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5 - To serve the nation in other respects in connection with significant problems in engineering and technology.

6 - To recognize in an appropriate manner outstanding contributions to the nation by leading engineers.

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FOREWORD

The COPPS project was intended to induce rational consideration of energy-environment problems; Forum II confirmed the effectiveness of the COPPS Report as a catalyst for that process through vigorous interaction of knowledgeable people. The two-day Forum II generated productive ideas and it revealed consensus on a number of issues. These are recorded here in the summaries of the panel and workshop chairmen supplemented by digests drawn from the stenographic record of floor discussions.

Forum II was an effective extension of the COPPS project because of the willingness of several hundred very busy people to give their time and effort to attend and join in the discussions. We are appreciative of this, and we are grateful to the participants in the panels and workshops and especially to their chairmen for organizing the programs. The COPPS staff was assisted by Mr. Daniel P. Sheer, formerly a COPPS Staff Assistant now pursuing graduate study at the Johns Hopkins University.

Supplementing the initial funding support for the COPPS study and report, grants to meet Forum II expenses were generously supplied by the Atomic Energy Commission, the Bureau of Mines, and the National Science Foundation.

FORUM II AGENDA

In the latter part of 1970, the National Academy of Engineering, in furtherance of its public responsibilities, authorized a study of the means for resolving conflicts between provision of supplies of electricity adequate for the Nation's requirements and protection of environmental quality consonant with public goals. That study, organized as the Committee on Power Plant Siting (COPPS), was an intensive twelve-month effort; its report* is a 340 page volume presenting comprehensive technical studies and a discussion of policy issues that includes some 50 major recommendations for early action.

To aid consideration of the COPPS Report in connection with public decision-making, NAE sponsored a conference to evaluate its conclusions and recommendations. Some 300 persons accepted invitations to meet as COPPS Forum II which was held in Washington, D.C. on March 7 and 8, 1972, about six weeks after distribution of the COPPS Report.** Those in attendance were persons actively engaged in energy and environment matters and in public interest concerns. There were members of federal and state regulatory agencies and legislatures, utility and other industry executives, academic and government environmental

*Engineering for Resolution of the Energy-Environment Dilemma, Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418 - $10.50.

**At the Shoreham Hotel

scientists and engineers, conservationists, lawyers, social scientists, and representatives of citizen organizations*, and this mix of interests and affiliations prevailed in the discussion groups. All sessions of the Forum were open, with press representatives in attendance.

The focus of the Forum discussions was on how to move ahead toward implementing needed actions and, reflecting the emphasis of the COPPS Report, the agenda emphasized two issues: consolidated site certification, and research and development needs. Additional issues for which the agenda made explicit provision through panels and workshops were the environmental standard setting process, public information, and applications in engineering practice. Furthermore, because the program was arranged so as to encourage comments from the floor, other issues were discussed as well. Each participant in the program spoke for himself without commitment of the organization with which he is affiliated.

The Forum program consisted of four-half day sessions:**

First Session - General introduction and presentation of COPPS Report highlights.

Second Session - Panel discussions of (1) needed federal and state legislation, and

*Appendix A lists the participants and tabulates their affiliation and geographic distribution.

**Appendix B shows the Forum II program.

(2) research and development needs.

Third Session - Five concurrent workshop sessions on (a) consolidated certification process, (b) R&D program and organization, (c) public information, (d) environmental standard setting process, (e) application in engineering practice.

Fourth Session - Presentation and discussion of workshop reports, and general discussion of Forum issues.

To enhance free discussion, the Forum program maintained informality -- i.e. no prepared papers were read, presentations by discussion leaders were brief, a good deal of time was allotted to questions and comments from the floor. In the initial session COPPS representatives capsulized highlights of the Report, in the other three sessions panelists and discussion leaders were persons not associated with formulation of the Report. The third Forum session utilized the entire morning of the second day, March 8, for five concurrent workshops that focussed on action proposals. Each workshop was organized by a panel of discussion leaders who identified objectives, issues, and alternatives. Most of the workshop time was used for discussion by participants and, from this, the workshop chairmen synthesized a consensus that constitutes the rapporteur's sum-

maries which were presented for discussion by the entire Forum in the final plenary session.

COPPS HIGHLIGHTS

In his welcoming remarks, NAE President Linder, traced the involvement of the Academy in the fields of power plant siting and energy utilization. Two years ago, the Academy, recognizing power plant siting as a critical problem requiring responsible discussion, established COPPS and secured funding from both public and private sectors. With the successful conclusion of the COPPS study, the Academy is now moving forward with a study of the entire field of energy utilization.

In introducing discussion of the COPPS Report, Dr. Lewis identified the Forum II purpose to be evaluation of the COPPS conclusions and recommendations. In that connection, he pointed out that the study was made by Working Groups and a Steering Group composed of representatives of the diverse interests concerned. To produce the COPPS Report, they collaborated in a manner essential to good engineering practice, practice which cannot be pursued in the framework of an adversary proceeding. The COPPS Report makes clear that in the short term, major developments for environmental protection would be the result of changes in regulatory and operating procedures; in the longer term, developments would depend upon the results of research and development.

