

# EQL

Caltech is no newcomer to the study of the problems of our physical environment. But the mounting urgency of those problems has convinced the Institute of the need to translate the results of its environmental research into effective action. This month Caltech announced the creation of an Environmental Quality Laboratory specifically designed to meet that need.

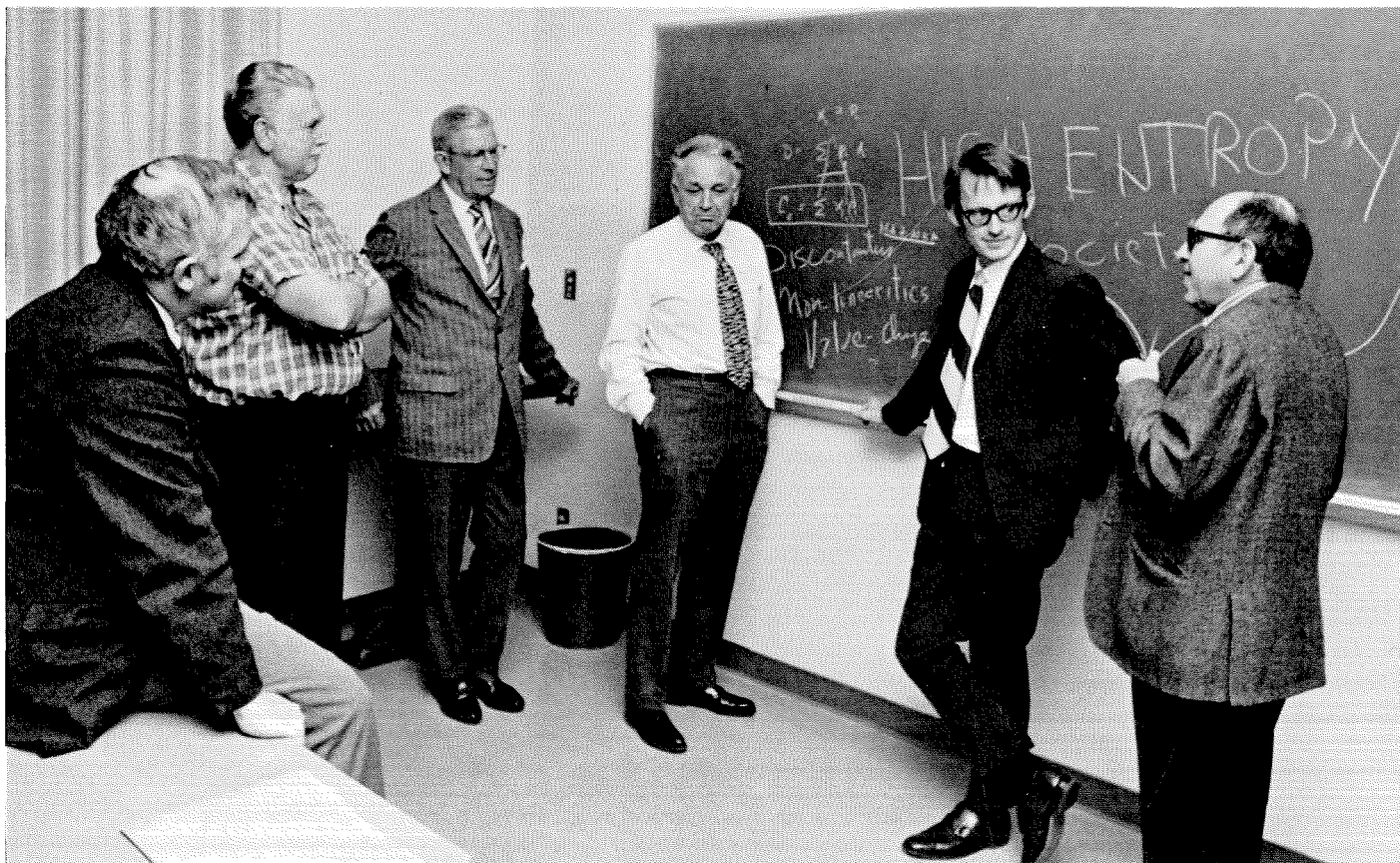
Like the Environmental Engineering Science Program that preceded it (p. 14), the EQL is committed to solving environmental problems. But the principal activity of the graduate academic program is basic research, and its immediate goal is to educate scientists and engineers to solve specific environmental problems. The EQL is action-oriented. Instead of confining itself to the traditional "scientific problem-solving" approach typically associated with academic studies, the EQL will often be dealing with broader, more comprehensive—and more controversial—problems than those addressed by the Environmental Engineering Science Program.

Even though the EQL represents a big step for Caltech, there is ample precedent for establishing a specialized laboratory, to be operated by—but kept organizationally distinct from—the Institute. JPL is, of course, an outstanding example. The Caltech faculty committee on Aims and Goals stated the rationale in its April 1969 report:

"It must be recognized that occasions will arise where the unique competences present in such an institution as Caltech will be called upon to meet pressing social needs at both national and local levels. It is important that faculty participation in such endeavors remain a matter of individual choice, and that any large-scale direct action programs be sufficiently insulated from the Institute that they do not distort its basic functions of research and education."

