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Lawrence Berkeley Laboratory
Applied Science Division

NEWSLETTER

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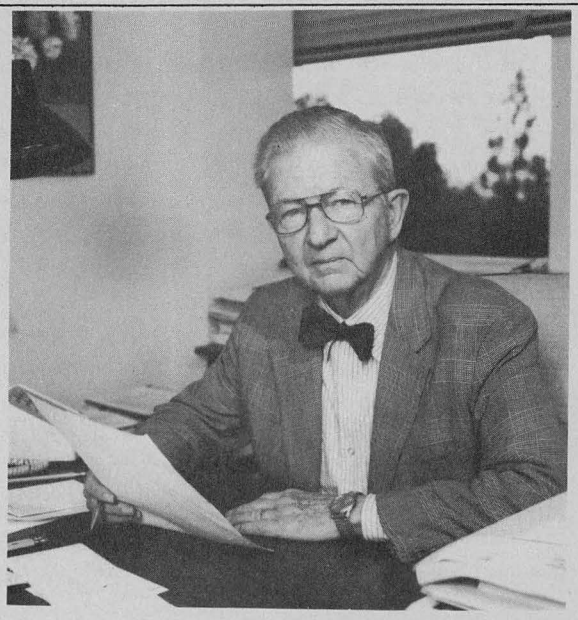
INTERVIEW WITH

CHARLES J. HITCH



Charles Hitch is President Emeritus of the University of California and a participating guest at LBL, and in particular with ASD's Energy Analysis Program. He was born in Missouri, graduated from the University of Arizona, and attended graduate school at Harvard University. He was a Rhodes Scholar at Oxford University, where he received an M.A. in Economics in 1935. His varied career includes the following positions: Fellow in Economics, Queens College, Oxford University (1935-48); member of War Production Board and Office of Strategic Services (1942-45); Head, Economics Division, RAND Corp. (1948-61); Assistant Secretary of Defense [Comptroller] (1961-65); Vice President, University of California (1965-67); President, University of California (1968-75); Professor of Economics, University of California, Berkeley (1965-75); President, Resources for the Future, Washington, D.C. (1975-79). The following is from a brief discussion with Charles Hitch.

ASD: How would you describe your most important current activities?

Hitch: Current activities which are most important to me still relate to national energy policy. Recently, however, I have been reducing some of my energy policy and other activities involuntarily. A good many organizations with which I've been working have strict time limits on length of service or have age restrictions. For example, I recently have had to retire after eight years from the Gas Research Institute Advisory Council, and after seven years from the Advisory Council of the Electric Power Research Institute. I also had to retire as a trustee of the Aerospace Corporation when I attained the magic age of 72 four years ago.

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Like so many at LBL, I have been deeply concerned about what is happening to the future of energy R&D sponsored by the federal government, including that at the National Laboratories. This concern has been increased by the Gramm-Rudman Act, which with many others I confess I do not fully understand. But I know enough to recognize a serious threat to these programs, and particularly to the R&D programs relating to conservation and substitutes for petroleum products. I think many people have been misled by the so-called "glut" of oil and the falling prices of oil in recent months into thinking the energy crisis is a thing of the past. In fact what is happening makes our energy future more vulnerable, not less. What we're witnessing is simply the breakup of a cartel, and I expect it to be a temporary breakup. We have been pumping out oil in the western world at a faster rate in recent years, while OPEC, in particular the Arab OPEC countries, have been cutting back on their production. This is causing the Arab OPEC ownership of the world's proven reserves, already over 50%, to increase steadily, while the reserves of the United States, the North Sea, and other western countries, whether they're in or out of OPEC, have been declining because of the high rate of pumping. I think it's not too hard to envisage, in the not too distant future, a situation in which OPEC would come roaring back as a more compact organization, geographically limited, with fewer members but controlling a larger portion of the world's reserves of oil than they do now. The moral of all this is that we had better keep our guard up; especially with federally sponsored research and development on conservation. We have learned since 1973 that we have much more leverage on the demand for energy than on new supplies. I've been back in Washington recently talking to some congressmen about this, and I am pleased that there are at least some of them who see the issue as we do.

ASD: You mentioned the Gramm-Rudman issue. What do you expect will be the real consequences of this particular law on basic and applied research?