Mr. Gerber reviewed Working Group III findings regarding electric energy needs in terms of the four sources for the

growth in demand: population growth, shifts from other energy sources; increased per capita use, and an expanding economy. There is no indication of any reduction in the rate of energy growth in this century. Increasing use of electric energy may be environmentally desirable because recycling, mass transit, and other environmentally oriented processes require expenditure of energy, and control of pollutants from energy production is more easily accomplished at central station units. Furthermore, increase in per capita productivity, an important goal of society, is tied to increased production of electricity. He pointed out that measures to reduce growth in electric energy consumption, unless applied uniformly for all types of energy, would affect the energy mix but might not reduce total energy use. Mr. Gerber called for the internalization of all costs, including environmental costs, in the price of electric power. Only if costs are properly internalized can desires of the public be expressed through the market.

Mr. Clement, speaking of the COPPS Report treatment of environmental quality pointed out that prerequisite to dealing successfully with these problems is that society change its orientation and goals. There are no "free goods" and in order for the market to operate properly, industry must pay for discharges to common property resources -- air, water, landscape, but the level of effluents that the environment can

tolerate must not be exceeded. There must be regional plans which describe interrelationships, identify unique and fragile resources and delimit assimilative capacities. In this connection, the COPPS Report provides helpful checklists of important parameters and opportunities. Mr. Clement expressed optimism regarding society's ability to make the necessary changes.

Mr. Gould, Chairman of the Working Group on Systems Approaches, characterized the COPPS Report as a valuable primer on the problems of power plant siting, and he recommended that it be updated on a regular basis. In essence, the systems approach to siting involves utilizing information regarding all significant factors of energy production and environmental consequences, weighting them, synthesizing alternative technological combinations to meet requirements, and selecting the most satisfactory one. This involves feedback regarding public acceptability, and iteration until the feedback is affirmative. Faced with an escalating load growth, utilities must find generation sites, and utilities are changing traditional attitudes toward environmental protection. The utilities must provide the public with meaningful information regarding their plans and, in formulating them, utilities must take into account many values some of which cannot be expressed in terms of dollars. Planning must

be the result of cooperative effort -- good engineering cannot result from an adversary process -- an important element of planning, especially in relation to non-monetary values, is that it reflect consultation with those concerned. Exceptions expressed by Mr. Nagel (who was unable to attend the Forum) were summarized by Mr. Gould: Due to the complexity of the problems, planning must be done by professionals; plans should be reviewed and commented on by the public and then returned to the planning professionals for appropriate revisions; however, there are so few suitable sites that the choices may only be the sequence in which they are utilized. In conclusion, Mr. Gould affirmed that good engineering can and will resolve the conflict between the production of electrical energy and environmental protection.

In the discussion following these presentations disagreement was apparent regarding the effect of price on power use -- one view being that price elasticity is small, and that the existing decreasing rate structure reflects true costs of producing electric power. The contrary view was expressed that pricing arrangements should and can implement social purposes. A moderating view recognized that socio-economic considerations are a large part of the siting problem, especially since it is becoming impossible to escape problems of externalities by remote siting.

A communication received subsequent to the Forum calls

attention to existing and potential development of geothermal energy as a supplement to fossil fuel and nuclear generation, and as an energy source for areas beyond the reach of electric transmission lines. Other comments emphasized regional planning that implements the systems approach. However, there was lack of agreement as to whether land use for power plant sites significantly pre-empts the landscape. It was observed, for example, that all the plants needed to supply California's power to the year 2000 could be located on five miles of shore line.

Dr. Philip Sporn urged recognition that advances in the conditions of living made during the past century are attributable to increased per capita productivity and basically to increased use of energy -- that increased energy use to achieve increased productivity continues to be the only way to better the human condition, including protection of environmental quality. Others commented, however, that also the current lifestyle must change with a general reordering of priorities.

The Second Forum session, held on the afternoon of March 7, was devoted to panel presentations and floor discussion of two major series of COPPS recommendations: needed federal and state legislation, and research and development needs. These two panel discussions framed consideration of implementing actions which were to be dealt with in workshops the following morning. The following summaries were prepared by the rapporteur associated with each panel and workshop.

CONSOLIDATED SITE CERTIFICATION

Panel I: Needed Federal and State Legislation

Summary and Analysis by Professor Charles Ehren

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Professor William H. Rodgers, Jr.
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Charles R. Ross, Esq.
Shelburne, Vermont

Former member - Federal Power Commission

Although the discussion at this panel went in a number of different directions, a very good part of it tended to suggest, both by things expressed and those omitted, a wide range of support for the general propositions stated by Dr. MacDonald at the beginning as the purposes of the Administration legislation.* Of those, a most important point was that reform legislation must structure into the regulatory system sufficient time for open, long-range planning and for the consideration of alternatives, time to explore fully all of the problems. Dr. MacDonald pointed out that the absence of time for open, long-range planning is a very significant cause of the present crises, leading to extended delays when plants are desperately needed on-line. The other panelists agreed.

