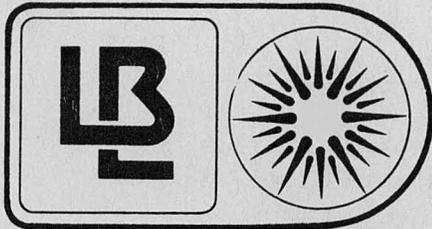


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# NEWSLETTER

Lawrence Berkeley Laboratory  
**Applied Science Division**

MARCH/APRIL 1986

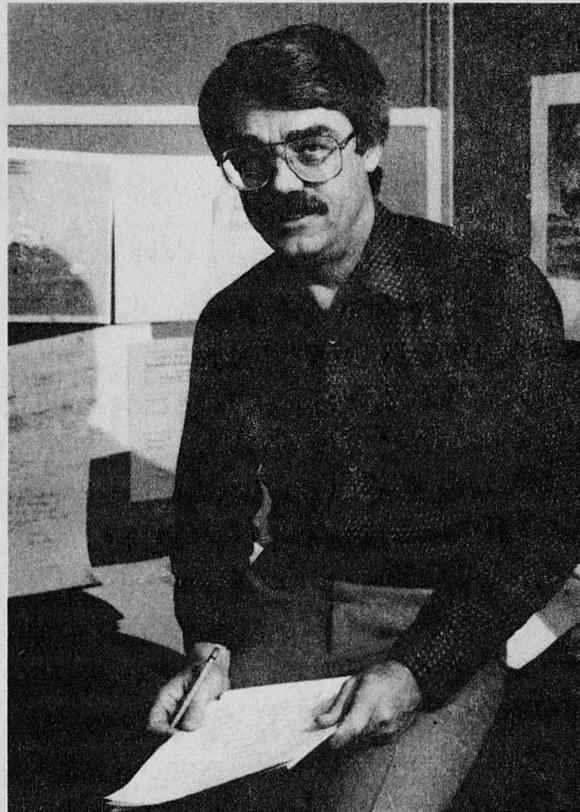
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INTERVIEW WITH

ED SOWELL



Ed Sowell has been working with Jeff Hirsch's Simulation Research Group since September 1985, participating as a research fellow with the newly established DOE-Industry Technology Exchange Research Program. The objectives of this program are to develop closer working relationships between the DOE labs and private industry, and to enhance the transfer of appropriate DOE research and technology to the private sector. The following is from a brief discussion with Ed Sowell.

ASD: How does the DOE industrial fellowship program work?

Sowell: The basic idea is to take a person from industry and bring him or her to a national laboratory for a one-year period in order to stimulate technology transfer. My situation is a little different because I am a professor in computer science and engineering at California State University at Fullerton. However, for the past 6 years I have also operated an independent consulting firm, Ayres Sowell Associates, where I have pursued both practical and research aspects of building energy simulation. It is through Ayres Sowell Associates that the DOE

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industrial technology transfer grant took place. I have worked for some time with Jeff Hirsch and other members of the Simulation Research Group, and Jeff was aware of the work I was doing. In particular, Jeff was interested in some work I had done with the Los Angeles Scientific Center of IBM, where we were pursuing a different tack than the conventional building energy simulation programs like DOE-2. Jeff's group was having similar ideas, and it seemed like an ideal opportunity for the technology transfer process to work both ways.

Usually, the individual would be moved — the family and the family dog too — to the location of the laboratory for a nine-month or twelve-month period. However, my wife and I decided together that we really didn't want to do that. Jeff proposed a 3-day per week arrangement without relocation and DOE accepted the idea. I then applied for, and was granted, a one-half time leave without pay at the University, and have essentially put my consulting activities on the back burner for the time being. I spend Monday through Wednesday in Berkeley and then fly home to Southern California every Wednesday evening.

ASD: Why were you interested in participating in this program?

Sowell: As far as my own motivation was concerned, I think I was really interested in the opportunity to be involved for an extended period of time with a group of people interested in the same work that I am doing. Cal State Fullerton is not a research university; we have a masters program, and over the years I have had DOE and NSF grants through the University, but it is very different from larger research universities where you would have other colleagues in your field to work with.

ASD: How does the work you did at IBM relate to what you are doing with Jeff's group here at LBL?

Sowell: We worked on developing a system with the ability to arbitrarily define a building in terms of small components that could be connected in any conceivable way. This would be quite different from the current generation of software, such as DOE-2 and BLAST (a program similar to DOE-2 developed by the U.S. Army), where the decisions as to how components are interconnected were set at the time the programs were written.