Hitch: Regardless of how the maneuvering on the Hill and between the Hill and the Executive Branch goes, I think that Gramm-Rudman will remain with us at least through this year, unless the courts declare it unconstitutional. It is almost inevitable that government sponsored R&D on energy and many other things -- basic and applied research -- will suffer. The first real crunch will come in connection with the FY 87 budget. I am pretty sure that nothing like the President's budget proposals will be enacted by the Congress, but I think one likely outcome will be that Congress will fail to put together a budget by Fall when the Gramm-Rudman first big bite will be taken. As compared with the President's budget, that would mean that R&D would suffer less, but it would still be cut disproportionately.

ASD: Do you think it is realistic to expect, as the Administration has suggested several times, that private industry will fill the gaps left in research funding after these severe cuts?

Hitch: No, I would not expect private industry to take up much of the slack that would be created. The cuts are going to come in basic research and the early stages of technological development. These are areas in which private industry has little or no incentive to do research because they can't latch on to many of the gains which will accrue from the research. That's why in an area like

buildings, in which LBL is so interested, the government must step in and take a leading role. The buildings industry is fragmented, with many small firms and little capability for research. If the government backs out, nobody is going to take its place.

ASD: What do you see is the role of economists in connection with energy and other public policy issues? This is an area that I know is dear to you, and it would be interesting to get some of your thoughts on it.

Hitch: Yes, this has been a matter of great interest to me. I've been very concerned with making economics useful, beginning when I was at the Rand Corporation as head of its economics division from 1948 to 1961. I had discovered that economists could be quite helpful in what we called "systems analysis" as a guide in choosing defense force structure and policies. I suppose most people would think defense policy was the last place where it would be appropriate to apply economics: "What do dollars matter when national security is at stake?" When the economics division was formed, we found the physical scientists and engineers performing systems analyses without the assistance of a branch of economics called benefit/cost analysis, and we knew we had something to contribute. We pitched in and joined some of the groups that were doing these analyses, attempted others successfully ourselves (of course with essential help from the scientists and engineers), and, I think, substantially modified many peoples' concepts of the role of economics.

When I went to the Defense Department as Assistant Secretary (Comptroller) and took some of the Rand people with me, we infected the Pentagon, or tried to, with the same doctrine. This was a part of the so-called "McNamara revolution", and I think some of it has stuck. I'm not sure just how much because I've had no relations with the Defense Department for many years. We did at least introduce a new word into the language -- "cost effectiveness" -- and it pleases me very much to see that it is now taken for granted that programs which are cost effective in defense, or almost anything else, are better than programs which are not cost effective.

ASD: As an educator, what do you feel is still needed to educate people in the area of energy resources and conservation? And what do you see as the role of universities in this effort?

Hitch: There's a very interesting book that was published a couple of years ago, "Caught Unawares", by Martin Greenberger, who's now a professor at UCLA. He took a look at the major energy policy analysis studies that had been made since the energy crisis broke, and made some rather startling discoveries. One was that the experts, the people who had seriously studied energy problems, split into left and right wings; but that there was much greater agreement on many issues among the experts than there was between the experts and the general public. One example was the deregulation of oil and gas prices. There was virtual unanimity among the experts on the side of deregulation, and a very strong majority against it among the general public. One unhappy conclusion that emerged was a negative correlation between the quality of a study and its influence. Clearly, I think there is a significant role here for education. I'm very pleased with what the University's Energy Research Group is doing in

this respect.

ASD: Could you describe your work with ERAB (the Energy Research Advisory Board)?

Hitch: I served on ERAB for seven years, from the time it was organized when the Department of Energy first came into being until last November when I resigned -- not really over any matter of principle; I'd just been doing it a long time and I wanted to concentrate on other things. Of course, ERAB is appointed by and reports to the Secretary of Energy, and he pretty much sets the agenda for ERAB. I would say that the Secretary of Energy now has little control over the Department's budget. The head of OMB has more; he second-guesses the Secretary and wins the battles. Congress, of course, has still greater influence. So ERAB is a body advising a Secretary who really doesn't have much authority over his own empire. That perhaps played some part in my decision to depart. I had previously served as Chairman of the General Advisory Committee for ERDA during the two years of its existence, and found that a much more satisfactory experience. The General Advisory Committee of ERDA was the successor to the General Advisory Committee of the Atomic Energy Commission, and like it a statutory advisory committee, which gave it a special status and freed it from some of the constraints operating on other advisory committees in the government. In ERDA we were a small committee of 9, as contrasted with ERAB which has 22 members. We were able to meet frequently and informally with the Administrator of ERDA and the Deputy Administrator.