Another point about which there seemed to be general agreement was the theme of federalism built into the Administration's legislation. There was a good deal of support for it, although the only theory actually expressed in justification was Mr. Gavin's theory that decision-making should be carried out as close to the people as possible. Perhaps Mr. Ross came as close as any panelist to a challenge by suggesting that the federal standards must be primary. I personally am not satisfied that that issue was explored adequately, and would suggest that the history of federal guidelines followed by state agencies in the water and air pollution fields does not provide a very good

*(Editor's note: H.R. 5277, S. 1684 - 92nd Congress.)

foundation for arguing that the same policy should be followed in the case of electric power and the environment. On the other hand, Mr. Clifton suggested not only that there should be primarily a state system in accordance with the federal guidelines, but that the governor of each state should have practically the final word in determining whether the state, itself, is meeting the federal guidelines. If one accepts the point, made by Dr. MacDonald and others, that the national quality of these problems is paramount, it seems to me that there is a real issue of political science here that was not addressed. Underscoring the national significance of these issues was Mr. Gavin's comment that the electric power issue is only a part, and, in the broad view, perhaps not the most important part, of the nation's overall energy policy problem.

Another very significant element in the discussion was Professor Rodgers' suggestion that one-stop licensing can, in fact, be a very healthy tool for the solution of electric facility siting problems but that the one-stop has to be a "full, fair stop". He provided not only a label but also two very specific suggestions for making "one stop" into "full, fair stop". He urged that there be established meaningful citizen participation in the decision-making process and a system for "sanitized research," meaning that research carried out by scientists and engineers should not be beholden to the utility industry as the source of their fees.

The last two points lead naturally to one of the most important matters raised during the question-answer period: the viability of the adversary process. Professor Rodgers pointed out that it can be a highly useful process for developing facts and that, historically, it has been such in our Anglo-American system, but that it can work only if all of the real interests are equally and adequately represented in the process. Thus, Professor Rodgers concluded, we need to look for mechanisms to make it fair, to assure that necessary interests are properly represented.

Mr. Ross pointed out the background giving rise to the need for citizen participation. He referred to another crisis presently besetting our society, the credibility gap suffered by almost all institutions, especially governmental institutions and, even more especially, governmental institutions in association with large, corporate institutions, as they are in the utility plant-siting cases. Mr. Ross declared that, in such cases, no processes will work if public confidence is not re-established. Other panelists agreed.

Certain omissions from the discussion are noteworthy, in addition to the federalism question already noted. First, although the National Environmental Policy Act was mentioned, its major historic significance was not sufficiently emphasized. By that I mean, its construction by the courts, and particularly by Judge Skelly Wright in the Calvert Cliffs' case, as an action-

forcing mechanism, designed to require government agencies to balance, on a grand scale, society's developmental and environmental interests. NEPA can be discussed in terms of the non-workability of the impact statement requirements, and perhaps that requirement is unworkable. When the Kalur, Quad Cities, and Greene County cases are put together with Calvert Cliffs', perhaps there results a mechanism that will completely bog down the administrative process. It is at least quite arguable that that is the case. Even if one accepts that proposition, however, it seems clear that any reform legislation truly aimed at going beyond the NEPA emergency and at solving the problems of electric power and the environment must be designed to avoid throwing the baby out with the bath. Any such legislation must recognize and provide for the balancing function in a very large way.

Finally, while the panel discussed long-range planning at some length, the conversation completely omitted one element. During the morning session, Dr. Sporn had mentioned the importance of the integrated utility system. Consideration of the need for integrated systems logically leads to consideration of nationally integrated systems. Some persons use the expression, "national grid". It is essential, as Dr. Sporn had suggested, that formulations of the balance between electric needs and environmental needs consider the efficiencies and interrelationship potentials of larger integrations. Indeed, maximum national

integration seems to be a necessary alternative. America is one nation economically and in every other way relevant to questions of development versus environment. It must be so treated when thinking about the electric industry. In considering larger and larger integrations, however, the nation is going to have to face up to the problem of who controls the larger, perhaps nationally integrated system. The real question of political science is whether the long-range planners, the real decision-makers, the initiators, are going to be persons responsible primarily to stockholders, or whether they are going to be persons responsible to the electorate. That truly profound question underlies and is inextricably related to the environmental questions discussed by the panel.

CONSOLIDATED SITE CERTIFICATION

Workshop A: Consolidated Certification Process

Summary and Analysis by Mr. James Woodruff

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New England Energy Policy Staff
Boston, Massachusetts

The panel and workshop on the Consolidated Certification Process was drawn together to discuss and comment on the concept that the recognized shortcomings of present procedures and organizations involved in obtaining approval for the siting and construction of power plants could be overcome by the development of a consolidated or unified approval or certification process. The concept is that which is often referred to by the over-simplified designation of the "one-stop" certification process.

One early and plain consensus of the panel and audience at the workshop was that a true "one-stop" process is neither possible, practical nor even desirable since it is universally recognized that the right of appeal of administrative decision to the courts should not and can not be proscribed or denied.

The workshop used as background and as a point of departure for discussion, the conclusions and recommendations under "Procedures and Organization" of the Report of the Steering Group in Engineering for Resolution of the Energy-Environment Dilemma: A Summary (pages 10, 11 and 12).