At IBM we introduced concepts that had been developed in other fields. For example, in operations research there had been a tremendous amount of work done in network theory; in mathematics and computer science much work had been done in graph theory. Techniques had been developed in both of these areas that we found applicable to our problem. The outcome of that was, at least at the proof-of-concept level, an implementation that allows the user to define a building in terms of any arbitrary connection of components. The software that we referred to as the "generator" then created the computer program. That portion of the work was done at the IBM Scientific Center, initially with Scientific Center funding only; but the Real Estate and Construction Division of IBM became interested in the work and began funding it. The Center decided that their part of the mission had been completed and they were ready to move on to new areas. The IBM Real Estate and Construction Division contracted with Ayres Sowell Associates to implement that work on the personal computer. That was one of the projects that had just been

completed when I accepted the grant to come here. Like all projects, it had constraints on time and budget; we made our mistakes; and we are reexamining that experience now in Jeff's group, keeping the good parts and trying to make improvements in the areas where it's deficient.

ASD: It sounds as if the DOE-2 program could change substantially in the future?

Sowell: As the Simulation Research Group now envisions the situation, DOE-2 is nearly complete. They plan to continue to support the program with upgrades that appear to be widely needed, and to continue supporting the users of that program, but to move over onto this completely different tack for the next generation. We are looking 5-10 years down the road. If we're successful at that, the whole picture will change because then the Lab is out of the program maintenance business — instead focusing on new fundamental developments.

ASD: Would you describe in more detail what you mean by "different tack"?

Sowell: Let me tell you about the architecture of the system we're talking about, which we call the "kernel" system. It's a very simple idea in which one defines a number of very elementary objects, which you can think of in a physical sense — a wall, a lighting fixture, pieces of furniture, a floor. The kernel system has low-level models of these objects, floating around in an ether, so to speak. It also contains software tools that allow the user to manipulate the models and cause them to interact in ways that the user selects instead of ways that the programmer selected. Basically, you create a number of small, easy-to-use tools and the facility for the user to connect them. We see the product leaving the Laboratory in that form — which, to be honest, is probably not going to meet the needs of the practicing engineer or architect, except for the more advanced in that community.

ASD: How will the needs of the practicing engineer or architect who won't be able to take advantage of this new system be met?

Sowell: Many of them will want a program like DOE-2 or BLAST, and we hope the needs of those people will be met by third parties. For example, there are companies and technical societies that offer proprietary building energy analysis programs that are alternative choices to DOE-2 and BLAST, which are public domain programs. By the way, those people have often viewed the work of the Lab on DOE-2 and the work of the Army on BLAST as not in their best interest — as government competing with private industry — and their view is not totally unfounded. What we hope is that people in that community will take the kernel system and use it to build end-use software products. If we're successful, we'll have those people who previously opposed our activities supporting us.

As far as the Simulation Research Group is concerned, its resources could then be focused on research rather than continuous updating of DOE-2. So far, the idea has received acceptance from several other major institutions in the building research field. On the technical side, we are making some headway with a rudimentary prototype system. But there is a long way to go!

## IRIDIUM COINCIDENCE SPECTROMETER DEVELOPED AT LBL

Scientists at LBL have built and tested an Iridium Coincidence Spectrometer which can measure iridium contents in the part-per-trillion range of geological samples (after neutron irradiation) about 500 times faster than was previously possible without labor-intensive chemical separations. It is 100 times faster than measurements, following carrier-free high-volume radiochemical separations for the siderophile elements, previously in use at LBL.

In addition, the instrument is much more reliable than previous techniques without chemical separations because it electronically removes essentially all interfering radiations induced by the neutron irradiation, and is not sensitive to small changes in equipment performance. Also, the possibility of contamination due to the continued use of iridium carrier in chemical separations is eliminated.

After automation of the sample changing procedures, the spectrometer will be able to measure the iridium content in tens of thousands of samples per year. These measurements will permit testing of a significant part of the geological sedimentary record for evidence of extraterrestrial impacts such as the one 66 million years ago which led to the extinction of most life on the Earth at that time.

Such a study would be impossible with other methods of iridium measurement, with or without chemical separations. Chemical separations after neutron activation are very effective ways to measure iridium in rock samples, but are more labor intensive and costly by factors of 10 to 100.

The spectrometer was conceived and tested by Luis Alvarez (Physics Division) and Frank Asaro (Applied Science Division). Mechanical engineering was handled by Donald Malone and his staff; electronic engineering of the Ge detectors by Frederick Goulding and his staff; and electronic engineering of photomultiplier tube assemblies on the two tanks of mineral oil by Bill Jackson.