During the summer of 1969 the Institute administration and faculty began a series of discussions on the feasibility of establishing a sizable air pollution laboratory at Caltech. A steering committee headed by Francis Clauser, chairman of the division of engineering and applied science, and a volunteer study group headed by Carver Mead, professor of electrical engineering, and John Seinfeld, associate professor of chemical engineering, were set up to evaluate all aspects of the idea. In addition a small JPL group was formed under the chairmanship of

**The Environmental Quality Laboratory  
—a new action-oriented venture at  
Caltech—will try to convert  
environmental research results into  
technical and social change.**



*Charter members of the Caltech Environmental Quality Laboratory confer with Samuel Lenher, former Du Pont vice president in charge of pollution control activities—James Morgan, professor of environmental engineering science; Mahlon Easterling, visiting professor of applied science; Mr. Lenher; EQL Director Lester Lees; John List, assistant professor of environmental engineering science; and Burton Klein, professor of economics.*

R. E. Covey to investigate such questions as organizational structure, modus operandi, size, location, and funding.

The deliberations of these groups and a further study headed by Lester Lees, professor of environmental engineering and aeronautics—which included faculty members in engineering and in social sciences and members of the Jet Propulsion Laboratory—identified air pollution as only the most conspicuous of a whole series of closely interrelated environmental problems and recommended the establishment of an Environmental Quality Laboratory with a broad mandate to study the whole question of the quality of life in the Los Angeles Basin and, ultimately, in the State of California.

By the summer of 1970 the results of these studies had been accepted in principle, Lees was named interim director, the nucleus of a staff was being assembled, and the guidelines for activity were being further delineated. The EQL was not only to be action-oriented, it was to have an interdisciplinary structure, to remain relatively small in size, and to stress informality and flexibility.

The EQL now has a staff of seven. Four are faculty

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members and divide their time between the laboratory and their academic duties: Lester Lees, economist Burton Klein, and environmental engineers James Morgan and John List. The others are Mahlon Easterling, a JPL staff engineer; Guy Pauker, a RAND Corporation political scientist; and Kenneth Heitner, a research engineer and recent Caltech graduate (PhD '69) in applied mechanics.

An ecologist, an additional economist, a cultural anthropologist, a social psychologist, and a young lawyer who is interested in and has some experience with legislation dealing with pollution would be desirable additions in the near future. However, the group has no wish to grow very large, and it will probably never have more than 12 to 14 members. There will also be a few graduate students who will be carrying out projects in the lab under the supervision of faculty advisers who may or may not be part of the EQL. Such graduate students could have considerable impact on industry and government over the next 10 to 20 years, and they may well turn out to be among the lab's most important products.

The EQL staff has already started making studies in two critical areas: 1—the impact of energy use on the California environment, and 2—the economic aspects of air pollution control in the Los Angeles Basin. These problems are typical of the issues that interest the laboratory group. If the EQL is to make a significant impact on Los Angeles and California, it will have to concern itself eventually also with land use, solid waste disposal, water pollution—in short, the whole spectrum of urban problems.

In its first study, the group is examining the growth in energy consumption in California and the effects of this growth on the environment, and is attempting to develop an energy consumption model to investigate integrated power planning and help predict the environmental impact of alternative plans.

In the air pollution study, the staff is analyzing the effects of the growing automobile population and the costs of reducing emission levels. They are finding out that, in the Los Angeles Basin at least, the relationship between emission levels and air pollution levels is highly non-linear, being strongly influenced by such variables as wind velocity, height of inversion layer, and sunlight intensity. Solving the air pollution problem is considerably more complicated than spending increasing amounts of money on controlling emissions from internal combustion engines.

The EQL's first graduate student is participating in the air pollution study. He is John Trijonis, a Caltech alumnus in aeronautics (BS '66, MS '67), who is now

working toward his PhD in environmental engineering science under the supervision of Roger Noll, associate professor of economics, and Lees. His part of the project is to assemble data on pollution control costs related to the internal combustion engine, to relate pollutant levels to emissions, and to evaluate the "damage costs" of pollutants.

Although the EQL is already a functioning unit, for the time being it has no real home. The staff currently meets in a conference room in the Karman Laboratory of Fluid Mechanics and Jet Propulsion while waiting for the remodeling of a large classroom in the Thomas Laboratory of Engineering into temporary headquarters. Plans for permanent quarters are to convert one or two of the Institute-owned houses adjacent to the campus when the staff and work enlarge—and when funds become available.

Funding plans are anchored to a \$1.5 million proposal to the National Science Foundation for "seed money." Support is also being solicited from industrial organizations and private foundations.

One guideline the EQL has laid down is maintenance of its independence and objectivity as it deals with the somewhat explosive questions related to the environment. It also expects to exchange ideas and information with industry, government, and conservation organizations. As a step in this direction, Samuel Lenher, a former vice president in charge of pollution control activities and current board member of the Du Pont Corporation, spent three weeks with the EQL last fall. Lees himself is a member of the Energy Use Panel of the California State Assembly's Council on Science and Technology.

The EQL will typically address itself to problems having a high technological content—such as the two current studies. This is in keeping with Caltech's traditional strengths. But in pursuing even the most highly technical environmental problems, Lees points out, we very quickly confront the most fundamental of questions—what kind of a world, what kind of a government, what kind of an individual human life do we want to have? To answer such questions requires more than presenting learned papers. "We really want our work to lead to some action," says Lees. "We want it to have real impact on the decision-making process, and this is going to be one of our toughest problems."

The Caltech Environmental Quality Laboratory is admittedly a high-risk project, since it may well be in the thick of some controversial issues. But if its studies can lead to technical and social changes that will achieve a harmonious relationship between man and his environment, the yield will more than justify the risk.