling just the gases.

E&E: You mean that the present EPA standards focus on gaseous emissions.

Hal: That's right. The standards address $SO_2$, $NO_x$, CO, and hydrocarbons. But our research at LBL indicates that emission of particulates — invisible soot — plays a critical role in air pollution.

E&E: But I thought you said particulates were the first pollutant eliminated through cleaner fuels and better combustion.

Hal: Particulates were greatly reduced in the larger size ranges, but our work shows that very small carbon particles, which we call soot, are emitted in prodigious quantities from various combustion sources, like automobiles, diesels, and natural gas burners, and that these particles seem to represent most of the carbon particles found in urban air. This view is directly contrary to the photochemical concept which views these particles as being formed in the atmosphere by the transformation of hydrocarbon gases into particulate carbon.

E&E: How does your work show this?

Hal: We use a wide variety of experimental techniques, but let me describe the results of a rather simple but powerful method that we've developed at LBL. We collect particles by pulling a sample of air through a filter. The deposit we find is always black or gray, and we've identified the species responsible as "graphitic" soot, which can only be produced directly by combustion. Now we also measure the total carbon contained in the air sample. We find that the amount of graphitic soot is a good predictor of the total carbon content of the sample; and this is true independent of atmospheric conditions or geographical area. That is, we would make the same prediction in Berkeley or Chicago in the winter as we would in Los Angeles under conditions of extreme photochemical activity in the summer. Also we find a similar relationship for particles collected directly from various combustion sources.

E&E: What do these results mean?

Hal: They seem to imply that the carbon particles in the air are not produced by photochemical reaction and, for the most part, the particles are due directly to primary emissions. We are now extending our sampling programs to sites in Denver, Houston, New York, Portland, Seattle, Chicago, Los Angeles, San Francisco, Washington, D.C., Tucson, and Atlanta, to test these ideas on a national level. This will give us a large data base, covering mixes of fuels, vehicle types, and atmospheric conditions.

E&E: How do these findings relate to control strategies?

Hal: The present strategy tends to downplay particulate emissions and prescribes controls for gaseous emissions. These standards help the situation; but it appears that they only solve part of the problem and that additional standards for particulates are needed.

E&E: So far you've only discussed the carbon particles. What about the sulfur and nitrogen species?

Hal: It turns out that these same carbon particles can be very effective catalysts for the production of sulfur and nitrogen species. In fact about five years ago, Tića Novakov and Ted Chang showed that all the major atmospheric particulate species could be produced in soot-catalyzed reactions. But this is another story and should be looked into at another time.