Future plans for the spectrometer involve automation of the sample changing, sample weighing, sample identification, data reduction and storage. The spectrometer will also be modified to measure about 10 other elements (useful in characterizing extraterrestrial debris) simultaneously with the Ir measurement.

## HONORS AND AWARDS

**Morton Denn**, head of the polymer program at LBL's Center for Advanced Materials and a principal investigator in ASD's Energy Conversion & Storage Program, has been elected to the National Academy of Engineering. He was honored for "intellectual leadership in the fields of polymer rheology, process dynamics, and modeling, and for a series of uniquely effective textbooks." Denn is one of 73 new NAE members elected this year from the United States.

**Elton Cairns** was elected Vice President of The Electrochemical Society. He assumed his new duties in May at the Electrochemical Society meeting which was held in Boston.

## ART ROSENFELD WINS SZILARD AWARD FOR PHYSICS IN THE PUBLIC INTEREST

Art Rosenfeld is one of the nation's leading researchers in energy conservation and efficiency, and he was named the 1986 recipient of the Leo Szilard Award for Physics in the Public Interest. Rosenfeld received the award, presented by the American Physical Society's Forum on Physics and Society, at a ceremony in Washington, D.C. on April 28. In a talk on his work entitled "Davids and Goliath: How Physics Applied to Energy Efficiency has Saved 100 Power Plants and 1 Alaska Pipeline", Rosenfeld stressed that he considers the award to be recognition of "the entire Energy Efficient Buildings Program at LBL".

The Szilard Award was instituted in 1974. Leo Szilard, a Hungarian-born physicist, was one of a group of scientists who alerted President Franklin D. Roosevelt to the possibility of an atomic bomb. After World War II he campaigned against its use, creating the Council for a Liveable World. Previous winners of the Szilard Award include Andrei Sakharov, Carl Sagan, Wolfgang Panofsky, Sidney Drell, Henry Kendall, and Hans Bethe.

Rosenfeld has been associated with LBL since 1955, originally working with Luis Alvarez in particle physics. In 1974, he turned his interests to energy conservation and energy efficiency. He is a professor of physics at U.C. Berkeley as well as Director of ASD's Center for Building Science.

### ASD PHOTOS TO BE TAKEN MAY 27-28, 1986

As announced in an earlier Newsletter, we plan to take photographs of all of the Division staff to be put in a display case in Building 90. We have set up the following schedule, and we are asking that all of you try to arrange to drop-in at either place to have your photo taken. On May 27 we plan to reserve the two 30-minute parking places in front of Building 90 between 1:30-4:30 for those of you who will be coming from other buildings.

**Tuesday, May 27 — Building 90, Room 3148 (1:30-4:30)**

**Wednesday, May 28 — Building 70, Room 191 (1:30-4:30)**

If you are unable to make either one of these dates, please call the Photo Lab and set up an appointment to have your picture taken there (Building 10) at your convenience. Doug McWilliams will take three pictures of each person and select the best one for the display.

## PERFORMANCE APPRAISAL SCHEDULE - A REMINDER!

The annual Performance Appraisal process is underway with some changes from last year as recommended by the Laboratory Task Force on Performance Appraisals. The most significant change is that the performance review plan now attempts to establish an interactive exchange of information between supervisor and employee prior to the draft stage of the performance appraisal being submitted to the Division for review. In order to meet the Laboratory mandated deadlines, ASD has adopted the following schedule:

**April 15, 1986:** Guidelines and forms sent to each supervisor from Division Office.

**April 15-May 15, 1986:** Employee informal written statements are written and discussed with supervisor. Supervisor writes draft performance appraisal.

**May 15, 1986:** Draft appraisals are due in the Division Office (to Jan Smith) for all employees.

**May 27, 1986:** Draft Appraisals will be returned to supervisors for final preparation and review with employees. Division Office clerical personnel will assist with typing, etc.; contact Jan Smith if you are in need of clerical assistance.

**June 15, 1986:** All performance Appraisals, signed by supervisor and employee, returned to Jan Smith.

**July 3, 1986:** "Request for Appraisal Verification" signed by Division Head, verifying to Personnel Department that all Performance Appraisals have been received by Division Office.