It was the majority view that the multiplicity of agencies from whom approvals must currently be obtained prior to power plant construction and the lack of clear guidelines impedes or frustrates the timely resolution of issues and the securing of finality of decision. Regulators as well as utility representatives expressed concern with the delays inherent in the

current certification procedures and see the consolidation of certification procedures to the maximum extent possible, consistent with due process, as an imperative if power shortages are to be avoided.

Environmentalists, while also expressing concern for reliability of power supply, cautioned against reliance on simplified procedures contending that existing institutions and procedures, although admittedly untidy, do bring about satisfactory results in the end with all issues being given due consideration.

There was strong support for the reliance on or establishment of certification agencies at the state level, as opposed to the federal level. The third alternative of the regional certification agency was considered a good concept and a worthy goal in those instances where commonality of problems and needs and compatibility of power pool or system boundaries with political boundaries could provide incentive sufficient to offset the obvious multi-state legislative and organizational problems.

If consolidated procedures are to be established, there appear to be persuasive reasons for accomplishing it on the state level in most cases that:

1 - Siting issues are generally related to local situations rather than general national concerns.

2 - States could most quickly provide a sufficient number of functioning regulatory systems based in many

cases on existing agencies with established procedures.

3 - A number of state agencies, familiar with local situations and with a diversity of approach tailored to those situations, could more expeditiously process the multiplicity of expected siting cases than a single federal agency.

It was recognized, however, that there are situations where certifications necessarily must be predominently federal, such as, failure of a state to act and cases involving federal power systems.

At least two issues discussed during the workshop could be said to need further examination:

1 - There was general agreement that a consolidated certification process will neither accomplish the ends sought nor will it receive general acceptance if the certification agency does not have public trust. Thus the credibility of the natural resources or environmental protection agency with utilities or the credibility of either type agency with the public in general would be crucial to a viable, effective consolidated certification process. It appears important that this matter be given an objective, "real-world" appraisal in the development of detailed recommendations or enabling legislation.

2 - There definitely was not a consensus as to whether the issues in certification procedures should be

limited strictly to technical power plant siting matters or whether these procedures should provide forums for considering such broader concerns as legitimacy of demand or growth in demand or environmental problems external to the plant under consideration involving fuel supply or waste disposal. The question needing further examination is whether power plant certification proceedings can, as a practical matter, be restricted to consideration of only siting problems or should these inquiries legitimately include consideration of the broader energy problems not necessarily directly connected with individual plants.

Editor's note: In separate communications, two Forum participants provided analyses of (a) the Oregon statute for state regulation of bulk electric power facilities, and (b) a proposed Virginia statute for the same purpose.

ENLARGED RESEARCH AND DEVELOPMENT PROGRAM

Panel II: Research and Development Needs

Summary and Analysis by Mr. Grant Bethers

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The electric utility industry is concerned with research and development to insure that the electric energy demands of our society are met and in a way that is compatible with our environmental objectives. R&D holds the answer to many of the challenges that face the industry today.

One of the most comprehensive and far-reaching array of R&D objectives ever outlined for the electric utility industry was chronicled by the Electric Research Council's R&D Goals Task Force in its report last fall "Electric Utilities Industry Research and Development Goals Through the Year 2000". This study calls for R&D expenditures over the next 28 years averaging $1.12 billion annually and includes priorities and timetables. This important contribution by the Electric Research Council will be useful as the electric utility industry expands its R&D activities.

1 - In charting the electric utility industry's future R&D program, the public and private sectors can work together. Government initiative is generally needed for example when (1) great uncertainty exists as to the results of research projects; (2) the magnitude of the project exceeds the industry's capability and resources; or (3) the prospects of returns is far off in time.

The Government should encourage and stimulate needed research effort by (1) funding long-range efforts; (2) furnishing seed money; and (3) creating a proper climate to allow the free enterprise system to operate effectively.

2 - The Electric Research Council's recommended $1.12 billion per year level of R&D expenditures is about double the present level of expenditures by government and industry. The Government's contribution is currently about one-half of this effort each year. With the present emphasis on protecting and improving the environment, the public sector contribution level is likely to continue at least one-half of the required R&D funds, perhaps being reduced in the later years.

3 - While the Electric Research Council was organized in 1965 and has received wide endorsement, there is a concern that the electric utility industry can achieve an adequate nation-wide cooperative R&D program based on voluntary participation. In recommendations by the ERC Goals Task Force and by the ERC R&D Finance Task Force, the Council would be incorporated enabling it to contract for research in prescribed areas and coordinate over-all electric utility programs. A full-time staff would be established to oversee the magnitude of research contemplated.

Funding of the R&D program should be assured for more than a year at a time. The "voluntary contributions" method used at present does not result in an equitable distribution of the research costs nor does it achieve complete participation.

One of the plans advanced is similar to the military's alleged "volunteer" system, which would call for a Federal tax, or its equivalent, using some appropriate formula applicable to

every electric utility system. The utility would be permitted a tax deduction to the extent that it had participated in research sponsored by the Electric Research Council. Other funds collected by the Federal Government as a result of this tax (amounts not contributed directly to the ERC) would be used for similar research but obviously be controlled by some governmental agency. There may be great difficulties in devising the appropriate legislation and securing support from all sectors.