ASD: Is there anything you consider to be a very high priority for your involvement in the near future?

Hitch: Oh, I have to seize opportunities as they come along. I can't do any very long-range planning at this stage of my life, but there are some things in which I'm engaged which interest me very much and I think are of some importance. I am still closely associated with the Aerospace Corporation as a member of its Investment Advisory Committee for the investment of its corporate pension fund, where the issues are of considerable importance not only to Aerospace, but also to the University of California and to the public and industry generally. I'm still involved with the Gas Research Institute, which has added me to its Research Coordination Council, which helps coordinate energy research at the Institute with research going on in government, industry, and elsewhere. I'm involved in an experimental project with biotechnology research, which attempts to obtain industry funding for biotechnology research in universities, and particularly at UC Berkeley and Stanford. I hope we're going to make a success of it, but we're running into some problems, one of which is the very short time horizon of most industries and their unwillingness to contribute much to research that doesn't offer short-term payoffs. However, we're certainly not giving up. Finally, I have been a very active trustee of the Asia Foundation for 19 years, promoting mutual understanding with the countries of Asia and more democratic institutions within them. The Asia Foundation, I am pleased to report, has no age limit for trustees.

UPDATE ON SNAP

The fifth cycle of SNAP (Search for New Areas & Projects) has been completed. The members of the SNAP group for this cycle were Paul Berdahl (Chair), Kim Kinoshita, John Girman, Henry Benner, Isaac Turiel, and Don Grether (ex-officio). The group evaluated twelve proposals, all of which presented interesting ideas for new research. They were able to narrow the list down to what they considered to be the top five and, as in the last cycle, they invited a representative from each of these to give a brief presentation and answer questions. The group identified what they considered to be the top three proposals and recommended to Elton that they be supported.

Elton and the Division Council decided to pursue the three recommended proposals:

Activation of Methane by a Supramolecule, Composed of a Binding Site and a High-Valent Oxo Metallo-Porphyrin Center, for Conversion to Methanol (Dick Fish)

Methane activation chemistry is an area of research which appears to be technically fertile and in which progress would lead to widespread applications. Fish's idea is to synthesize an organo-metallic molecule which can mimic the enzymatic action of methanemonooxygenase in catalyzing the oxidation of methane to methanol. The type of molecule envisaged is a supramolecule, which has a cavity to bind the methane molecule during catalysis. Recent reports have described the synthesis of new, particularly suitable molecules which can be used in the experimental work.

Individual Microparticle Analysis (Henry Benner, Rollie Otto)

The eventual goal of this research is the development of instrumentation for the real-time elemental analysis of individual microparticles. High-speed economical analysis of aerosol populations particle by particle, including those particles with sizes of less than 0.5 microns (currently not accessible with single-particle analyzers), is desired. The achievement of this goal would open up major new areas in aerosol research. The approach is to charge the particles electrically, to inject them into a vacuum chamber by a technique yet to be determined, and to accelerate them to roughly 1 Mev. A "proof-of-concept" experiment will be performed by accelerating synthetic microparticles in one of LBL's accelerators.

Optical Coatings for High Performance Automotive Coatings (Mike Rubin, Steve Selkowitz)

The idea of this proposal is to bring the expertise in the area of energy efficient coatings for window applications to bear on the closely related problem of controlling radiant energy flow through automotive glazings. First, the proposers intend to determine industry's needs by discussion with auto manufacturers, and by analysis. Then they intend to select one promising materials system and conduct a proof-of-concept experimental program to fabricate and characterize samples. An example of the materials system might be a durable near-infrared reflection coating.

UPDATE ON DIVISION ORGANIZATION

On July 13, 1984, Elton appointed an Advisory Committee to consider various issues that had brought into question the Division's present organization, and to develop a recommendation for a revised organizational structure. Last May the Committee submitted its recommendations in the form of a report entitled "Management and Organization of the Applied Science Division". Subsequently, informal discussions continued in a variety of forums. Based on the report of the Committee and the discussions, Elton presented (in a memo dated December 18, 1985) major elements of a proposed new organization. The highlights are as follows.

