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**Author**

Schwartz, Lila

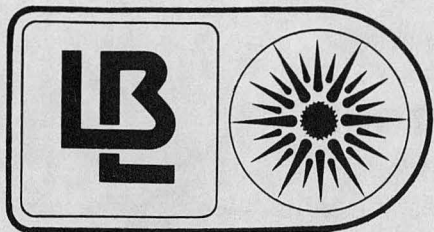
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PUB-432



# NEWSLETTER

Lawrence Berkeley Laboratory  
**Applied Science Division**

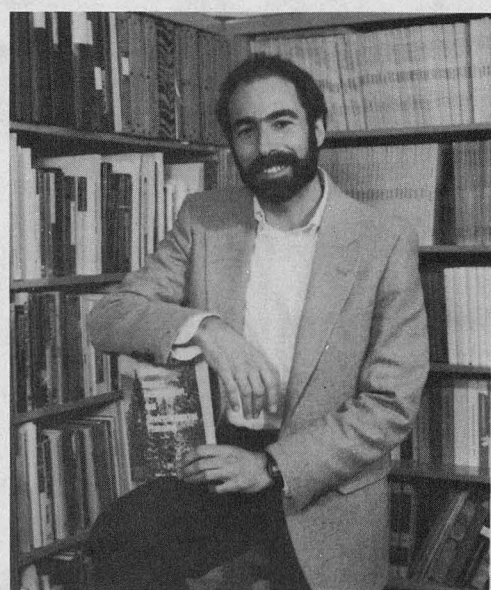
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### EMPLOYEE PROFILE



**WALT WESTMAN** joined LBL this past October in the Environmental Policy Analysis activity within the Energy Analysis Program. Walt received his B.A. in botany from Swarthmore College, obtained a M.Sc. degree in statistical ecology from Macquarie University in Australia, and a Ph.D. in community and ecosystem ecology from Cornell in 1971. In 1971-72 he was a Congressional Fellow of the American Political Science Association, advising the U.S. Senate Subcommittee on Air and Water Pollution.

Following his stint in Washington, Walt returned to Australia as Lecturer in Ecology in the Department of Botany at the University of Queensland. During his three years in Queensland, Walt became involved in numerous advisory positions for governmental and citizens groups on environmental issues, and wrote both research and popular articles on the Australian environment. He was a Professor of Environmental Studies in the Department of Geography at UCLA (1976-1984), and has been a National Research Council Resident Research Associate at NASA/Ames Research Center, where he continues research in remote sensing of earth resources.

Walt plans to help develop the environmental policy area by conducting applied ecological research, focusing initially on two areas: 1) the effect of tropical deforestation on species loss, and 2) the ecological impact of predicted global climate changes. The tropical work will involve his returning to Queensland for field work in 1988. The goal is to build expertise which contributes to public policy debates, and to help insure that agencies are using the best ecological information and theories in developing public policies.

Walt was born in New York, and spent his childhood in both New York and Puerto Rico. He currently lives in San Francisco, likes to travel, and particularly enjoys backpacking.

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## UPDATE ON THE ASD NEWSLETTER

The Newsletter went into a temporary lapse when Susan Petersen, the editor, took the Program Administrator position in the Windows & Lighting Program back in January. Lila Schwartz has now joined the Division Office in Susan's former position, and is the new editor. Because of the lapse, this edition of the Newsletter has a number of previously unreported items that have "matured" over the past few months.

We are going to make a valiant effort to restore the Newsletter to a monthly format. Items or suggestions for the Newsletter can be given to Lila (x4098) or Pat Ross (x5297).

## UPDATE ON SUPERCONDUCTIVITY

The September/October 1987 Newsletter had a rather extensive article on *ASD and the New High Temperature Superconductors*. As a brief recapitulation, the Materials and Chemical Sciences Division (MCSD) has the lead at LBL for research on the new superconductors. However, ASD has expertise and facilities which are relevant to such research. As mentioned in the earlier Newsletter, ASD is the LBL participant in the DOE/EPRI Assessment of Energy Productivity Applications of High Temperature Superconductors: Paul Berdahl for *Basic Processes and New Concepts*, and Sam Berman for *Lighting*.