In another method favored by the investor-owned electric utility systems, the R&D program would be planned, financed and carried out by the industry with counsel and guidance from other interested parties. Under this plan, electric utilities would have to be allowed by their regulatory agencies to include the cost of research in their operating expenses. At the present time, the National Association of Regulatory Utility Commissioners Ad Hoc Committee on Energy Research and Development is cooperating with the industry in planning for the financing of an expanded research program on this basis.

4 - From time to time proposals are made that the electric utility industry construct and operate a large, centralized R&D facility. A number of steps should be taken prior to considering this proposal. After the Electric Research Council is incorporated, a full-time staff established, advisory panels functioning to assist the Council and the financing plan

adopted, then a specific program covering a number of years ahead should be developed.

At this time, it would be necessary to determine the extent to which the research could be accomplished by utilizing existing organizations and facilities. Should a situation arise where existing facilities are not available to the Council, this body would then be faced with a determination of whether to expand some existing facility or provide a laboratory of its own. In time the Council may find it appropriate to have centralized or regional R&D facilities. However, a desirable policy would prevent the establishment of self-perpetuating units.

Much R&D is now performed under contract, being placed where the greatest competence can be found. Not-for-profit research laboratories, universities and colleges, manufacturers and industrial research facilities would continue to be utilized under an expanded research and development program.

5 - Participation by colleges and universities in the electric utility industry research program could be broadened beyond the consulting activities of the faculty. Universities could be asked to undertake fundamental and long-range research. There is a feeling among university people that the desirable interaction with electric utility companies has been too restricted. Too few of the best students have been attracted to utility companies; little advantage has been taken of the available expertise on campuses which would permit attention to pro-

blems in which environmental concerns, individual and societal values, and patterns of individual and group behavior play an equal role with economics and engineering in a framework of law.

As the COPPS Report emphasizes, a systems viewpoint is essential in considering the problems faced by the electric utility industry. A sequential solution of each problem will not necessarily lead to an optimal answer. It is possible for a university to produce a multi-faceted attack on a problem which will broaden the education of a student without sacrificing his disciplinary competence and make the research results far more meaningful. The credibility of university findings and recommendations is considered greater than similar findings from industry sources.

6 - The Electric Research Council's R&D Goals Task Force report treats environmental research in several areas: (1) air quality, (2) water quality, (3) nuclear, and (4) general environment - all in Chapter 4, (5) development of more efficient power generating sources, (6) coal gasification, and (7) development of cryogenic cable technology. Funding for the first four categories is estimated to total about $100 million per year for the forseeable future. The successful implementation of this large and rapidly expanding effort will pose a real challenge.

Siting of new power plants will be the challenge of the future. New generation methods such as fuel cells, gas turbine combined cycle and MHD are likely to be more acceptable to the

large city because of a lessened environmental impact. R&D's role should be to bring these new sources to a state of commercial feasibility as soon as possible. It is hoped that coal gasification will arrive on the commercial scene by the end of the decade.

Underground transmission research is of importance to utilities serving large cities. Ways to increase load carrying capacities of cable systems and up-rating of circuit breakers are under study at the present time. Off-shore siting holds promise of attractive environmental and economic advantages, but will likely require substantial R&D effort.

Editor's note: During the final Forum session, Dr. Ackermann discussed a recent study on waste heat transfer from large sources into the environment* that exemplifies how research programs are formulated. This study is consistent with the COPPS recommendations and it identifies more specifically the needed research regarding thermal discharges. More environmental data should be acquired for the various regions, and better models should be made to refine physical and biological impact calculations especially for

*Copies of the conference report may be secured from Dr. William C. Ackermann, Illinois State Water Survey, P. O. Box 232, Urbana, Illinois 61801

atmospheric effects. There should be mechanisms for technical information exchange, and research coordination and funding. System approaches should be utilized for plant location, sizing, and design. Multi-disciplinary research is needed for evaluation of alternative technological combinations and for public education. The report of the study is a useful guide for planning and coordinating research in this field.

ENLARGED RESEARCH AND DEVELOPMENT PROGRAM

Workshop B: Research and Development/
Program and Organization

Summary and Analysis by Mr. Peter Lewis

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Dr. Herbert H. Woodson
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The Workshop on R&D followed the previous day's panel discussion which was devoted to R&D Needs. During that session the R&D goals of the electric utility industry and the proposed program of the Electric Research Council were reviewed.

In his opening remarks for the R&D Workshop, Mr. Huse indicated that the discussion should be directed to how the proposed R&D program can be implemented and specifically to:

1 - planning a responsive R&D program,

2 - establishing an organization,

3 - selecting organizations to perform R&D, and

4 - financing the R&D program.

The Workshop was not to concern itself with a discussion of specific R&D projects or with the need for growth in the electric utility industry since these controversial subjects are more suited to other programs.

A major conclusion of the R&D Workshop is that a great deal of attention is being focused on the use of land and resources for the production of electricity. This attention is not in proportion to the impact of power production on the environment compared with all other environmental impacts. Electricity is only one of several forms in which energy is used and power plants are only one of many types of industrial plants affecting the environment is some way. Regional land use and resource planning and regulation should take into account all potential uses so that the needs of society are met with the least possi-

ble detrimental effect on the environment.