The present overall "line management" structure would be retained, with the Program Leaders reporting to the Division Head. However, the Programs would be restructured and retitled as follows:

- Energy Conversion & Storage - electrochemical & thermal storage, fossil energy, biochemical conversion, microstructural materials, polymers & composites
- Whole Buildings Performance - passive solar, active solar, building energy simulation
- Indoor Environment - radon, combustion, organics, control techniques, energy performance of buildings
- Windows and Lighting - optical materials, fenestration performance, lamp technology, lighting controls & impacts
- Energy Analysis - economic/integrating studies, building energy data & analysis, international energy studies, resource allocation
- Environmental Research - atmospheric aerosols, combustion, flue gas chemistry, ecological & biological systems, instrumentation, trace element analysis

In addition there would be two Centers with a coordinating or "cross-cutting" function:

- Center for Building Sciences
- Center for Atmospheric & Biospheric Effects of Combustion

In his December 18 memo, Elton stressed that he viewed the process as an iterative one and that the proposal was not intended to be in final form or complete. Indeed, since then, there has been considerable discussion concerning the details of and the leadership positions within the proposed structure. When these have been worked out, the new organizational structure will be announced and implemented in full. In the meantime, certain of the Division's activities (see next item) are anticipating the change.

UPDATE ON ANNUAL REVIEW

The Division has had an Annual Review on behalf of the Laboratory Director since 1978. We operated on a three year cycle such that any given research area was reviewed every third year. The members of the Review Committee were chosen primarily for their expertise in the areas under review.

The character of the Annual Review has been changed this year at the request of Director David Shirley and Deputy Director Gerd Rosenblatt. The new style of Review is

oriented more towards the Division as a whole, and will stress: broad topics of management, organization, and planning; overviews of the Centers and Programs; and representative research topics.

The Review Committee is expected to be a continuing one, with some allowance for turnover from year to year. The Committee members will be chosen for their ability to assess the Division overall, and thus will tend to be: at high levels within Universities, industry, and other National Labs; generalists; and (collectively) representative of the broad research interests of the Division.

The 1986 review is now set for April 24-25, and is structured along the lines of the proposed organization of the Division. The tentative topics and speakers are as follows:

- Overview of LBL - Gerd Rosenblatt
- ASD overview, organization structure, strategic planning - Elton Cairns
- Center for Building Sciences - Art Rosenfeld
- Whole Building Performance: Next generation simulation code - Jeff Hirsch
- Windows & Lighting: Surface wave excitation in fluorescent lamps - Sam Berman
- Indoor Environment: Radon - Tony Nero
- Energy Analysis: International studies - Lee Schipper
- Energy Conversion & Storage: Solid state radiative heat pump - Paul Berdahl
- Energy Conversion & Storage: Removal of H_2S from coal-derived synthesis gas - Scott Lynn
- Center for Atmospheric & Biospheric Effects of Combustion - Alex Quintanilha
- Environmental Research: Atmospheric aerosols - Tica Novakov
- Environmental Research: Combustion chemistry - Nancy Brown

The Review Committee members are:

John Eberhard	Executive Director, Advisory Board for the Built Environment, National Academy of Sciences
Sol Penner	Professor of Applied Mechanics & Engineering Science, UC San Diego
Martin Greenberger	IBM Professor of Computer & Information Systems, Graduate School of Management, UCLA
William Fulkerson	Director of Energy Division, Oak Ridge National Laboratory
Fritz Kalhammer	Vice President for Energy Management and Utilization, EPRI
Jack Calvert	Senior Scientist, National Center for Atmospheric Research

SPACE IN AND AROUND BUILDING 90

There have been some recent moves out of and within the Building 90 complex. Some were discussed at Project Leader's Meetings, but others occurred more or less at the last minute. We were under considerable pressure from the Lab to meet a nearly impossible time schedule, and we weren't able to keep everyone informed. Briefly, the situation is:

- Most of Sam Berman's group in Building 90 moved to trailer B46B.
- Some of Steve Selkowitz's group moved from the 1st floor to the 3rd floor space vacated by Berman.
- Alan Meier and co-workers moved from trailer B90B to the space on the 1st floor vacated by Selkowitz.
- Trailer B90B was removed (as was the trailer B90A previously occupied by the Administration Division).