## UPDATE ON SNAP

The sixth cycle of the SNAP (Search for New Areas and Projects) Group was established by Elton in February. The purpose of the SNAP Group is to further the Division's efforts to identify promising research ideas and to obtain support for them. The members of the Group for this cycle are:

Kim Kinoshita (Chair)  
Donald Levy  
Ronald Kammerud  
Henry Benner  
Isaac Turiel  
Donald Grether (ex-officio)

In February a memo was sent to all scientists in the Division asking that proposals be submitted by May 1. Eleven proposals were received and they are now being evaluated by the SNAP Group.

## DIVISION NEWS

- **Pan Pacific Lighting Exposition.** Michael Wilde, from the Windows and Daylighting Group, was the Daylighting Section Chairman for this Exposition, which was held in San Francisco May 4-6, 1986. Francis Rubinstein and Rudy Verderber, from the Lighting Systems Research Group, participated as speakers, along with LBL visiting scientists, Tai Ming Zhou and Fuzi Li. A "simulated" Sky Simulator was exhibited to show how changing light conditions affect many basic major concerns in building projects.
  
- **Pio Manzu's 12th International Conference.** Giulio Andreotti, Italian Minister of Foreign Affairs and Co-President, Pio Manzu International Research Centre, Verucchio, Italy, has invited Andrea Ketoff, from the International Energy Studies Group of the Energy Analysis Research Program, to participate in a panel discussion at their international conference in October 1986. The topic of discussion will be "Oil: From Conflict to Agreement for Stable Growth".
  
- **Concrete Masonry Solar Architecture Quarterly.** The current issue of this journal (April 1986) offers an in-depth technical discussion of thermal mass, particularly its use in the vital residential market. The first article, "Thermal Mass in Exterior Walls of Residential Buildings", by Stephen Byrne and Ronald Ritschard of the Energy Analysis Program, details the results of a recently completed computer study performed to detail methods to account for the energy conserving effects of massive walls in residences. The final report will be made to the DOE in the near future, and is also to be used to help establish ASHRAE 90.2 energy performance standards.
  
- **RETSIE 86.** The Renewable Energy Technologies Symposium & International Exposition will be held June 3-5, 1986, in Anaheim, and Ron Kammerud, Building Energy Systems Program, will participate as a speaker in the Conservation/Energy Management session. His subject is "Potential of Passive Solar for Commercial Buildings".
  
- **Fan Mail from Cardinal Insulating Glass Co.** Art Rosenfeld passed along a copy of a letter to Don Fuqua, Chairman of the House Science & Technology Committee, from Roger O'Shaughnessy, President of Cardinal IG, extolling the virtues of LBL's Windows and Lighting programs. Cardinal IG is now the largest producer of "Low E" coatings in the world, and Mr. O'Shaughnessy states that in the late 1970's members of his company had the good fortune to participate in a number of semipublic forums where presentations by Sam Berman and Steve Selkowitz represented their first exposures to this "new and potentially profitable energy conserving product". At the end of a full page of compliments, he closes the letter with "Federal dollars were well spent with Lawrence Berkeley and their visionary staff".

## RECENT REFEREED JOURNAL ARTICLES

A.E. Robinson, E. Hrabata and L. Packer, "Measurement of Proton/ $M_{412}$  Ratios in Suspensions of Purple and White Membrane from *Halobacterium Halobium*," from Ion Interactions in Energy Transfer Biomembranes, pp. G.C. Papageorgiou, J. Barber and S. Papa, eds., Plenum Publishing Corporation (1986).

E. Tel-Or, M. Huflejt and L. Packer, "The Role of Glutathione and Ascorbate in Hydroperoxide Removal in Cyanobacteria," *Biochemical and Biophysical Research Communications*, Vol. 132, No. 2, pp. 533-539 (1985).

G. Hartzog, R.J. Mehlhorn and L. Packer, "A Reevaluation of the Surface Potential of the Inner Mitochondrial Membrane Using ESR Techniques," from Ion Interactions in Energy Transfer Biomembranes, pp. G.C. Papageorgiou, J. Barber and S. Papa, eds., Plenum Publishing Corporation (1986).

D.W. Neumann and S. Lynn, "Kinetics of the Reaction of Hydrogen Sulfide and Sulfur Dioxide in Organic Solvents," *I&EC Process Design & Development*, 25, pp. 248-251 (1986).

L. Packer, K. Gohil, B. deLumen and S.E. Terblanche, "A Comparative Study on the Effects of Ascorbic Acid Deficiency and Supplementation on Endurance and Mitochondrial Oxidative Capacities in Various Tissues of the Guinea Pig," *Comp. Biochem. Physiol.*, Vol. 83B, No. 1, pp. 235-240 (1986).