Subsequently, Berdahl took on the Information role of the Center for Thin Film Applications (John Clarke, leader) within MCSD. In addition, we have been working closely with MCSD to develop complementary research efforts. A joint MCSD/ASD/AFRD (Accelerator and Fusion Research Division) proposal was submitted to the DOE Office of Energy Storage and Distribution (OESD) at the end of February. This Office offered all the National Labs an opportunity to propose research aimed at developing the new materials for applications for electric power systems: magnetic energy storage devices, generators, and transmission lines. The LBL proposal had three tasks:

- (1) Magnet & Device Design - Clyde Taylor, Ron Scanlon, AFRD
- (2) Design of Tape Conductors Utilizing Films - J.W. Morris and others, MCSD
- (3) Film Processing Methods
  - Sputtering - Mike Rubin, ASD
  - Laser ablation - Rick Russo, ASD
  - Sol-gel processing - Arlon Hunt, ASD
  - Electrical characterization - Paul Berdahl, ASD

OESD selected ten Labs to undertake research on a wide variety of approaches to developing conductors. LBL received funding in FY88 for the Films Processing task. The plans for FY89 are to emphasize Films Processing, but to start some work on the other tasks.

## RECENT SNAP PROJECTS

The seventh cycle of SNAP (Search for New Areas and Projects) was completed last November. The members of the SNAP Group for that cycle were Henry Benner (Chair), Don Levy, Dick Fish, Joan Daisey, Ron Kammerud, Alan Meier, and Don Grether (ex-officio). Fifteen proposals were received and evaluated by the Group. As a first step, each member of the Group looked in some detail at two or three of the proposals: met with the author(s), looked into the literature, sought the advice of outside experts, and the like. This information was used by the Group to identify the top five proposals, and, as in recent cycles, a representative from each of them gave a brief presentation and answered questions. The Group's recommendation essentially ranked the proposals in priority order. Elton and the Division Council decided to pursue the top three.

### **Sputtering and Laser Evaporation for High Temperature Superconducting Thin Films (Mike Rubin and Rick Russo)**

This effort is based on two of the areas of expertise mentioned under *Update on Superconductivity*. In sputtering, a target material in a vacuum chamber is bombarded by argon ions. The eroded material deposits on a substrate as a thin film. Sputtering is used in industry to, for example, deposit low-E (emissivity) films on windows. In laser evaporation (or perhaps more properly, laser ablation), a high-power laser strikes a target, with the resulting vapor plume deposited on a substrate.

This particular SNAP effort gave us a several month head start on the work proposed to DOE/OESD, and undoubtedly contributed to the success of the proposal.

### **Core-Auger Electron Coincidence Spectroscopy (Tica Novakov)**

This effort would develop a novel spectroscopic technique for chemical analysis of materials containing low-Z elements (boron, carbon, nitrogen, oxygen, fluorine) by combining two techniques. One of these is Photoelectron Spectroscopy (PES), also known as ESCA (Electron Spectroscopy for Chemical Analysis). In this technique a sample is irradiated by, say, x-rays, and the energies of the emitted core electrons are measured in a spectrometer. PES is used for element identification, but also provides information on the molecular state of the element. The second technique is Auger Electron Spectroscopy (AES). Photoelectron emission results in a missing core electron or "hole", which is filled by a higher lying electron. In this process yet a third electron, the Auger electron, may be ejected from the atom. AES can also provide information on molecules, but various difficulties (such as large backgrounds) have hindered its use for low-Z elements in solid samples.

The idea is to use two spectrometers in coincidence in order to detect the core electron and the Auger electron from the same atom. The expectation is that many of the difficulties will be overcome (e.g., the background will be substantially reduced) and that AES will become a useful technique for low-Z elements.

### **Reactions of Adsorbed Stratospheric Gases on Ice Systems (David Littlejohn)**

Recently, there has been considerable concern over the depletion of ozone in the stratosphere in general, and over an ozone "hole" in the Antarctic in particular. There seems to be general agreement that chlorine from refrigerants, aerosol spray propellants, and other CFC's (chlorinated fluorocarbons) are a major cause of ozone

depletion. The actual chemistry is quite complicated, and involves nitrogen as well as chlorine compounds. The ozone hole was something of a surprise since chemical species are usually rather uniformly distributed in the stratosphere. The suggestion has been made that polar stratospheric clouds of ice crystals may selectively adsorb some of the species or otherwise affect the chemistry. However, direct experimental studies of such processes are quite difficult.

This particular effort would investigate in the laboratory the chemistry occurring on the surface of ice crystals under stratospheric temperatures and pressures. A variety of laboratory techniques can then be brought to bear in order to understand the chemistry: chemiluminescent  $\text{NO}_x$  analysis, gas and ion chromatography, Raman spectroscopy, Fourier transform infrared (FTIR) spectroscopy, and others.