Two double trailers from the Building 80 area are supposed to be moved to the former sites of B90A and B90B. We have been assigned the B90B replacement, and should be able to occupy it by April 4, 1986. The new trailer will give us some much needed flexibility. In particular, we should be able to consolidate the Energy Analysis people who are currently scattered about the third floor.

DIVISION NEWS

— **Professional Staff Committee**. John Harte, who is currently in Australia on sabbatical leave for six months, is stepping down as a member of the Professional Staff Committee after 13 years of service to the Division. His time and efforts have been sincerely appreciated. Harvey Blanch, Deputy Program Leader of the Chemical Process Program, has been appointed to the Committee to replace Harte.

— **Visitors**. Ken Friedman, DOE Special Assistant for Policy Planning & Analysis to Alan Streb (Deputy Assistant Secretary for Conservation), visited LBL on January 14 and met with the buildings group leaders from the Solar, Energy Analysis, and Energy Efficient Buildings programs.

Evald Shpilrein, Chief of Department, and Viktor Maslennikov, Chief of Laboratory, from the Institute of High Temperatures, USSR Academy of Sciences, Moscow, visited LBL on Friday, February 21. They were accompanied by R.H. Socolow, Director, and R.H. Williams, Senior Research Fellow, Center for Energy and Environmental Studies, Princeton University. The group met with members of the Energy Efficient Buildings Program and toured the Sky Simulator, MoWitt, and the Lighting Laboratory.

INVITED TALKS AND FOREIGN TRAVEL

January

- Rick Diamond was an invited speaker at the annual convention of the National Association of Homebuilders (NAHB) in Dallas, Texas. His topic was "Multi-Family Retrofits".

- Rudy Verderber was invited to speak at a meeting of the Illuminating Engineering Society (IES) in Reno, Nevada. His talk was titled "Review of Lighting Control Equipment and Applications".

February

- Mark Levine traveled to Singapore, Kuala Lumpur, Jakarta, and Bangkok for meetings with representatives of the Association of South East Asian Nations (ASEAN).

- Jayant Sathaye traveled to Tokyo, where he met with members of the Institute of Energy Economics. He then went on to Taipai for meetings with the Taiwan Power Company and the Chung-Hua Research Institute, and to Bangkok, where he met with representatives of the United Nations, the National Energy Administration, and the Asian Institute of Technology.

CONGRATULATIONS!

— To Gloria and Ezell Gill on the birth of their daughter, Dana Lynelle, on November 27, 1985. Dana arrived well-developed, weighing in at 10 lbs. 4 oz.! Gloria will be back at work sometime around the 1st of March.

— To Rollie and Shari Otto on the birth of their daughter, Kristin Marie (Kristy), on January 7, 1986. Kristin, who was born at Alta Bates Hospital in Berkeley, weighed 7 lbs. 1 oz.

RECENT REFEREED JOURNAL ARTICLES

R.J. Mehlhorn, J.J. Maguire, G. Hartzog and L. Packer, "Oxygen Radicals and Cancer: Free Radical Generation and Oxidative Damage in Mitochondria," *Cell Membranes and Cancer,* Proceedings of the Second International Workshop on Membranes in Tumour Growth, pp. 223-233 (Amsterdam: Elsevier, 1985).

T.L. Lomax and R.J. Mehlhorn, "Determination of Osmotic Volumes and pH Gradients of Plant Membrane and Lipid Vesicles using ESR Spectroscopy," *Biochemica et Biophysica Acta 821,* pp. 106-114 (1985).

A. Ghirardi, "Trends of Energy Use in Brazil: Is Self-Sufficiency in Sight?," *The Journal of Energy and Development,* Vol. 10, No. 2, pp. 183-191 (1985).

M.P. Modera, M.H. Sherman and R.C. Sonderegger, "Determining the U-Value of a Wall from Field Measurements of Heat Flux and Surface Temperatures," *Special Technical Testing Publication 885,* pp. 203-219, American Society for Testing and Materials, Philadelphia (1985).

L. Schipper and A.N. Ketoff, "The International Decline in Household Oil Use," *Science,* Vol. 230, pp. 1118-1125 (1985).