The salient points in the discussion of each of the major topics are summarized below:

1 - Planning a responsive R&D Program

There was essentially universal agreement among the Workshop participants that the public should be encouraged to participate, or provide input, to the planning of the R&D program. The public input should be used to help establish R&D priorities rather than the specific projects to be undertaken. The public should be educated to look at the facts so that the public input is relevant to the problem and not based on emotion. One method suggested to obtain the public input is to establish a "Citizens Advisory Committee" to work with the R&D planning organization.

Utilities are responsible for providing safe, adequate economical and environmentally acceptable electric service and should therefore lead the R&D program activities of the industry.

The availability of manpower to conduct the R&D program must be included in the planning. While some of the short range manpower needs of an expanded program can be obtained by cross training scientists and technicians with experience in other areas of research, the long-range requirements will have to be obtained from the universities.

The R&D objectives of government agencies are not necessarily the same as those of the industry. In general, government agencies have a regulatory function and are not primarily concerned with stimulating research to solve basic problems. As a result, the utilities should direct the R&D program planning for finding solutions to power plant siting problems.

3 - Establishing an R&D Organization

There is a need for a national organization to coordinate R&D related to the production of electrical energy. Several suggestions were made concerning the type of organization to be established. There was a general consensus that the organization should coordinate the R&D program and disseminate information resulting from the program. The Workshop participants were divided on program administration, with some preferring centralized administration and control, while others preferred a regional approach. There was agreement that the program should be conducted at the many laboratories throughout the country, taking advantage of the excellent resources available at university, manufacturer, government and not-for-profit organizations.

One organization proposed would be similar to the National Science Foundation. This organization would have two advisory boards: one to provide a voice for the

public and a second board of technical experts.

The administrative staff of the national coordinating organization should be headed by a capable administrator. While there is a tendency to seek a prominent scientist for this position, the consensus of the Workshop was that only qualified administration will ensure an effective program.

3 - Selecting Organizations to Perform R&D

Participants in the R&D Workshop agreed that there should be diversity in conducting the utility research program. The laboratories selected to perform research should have the best manpower and facilities available. Research should be assigned to laboratories throughout the country for several reasons:

a. Utilities have an interest in developing their regions and industry will tend to move into areas where research is being performed.

b. Money to fund the research will be obtained from all parts of the country, whether it comes from consumer, taxpayers or stockholders and should be distributed in a similar fashion.

c. The manpower needs of the electric industry are supplied by colleges and universities throughout the country and university research should be used to encourage manpower development.

Long-range programs requiring continued support should be directed to well-established laboratories with demonstrated records of quality performance. Short-term programs could be assigned to unproven laboratories, thereby permitting them to establish a record. Short-term programs could also be assigned to the exceptionally bright individuals employed in university research.

The role of research at the universities was a subject of some debate among the academicians. One viewpoint was that we should be realistic about the quantity and quality of R&D that can be done at university laboratories. Part-time faculty members and students are not going to make major contributions to large R&D programs. To bring university research capabilities into the overall program, research institutes, associated with universities and staffed with full-time research scientists, should be established. With this arrangement, the research staff could work full-time on research projects and still draw on the expertise of teaching university professors as part-time consultants.

An opposing viewpoint was that many major innovations have been the result of university research. Significant research projects can be accomplished at universities and more research should be supported at universities to make use of the excellent facilities available.

There was a general consensus that universities could perform basic research while providing training for future technical manpower requirements. Applied research and general development should be performed at special research laboratories such as industry facilities and not-for-profit organizations. Manufacturers should devote their research effort to product improvement and improving manufacturing techniques to help retain competition within industry and insure that U.S. manufacturere remain competitive with manufacturers in other countries. Government laboratories should concentrate on very large, long-term research programs that cannot be accomplished through other means.

4 - Financing the R&D Program

The R&D Workshop participants discussed the two commonly proposed methods for financing the research program of the electric utility industry. These methods are, first a surcharge on electric service based on either energy used (kilowatthour sales) or a percent of gross revenues and second, an R&D tax. It was thought that increased interest in the R&D program would be generated if the funding was provided through several sources. This would also alleviate problems associated with budgetary approval of government appropriations for R&D and regulatory response to utility expenditures for R&D.

The method of financing adopted should adequately consider the level of R&D currently being conducted by many electric utility companies and should not inhibit local and regional research programs in the future.

Editor's note: A subsequent communication received from one of the Forum participants points out that in the consulting engineering and commercial R&D fields there are substantial resources of manpower and organizations with experience and competence related to the needed R&D program. He urges full consideration of these resources before decision to assign major shares of the program to large centralized facilities such as National Laboratories which he considers to be not well suited for successful performance.

PUBLIC INFORMATION

Workshop C

Summary and Analysis by Mr. Edgar Pike

Chairman:

Mr. Julian S. Stein, Jr.
Public Relations Counsel
Washington, D. C.

Rapporteur:

Mr. Edgar N. Pike
Program Officer
Peace Corps
Washington, D. C.

Discussion Leaders:

Mr. David Bird
The New York Times
New York, New York

Mr. Herbert H. Brown
Vice President
The Overview Corporation
Washington, D. C.