Elton recently reconstituted the Group for the eighth cycle of SNAP as follows: Ron Kammerud (Building Energy Systems Program, Chair), Dick Fish (Energy Conversion & Storage Program), Tony Hansen (Environmental Research Program), Alan Meier (Energy Analysis Program), Carl Lampert (Windows & Lighting Program), Joan Daisey (Indoor Environment Program) and Don Grether (Deputy Division Head, ex-officio).

The Division's scientists should expect to receive a memo from the Chair in the near future.

## HOLLOWELL LECTURE SERIES COMMITTEE

Somewhat over five years ago, Elton established the Craig Hollowell Lecture Series on Energy and the Environment as a memorial to Craig and as a way of providing recognition to outstanding scientists in the energy and environment fields. For the purposes of selecting a candidate and otherwise making the necessary arrangements for the 1988 lecture, the committee was recently reconstituted as follows: Arlon Hunt (Energy Conversion & Storage Program, Chair), Rolf Mehlhorn (Environmental Research Program), Tica Novakov (Environmental Research Program), Art Rosenfeld (Center for Building Science), Mike Wahlig (Building Energy Systems Program), Steve Selkowitz (Windows & Lighting Program), Dave Grimsrud (Indoor Environment Program), James McMahon (Seminar Coordinator, ex-officio), Alex Quintanilha (Assistant Division Head, ex-officio), and Lila Schwartz (Staff).

In the memo that reconstituted the Committee, Elton expressed his thanks to Rolf Mehlhorn for chairing the 1987 committee; Arlon Hunt, Tica Novakov, Jeff Harris, Fred Winkelmann, Rudy Verderber, Rich Sextro, James McMahon, and Alex Quintanilha for serving on that committee; and Susan Petersen for ably assisting the committee.

The Committee will be meeting in the near future to consider candidates for the 1988 lecture. Anyone with suggestions should contact a member of the Committee.

## DIVISION NEWS

- **Tony Nero**, from the Indoor Environment Program has been elected a Fellow of The American Physical Society "For his leadership in the study of radon and indoor air quality and assessment of risks associated with nuclear, geothermal and fossil fuel generation of electric power." At the same time, **Jack Hollander** and **Bob Budnitz**, both previous Division Heads of the Applied Science Division (formerly Energy & Environment) were elected Fellows of the American Physical Society.
- **Joan Daisey**, from the Indoor Environment Program, has been invited to serve on the Board of Scientific Counselors for the Agency for Toxic Substances and Disease Registry of the Department of Health and Human Services. In addition, the National Research Council Board on Environmental Studies and Toxicology has invited Joan to serve as a member of the Committee on Advances in Assessing Human Exposure to Airborne Pollutants.

## ASD ADMINISTRATION COMMITTEE

In February, Elton established the ASD Administration Committee as a successor to the Scientific Burden Committee established in 1985. The initial membership of the committee is as follows: Robert Cheng (Environmental Research Program), Joe Klems (Windows & Lighting Program), Max Sherman (Indoor Environment Program), Nori Hudson (Indoor Environment Program), Garth Burns (Energy Conversion & Storage Program), Ron Ritschard (Energy Analysis Program, Chair), and Cheryl Fragiadakis (Division Office, ex-officio).

The new committee will focus on the administrative effectiveness of the Division. The specific charge is to 1) evaluate specific administrative support services provided by the Division Office and Programs; 2) Evaluate various ways of effectively and efficiently maintaining appropriate administrative support services; and 3) formulate and transmit any recommendations to the Division Head.

In his memo announcing the formation of the new committee, Elton also thanked the members of the Scientific Burden Committee (most recently Kim Kinoshita, Mike Wahlig, Robert Cheng, Ron Ritschard, Rudy Verderber, and Cheryl Fragiadakis) for their service to the Division. Over the last three years, that Committee (with varying membership) made its evaluations and recommendations on various portions of the scientific burden budget.

## INDOOR RADON RESEARCH

As a result of work at LBL and elsewhere, indoor radon has received national attention in recent years. In response to the concerns over indoor radon and its potential for inducing lung cancer, the DOE Office of Health and Environmental Research (OHER) has been increasing its support for radon-related research. Somewhat over a year ago OHER solicited peer-reviewable proposals from universities and the National Labs. LBL submitted proposals from four divisions: ASD, Earth Sciences (ESD), Biology & Medicine, and Information and Computing Sciences (ICSD) [Biology & Medicine was subsequently split into the Cell & Molecular Biology Division (CMBD) and the Research Medicine & Radiation Biophysics Division (RMRBD)]. OHER conducted an outside technical review and an internal programmatic review over the course of last Summer and Fall and, finally, announced its decisions in January.