P. Berdahl and L. Shaffer, "Galvanomagnetic Luminescence of Indium Antimonide," *Appl. Phys. Lett. 47,* pp. 1330-1332 (1985).

P. Persoff, "Development and Testing of Spent Shale Grouts for Backfilling Abandoned In-Situ Oil Shale Retorts," *Journal of Petroleum Technology,* Vol. 34, pp. 1033-1035 (1984).

F.J. Offermann, R.G. Sextro, W.J. Fisk, D.T. Grimsrud, W.W. Nazaroff, A.V. Nero, K.L. Revzan and J. Yater, "Control of Respirable Particles in Indoor Air with Portable Air Cleaners," *Atmospheric Environment,* Vol. 19, pp. 1761-1771 (1985).

P.M. Rice, H.V. Michel, F. Asaro and F. Stross, "Provenience Analysis of Obsidians from the Central Peten Lakes Region, Guatemala," *American Antiquity,* Vol. 50, pp. 591-604 (1985).

B.M. Jones, G.W. Langlois, R.H. Sakaji and G.G. Daughton, "Effect of Ozonation and UV Irradiation on Biorefractory Organic Solutes in Oil Shale Retort Water," *Environmental Progress,* pp. 252-258 (1985).

G.W. Traynor, J.R. Girman, M.G. Apte, J.M. Dillworth and P.D. White, "Indoor Air Pollution Due to Emissions from Unvented Gas-Fired Space Heaters," *APCA Journal,* Vol. 35, No. 3, pp. 231-237 (1985).

P.D. Mackenzie and C.J. King, "Combined Solvent Extraction and Stripping for Removal and Isolation of Ammonia from Sour Waters," *I&EC Process Design & Development, 24,* pp. 1192-1200 (1985).

R.K. Cheng, L. Talbot and F. Robben, "Conditional Velocity Statistics in Premixed CH_4-Air and C_2H_4-Air Turbulent Flames," Twentieth Symposium (International) on Combustion/The Combustion Institute, pp. 453-461 (1984).

M. Rubin, "Optical Properties of Soda Lime Silica Glasses," *Solar Energy Materials,* Vol. 12, pp. 275-288 (1985).

W.H. Benner, P.M. McKinney and T. Novakov, "Oxidation of SO_2 in Fog Droplets by Primary Oxidants," *Atmospheric Environment,* Vol. 19, No. 8, pp. 1377-1383 (1985).

R.H. Fish, A.D. Thermodsen and H. Heinemann, "A Comparison of Polymer-Supported Chlorotris-(Triphenylphosphine)Rhodium(I) to its Homogeneous Analog in the Selective Reduction of Polynuclear Heteroaromatic Compounds, *Journal of Molecular Catalysis, 31,* pp. 191-198 (1985).

P.H. Tewari, A.J. Hunt and K.D. Lofftus, "Ambient-Temperature Supercritical Drying of Transparent Silica Aerogels," *Materials Letters,* Vol. 3, Number 9,10, pp. 363-367 (1985).

A.K. Oppenheim, "Dynamic Features of Combustion," *Phil. Trans. R. Soc. Lond.,* Vol. A315, pp. 471-508 (1985).

Z.-X. Wang, D.D. Hollister and S.M. Berman, "Development of Novel Lamps for Study of Enhanced Production of Resonance Radiation by Low-Density Mercury Discharges," IEEE 1984 IAS Conference Record, pp. 1259-1262 (1984).

L. Packer, "Mitochondria, Oxygen Radicals and Animal Exercise," Proceedings of the International Symposium on Membranes and Muscle, Cape Town, S.A., March 18-21, 1985, pp. 135-147.

S.R. Vosen, R. Greif and C.K. Westbrook, "Unsteady Heat Transfer During Laminar Flame Quenching," Twentieth Symposium (International) on Combustion/ The Combustion Institute, pp. 75-83 (1984).

D.H. Mohr and C.J. King, "Identification of Polar Organic Compounds in Coal-Gasification Condensate Water by Gas Chromatography-Mass Spectrometry Analysis of High-Performance Liquid Chromatography Fractions," *Environmental Science and Technology,* Vol. 19, No. 10, pp. 929-935 (1985).

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