Mrs. Bernard H. Flood
President of the
Board of Directors
Project CEVAL
Canaan, Connecticut

Mr. Floyd L. Goss
Chief Electrical Engineer
and Assistant Manager
Los Angeles Department
of Water and Power
Los Angeles, California

Mr. Vernon F. Stricklin
Director, Public Information
Baltimore Gas & Electric Company
Baltimore, Maryland

The Chairman set forth the central issues for discussion by noting that the topic of public information had produced the only minority dessent in the COPPS Report. The Chairman asked the panel to consider present methods of public participation in power plant siting decisions and asked if there were not better and more acceptable ways to involve the public.

The panel was asked to consider new public hearing forums to replace or supplement public service commissions; to consider the pros and cons of the adversary system as a way to bring out the facts and arrive at a decision; to examine the questions of who is the public, and who speaks for them; to discuss the differing attitudes of the public depending on their physical proximity to the power plant site; to discuss the recommendations for public disclosure contained in the Freeman Report; and to discuss so-called "open planning" procedures.

Mr. Goss pointed out that the number-one problem as far as public information was concerned was the public's lack of confidence in our institutions. This confidence must be re-established. The problem goes beyond just utilities. Absolute candor in communication is required. All information impact eventually depends upon the attitude of the press, which is the principal molder of public opinion.

Mr. Goss criticized committees or groups, such as the California Citizens Committee, which investigate power plant siting on an ad hoc, plant-by-plant, instead of multi-plant

basis. He also felt that citizens groups were badly grounded in information and had no body of knowledge to draw upon. As for open planning, Mr. Goss felt that the public really did not want this responsibility, that it was content to let the utilities handle it.

Mrs. Flood discussed Project CEVAL, a citizens group organized to provide factual information for residents of the Berkshire area regarding a proposed Northeast Utilities peak load water impoundment, and to advise regarding its location.

Mrs. Flood strongly believes that any citizens' effort must be based upon a faith in the rational man. The CEVAL Committee was of the blue ribbon type, and was liberally funded through a Boston conservation foundation by Northeast Utilities.

Problems arose from the outset. There was a cleavage between the native New Englanders who were in favor of anything that promised to lower the tax base, and the "outsiders" who had moved to the Berkshires from New York and elsewhere and wanted no damage to the environment.

Project CEVAL attempted to give facts via newsletters, engineering surveys, rumor clinics, etc., but were disappointed to find after one full year that the public was still hazy about the project. The "die-hard" opposition made good use of the fact that CEVAL was subsidized, although indirectly, by the power company.

After two years, the power company has now decided, for altogether different reasons, to lay the project aside for the time being. Mrs. Flood still feels that there was not sufficient hard data and that the hoped-for rational approach deteriorated to a confrontation between the "doomsday" people and the "business-as-usual" people.

In spite of it all, however, her faith in "rational man" is unshaken.

Mr. Stricklin provided a case history of the public information aspects of the Calvert Cliffs siting experience. He explained that the site was purchased in 1966, and the planned construction was announced to the press in 1967. Public opposition did not really surface until 1969. Mr. Stricklin explained that the public had no part in the acquisition decision as the PSC did not have jurisdiction over site selection until 1968. He pointed out that numerous changes in the procedures -- changing the rules in the middle of the game -- made it difficult for the company to know what to do. The PSC, for example, ruled they did not have jurisdiction, but the court reversed this and they had to hold new hearings in 1969. The Calvert Cliffs decision regarding the AEC also changed the public information climate especially when the question of thermal pollution of the Chesapeake Bay and radiation hazards were definitely brought out.

In August of 1969 the Governor appointed a Special Task

Force to investigate the Calvert Cliffs proposal and BG&E decided upon an advertising campaign of six full page ads in the metropolitan press plus radio and TV. Stricklin believes that this ad series was convincing and favorably impressed public opinion. BG&E received its final certificate for Calvert Cliffs in 1971, long after construction had already begun.

Mr. Stricklin believes BG&E followed a proper course throughout the Calvert Cliffs episode. He expressed relief and satisfaction that Maryland now has a power plant siting law which removes site selection responsibility from the utility. Under the law the state must approve all sites and can even acquire sites with funds generated from a kilowatt surcharge. The PSC now must approve construction and the state is further required to make its own independent research findings.

Mr. Brown criticized public information programs for being persuasive rather than informational, applying this to the ACE and FPC as well as private utility companies. He pointed out that information is only a tool, not a problem solver in and of itself.

Mr. Brown feels that the utilities are confronted with the basic problem of having to give lip service to today's new values while still having to do business within a structural and policy framework that has not changed since the 1930's.

Among the premises which still overhang the operations and regulations of utilities are:

1 - The utility company should select the site,

2 - The doctrine of cheap power above all else,

3 - Growth for lowest unit cost - the economies of scale,

4 - That PSC's are the bodies in which all decisions should be made,

5 - Land acquisition is not a public concern, and

6 - Non-productive capital expenditures, such as pollution control devices, unnecessarily increase rates.

Mr. Brown pointed out how difficult it was for the utilities to still try to function within these outmoded criteria. He expressed the hope that with the acceptance of new criteria and guidelines that the objectives of public policy and power policies would once again be compatible, as they had been forty years ago.