Some, but not all, of the LBL proposals were funded, and not for the requested amounts. However, the combination of new and ongoing projects gives LBL a substantial and expanded radon research program. We are one of four institutions that OHER regards as a "major" center for radon research. The specific areas of research are as follows:

**Health Effects - Lung Cancer Induction.** Stan Curtis (RMRBD) and Alope Chatterjee (CMBD) are investigating cell transformation by alpha particles from radon progeny. This project was funded by OHER starting in FY87.

**Health Effects - Epidemiology.** As part of the ongoing PAREP (Populations At Risk to Environmental Pollution) work funded by OHER, Deane Merrill (ICSD) is studying lung cancer mortality in the "Reading Prong" area of New Jersey and Eastern Pennsylvania, an area with known elevated indoor radon levels.

**Characterization - Availability & Transport.** Tony Nero, Rich Sextro, and others in ASD have been undertaking building studies for some time: source, entry, removal, and mitigation. This effort has received funding for some years from OHER, and in addition is one component of the Division's ongoing indoor environment effort for DOE Conservation and Renewable Energy (CE). Recently, these investigators undertook a two year field study in New Jersey, co-sponsored by EPA, OHER, and CE.

Newly funded by OHER for FY88 is an experimental and modeling study of radon migration through soils and into buildings. The work is being carried out by Rich Sextro (ASD), and T.N. Narasimhan and Harold Wollenberg (ESD).

**Characterization - Decay Product Behavior.** Joan Daisey, Rich Sextro, and Nancy Brown (ASD) will be investigating the interactions of radon with gaseous pollutants (e.g., organic gases, NO<sub>2</sub>). This project is funded by OHER starting in FY88.

**Critical Analysis.** As part of an ongoing OHER funded project, Tony Nero (ASD) undertakes periodic updates on the state of information, characterization and health related data bases, and absolute and relative risk models.

Plans are for LBL to have a coordinated inter-division radon research program, with a view towards developing additional research areas for a more comprehensive program.



## RECENT REFEREED JOURNAL ARTICLES

Oxygen Radicals in Biological Systems, Alexandre Quintanilha, ed., Plenum Publishing Corporation, New York, (1988).

S.F. Sciamanna and S. Lynn, "An Integrated Process for Simultaneous Desulfurization, Dehydration, and Recovery of Hydrocarbon Liquids from Natural Gas Streams," *I&EC Research*, 27, 500 (1988).

S.F. Sciamanna and S. Lynn, "Sulfur Solubility in Pure and Mixed Organic Solvents," *I&EC Research*, 27, 485 (1988).

S.F. Sciamanna and S. Lynn, "Solubility of Hydrogen Sulfide, Sulfur Dioxide, Carbon Dioxide, Propane, and *n*-Butane in Poly(glycol ethers)," *I&EC Research*, 27, 492 (1988).

F. Winkelmann, "Advances in Building Energy Simulation in North America," *Energy and Buildings*, 10, 161-173 (1988).

D.K. Liu, L.P. Frick and S.G. Chang, "A Ferrous Cysteine Based Recyclable Process for the Combined Removal of NO<sub>x</sub> and SO<sub>2</sub> from Flue Gas," *Environmental Science & Technology*, 22, 219 (1988).

D. Lucas, D. Dunn-Rankin, K. Hom, and N.J. Brown, "Ignition By Excimer Laser Photolysis of Ozone," *Combustion and Flame*, 69, 171-184 (1987).

K.R. Gurney, A.D.A. Hansen and H. Rosen, "Methane and Carbon Dioxide Increases in the Urban Boundary Layer: Inferences From Whole-Column Infrared Absorbance Measurements," *Geophysical Research Letters*, 15, No. 1, 32-35 (1988).

P. Lessner, F.R. McLarnon, J. Winnick and E.J. Cairns, "Kinetics of Aqueous Polysulfide Solutions," *Journal of the Electrochemical Society*, 134, No. 11, 2669-2677 (1987).

R.E. Russo, F.R. McLarnon, J.D. Spear and E.J. Cairns, "Probe Beam Deflection for *in situ* Measurements of Concentration and Spectroscopic Behavior during Copper Oxidation and Reduction," *Journal of the Electrochemical Society*, 134, No. 11, 2783-2787 (1987).

L. Schipper, A. Ketoff, S. Meyers and D. Hawk, "Residential Electricity Consumption in Industrialized Countries: Changes Since 1973," *Energy*, 12, No. 12, 1197-1208 (1987).

S. Lynn, D.W. Neumann, S.F. Sciamanna and F.H. Vorhis, "A Comparison of the UCB Sulfur Recovery Process with Conventional Sulfur Recovery Technology for Treating Recycle Gas From a Crude Oil Residuum Hydrotreater," *Environmental Progress*, 6, No. 4, 257-266 (1987).