D. Ross, R.J. Mehlhorn, P. Moldeus and M.T. Smith, "Metabolism of Diethylstilbesterol by Horseradish Peroxidase and Prostaglandin-H Synthase," *The Journal of Biological Chemistry*, Vol. 260, No. 30, pp. 16210-16214 (1985).

J.H. Klems, "Error Analysis of *In Situ* Field Tests of Fenestration Net Energy Performance," *Energy and Buildings*, 8, pp. 165-173 (1985).

F.R. McLarnon and E.J. Cairns, "Status of DOE-Sponsored Research on Advanced Secondary Batteries," *New Materials and Processes*, Vol. 3, pp. 394-402 (1985).

K. Kinoshita, "Separator Technology for Electrochemical Applications: Department of Energy-Sponsored Research," *New Materials and Processes*, Vol. 3, pp. 403-410 (1985).

D. Littlejohn and S.-G. Chang, "Determination of Nitrogen-Sulfur Compounds by Ion Chromatography," *Analytical Chemistry*, 58, pp. 158-160 (1986).

R. Fish, "Reactions of Organoarsonic Acids and Arsenic Acid with Catechol Ligands Bonded to Polystyrene-Divinylbenzene and Regeneration of the Ligand Site by a Simple Hydrolysis Procedure," *Inorganic Chemistry*, 24, pp. 4456-4458 (1985).

T. Lionel, R.J. Martin and N.J. Brown, "A Comparative Study of Combustion in Kerosene Heaters," *Environ. Sci. Technol.*, Vol. 20, No. 1, pp. 78-85 (1986).

F. Winkelmann and S. Selkowitz, "Daylighting Simulation in the DOE-2 Building Energy Analysis Program," *Energy and Buildings*, 8, pp. 271-286 (1985).

## INVITED TALKS AND FOREIGN TRAVEL

### *March*

- o In Los Angeles, Steve Selkowitz gave a talk entitled "Fenestration System for Optimal Performance" at the 1986 West Coast Energy Management Conference.
- o Rudy Verderber visited the GTE Corporation in Boston, where he delivered an invited lecture on lighting controls.
- o Nabil Amer gave a series of talks at the American Physical Society Meeting in Las Vegas, Nevada. Among them were "Light-Induced Defects in a-Si:H Alloys" and "A Contactless Approach for Measuring Thermal Diffusivity of Thin Solid Films".

### *April*

- o Art Rosenfeld traveled to Toronto, Canada, where he testified on least-cost utility planning before an Ontario Province energy committee. He gave an invited talk on the same subject in Columbus, Ohio, for the Ohio Public Utilities Commission.
- o Carl Lampert attended the International Energy Agency (IEA) Task X Workshop on solar materials in Vienna, Austria. In Innsbruck, he gave a presentation on solar materials and glazings at the Optics Conference of the Society of Photo-optical Instrumentation Engineers (SPIE).
- o Tony Hansen traveled to Thule, Greenland, to participate in an National Oceanographic and Atmospheric Administration (NOAA) sponsored Arctic atmosphere sampling experiment.
- o Robert Cheng presented a paper at the 1986 Spring Technical Meeting of the Combustion Institute in Banff, Canada. The paper was entitled "Intermittency and Conditional Velocities in Premixed Conical Turbulent Flames."
- o Steve Selkowitz visited the Energy Building Research Station in Garston, U.K. He presented a paper at the Glass Environment Conference in London, and then travelled to Glasgow, Scotland, where he visited the ABACUS Group at the University of Strathclyde for research discussions.
- o Art Rosenfeld was an invited speaker at the American Society of Mechanical Engineers (ASME) Annual Solar Energy Division Conference in Anaheim, California. His talk was entitled "Opportunities for Conservation".
- o Tica Novakov presented an invited talk on "Heterogeneous SO<sub>2</sub> Oxidation" at the National Meeting of the American Chemical Society in New York City.
- o Tica Novakov, Henry Benner, and Tony Hansen travelled to Vienna, Austria, to participate in the Third Workshop of the Collaborative Research Group on Heterogeneous Atmospheric Chemistry conducted at the Technical University. Tica presented an invited talk entitled "Heterogeneous SO<sub>2</sub> Oxidation".
- o Ron Kammerud attended meetings of the International Energy Agency in London, England.

- o Sam Berman traveled to Germany to attend the 4th International Symposium on the Science and Technology of Light Sources at the University of Karlsruhe. In Aachen, he visited Philips Electronics for research discussions.
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