R.H. Fish, A.D. Thormodsen, R.B. Belser, Jr., G. Friedman and J.G. Reynolds, "Polymer-Pendant Ligand Chemistry, 2: Reactions of Vanadyl Acetylacetonate with Catechol Ligands Bonded to Polystyrene-divinylbenzene Resins and Structural Determination of the Vanadium Catecholates on the Polymer," *Reactive Polymers*, 6, 255-266 (1987).

## INVITED TALKS AND FOREIGN TRAVEL

### *December*

- Elton Cairns was invited to present talks to Electrochemical Society chapter meetings in Midland, MI, and Chicago, IL. The talks at both of the meetings were entitled "Status of Advanced Batteries" and "Status of The Electrochemical Society."
- Ron Ritschard was an invited speaker and workshop coordinator at the 1987 National Weatherization State Manager's Conference in Charleston, SC, where he presented a talk titled "Simplified Energy Analysis Tools for Application to State Weatherization Programs."
- Tica Novakov was invited by the Defense Nuclear Agency to speak at the Nuclear Winter Workshop in Los Angeles. Novakov's talk was titled "Cloud Chamber Experiments with JP-4 and Wood Smoke."
- Tony Nero and Rich Sextro traveled to Lisbon, Portugal to present papers at the Fourth International Symposium on the Natural Radiation Environment. Nero presided over a session and presented two papers, "Appraisal of the U.S. Data on Indoor Radon Concentrations," coauthored by Ken Revzan and Rich Sextro, and "Mapping Surficial Radium Content of U.S. Soil as a Partial Indicator of Indoor Radon Concentrations," coauthored by Ken Revzan. Sextro's paper was titled "Radon Entry and Control in Seven Homes with Basements."
- Jayant Sathaye traveled to Beijing and Nanjing, China, for research discussions. He also visited with representatives of the Asian Development Bank in Manila and the East/West Center in Honolulu.
- Walt Westman was invited to attend an EPA working meeting in Tucson to help prepare a research plan for global climate change.
- Art Rosenfeld traveled to Hartford, Connecticut, where he testified on behalf of the State of Connecticut Office of Policy and Management before the State of Connecticut Public Utility Control in the Connecticut Light & Power Rate Case.

### *January*

- Kim Kinoshita was an invited seminar speaker at Magnetic Peripherals, Inc. (a Control Data company) in Minneapolis, Minnesota. His topic was "Physicochemical Properties of Carbon and Graphite." He then gave a talk at the University of Minnesota titled "Carbon Corrosion in Electrochemical Systems."
- Lee Schipper was invited to speak at the Cambridge Energy Research Associates Conference held in Houston, Texas; the subject of his talk was "Energy Conservation in the OECD: Permanent or Reversible."
- Rudy Verderber travelled to Los Angeles to Chair an LA Water & Power session in which he presented a talk titled "Lighting Your Way Into the 21st Century."

*February*

- Jayant Sathaye was an invited speaker at the United Nations in Bangkok. The subject of his talk was "Sectoral Energy Demand Analysis."
- Fred Winkelmann was invited to speak on the DOE-2 program at a seminar sponsored by B.C. Hydro in Vancouver, B.C. He also participated in discussions on the B.C. Hydro energy management project.

*March*

- Mark Levine travelled to Thailand, Indonesia, Singapore, and Manila for research discussions.
- Art Rosenfeld was invited to give the Physics-Architecture Joint Colloquia at the California Polytechnic University in San Luis Obispo. Art's presentation was titled "Energy-Efficient Buildings: Davids vs. Goliath."
- Mike Rothkopf was an invited speaker at Rutgers University in New Brunswick, NJ. His presentation was titled "Two Topics in Applied Queueing Theory." He also presented a talk at the University of Pennsylvania in Philadelphia titled "Designing Auctions for the Purchase of Electric Power."
- Elton Cairns was invited to make presentations to the ECS Local Sections in Minneapolis, Minnesota and Milwaukee, Wisconsin. His talks were titled "Status of Advanced Rechargeable Batteries" and "State of the Electrochemical Society."
- Art Rosenfeld was the keynote speaker at the 1988 Inter-Utility Energy Conservation Conference in Green Bay, Wisconsin and at a meeting in Colorado Springs, Colorado for DOE conservation program managers and the State. The title of his keynote speech was "The Rise, Fall, and Rise of Energy Conservation." Art was also the featured speaker at the Wisconsin PSC Least-Cost Planning Seminar in Madison, Wisconsin. His topics were least-cost planning and demand-side options.

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