Mr. Bird explained that in their treatment of energy and power plant stories -- as in their treatment of all stories -- newspapers were dedicated to change. Stories are judged by "does this move an idea ahead?" The result inevitably is that the media plays up, and thrives on, controversy. This should be recognized as a fact of life.

And there is a <u>real</u> controversy between energy and the environmentalists.

He feels that the question, "Do we really need this power plant?" is not asked often enough or profoundly enough. In that connection Mr. Bird mentioned the SST as an example of an occasion when the public decided to "stop progress."

Mr. Bird wondered if there really was such a thing as objective research and felt that a kilowatt surcharge should be imposed to provide public funds for more objective fact-finding. He too felt the need for new public agencies and forums to help evaluate power plant siting issues. He also underlined the need to break the dialectic log jam, rather than paper over differences "as the COPPS Report did."

In the discussions that followed the most important points that were brought out were these:

1 - Citizen participation will work if institutions are adequate and responsive.

2 - Power interests overall have done a poor job of explaining, partly because planning has been too short-term and not sufficiently comprehensive.

3 - Public needs more time. In the past they have had only 60 days to get information together. They need more time and better access to facts.

4 - The specialized agencies, both state and federal, are still ill-equipped to come to grips with environmental problems and the newly concerned public.

5 - Better land-use policies are needed.

Conclusions and Recommendations

Since public information is an inexact science, the conclusions and recommendations sometimes melt into each other. Hence we have presented them together here. Our effort is to catch the overall mood and direction of our workshop discussion.

The workshop basically agreed on at least these points:

1 - The public lacks confidence in present institutions, especially PSC's.

2 - New ways must be found to channel and accommodate public insistance on participation in site selection and long-range planning.

3 - Persuasive informational approaches must give way to greater forthrightness and candor from all sides.

4 - Information can best be productive when linked to long-range, regional planning.

5 - The public must have access to more facts and the time to assimilate them and prepare its presentations. The Freeman 5-year long-range, 2-year specific location formula was endorsed.

6 - Power plant siting laws, such as the one in Maryland, were endorsed strongly.

7 - Don't expect too much of <u>any</u> information or technique.

8 - The power-environmentalist conflict is not inevitable, once new laws, new procedures and new institutions

bring public policy and industry policy into alignment.

Other points, which were identified as on-going problems were:

1 - There is no single public. The proposed plants' near neighbors, the environmentalists, distant neighbors, power users -- all have differing interests and concerns.

2 - The adversary proceeding and open planning both have their faults and both can be exploited by the participants in the process.

3 - This should be recognized as a transitional period during which new ideas are breaking old ways of thinking and acting. Ferment and conflict is thus inevitable over the short-term. Rules are changing fast.

4 - This is a time for rigorous self-examination by both the utility and the environmentalists. Those charged with information responsibilities must set high standards of truth and candor for themselves.

5 - Experts must be willing to let the public make "mistakes,".

Editor's note: A subsequent communication from an engineer who attended this workshop urges his fellow utility engineers to exhibit constructive concern; there is need to be attentive and responsive when the public raises basic issues, even ones outside of

traditional engineering. He also urges avoidance of what he refers to as "the mandarin complex" i.e. the appearance of knowing better than does the public what it should have and how it shall be served.

ENVIRONMENTAL STANDARD SETTING PROCESS

Workshop D

Summary and Analysis by Mr. James Kerrigan

Chairman:

Dr. Gerard A. Rohlich
C. W. Cook Professor of
Environmental Engineering
University of Texas
Austin, Texas

Rapporteur:

Mr. James E. Kerrigan
Assistant Director
Wisconsin Water Resources Center
Madison, Wisconsin

Discussion Leaders:

Dr. Daniel S. Eppelsheimer
Chairman
Southern Interstate Nuclear Board

Professor of Metallurgical
and Nuclear Engineering
University of Missouri
Rolla, Missouri

Dr. John C. Geyer
Professor
Department of Geography and
Environmental Engineering
The Johns Hopkins University
Baltimore, Maryland

Dr. Lois K. Sharpe
Staff Coordinator
Environmental Program and Projects
League of Women Voters Education Fund
Washington, D. C.

Dr. James H. Wright
Director
Environmental Systems Department
Westinghouse Electric Corporation
Pittsburgh, Pennsylvania

The subject for discussion in Workshop D was the "Environmental Standard Setting Process". In opening the session, the panel members directed brief statements toward a consideration of the methodology and procedures in establishing objectives, evaluating criteria, and formulating standards.

At the outset of the discussion it was pointed out that there is need to distinguish between criteria and standards. Criteria are the scientific bases for the promulgation of standards. The setting of standards is an administrative procedure and, although based ideally on scientific information, should include the additional considerations of economic, social, political, and legal constraints, including externalities, in order to determine the net good to society.

The general acceptance of the concept that the state or nation is charged with a responsibility in the setting of proper regulations and standards for the welfare of the public goes back many centuries and in many cases has evoked controversy.

Three sets of people are involved in decisions on setting standards:

1 - Elected officials;

2 - Government agency personnel; and

3 - Non-governmental organizations, institutions, and individuals. This set includes corporations, industries

and trade groups, professional organizations, and environmental oriented organizations, councils, and coalitions.

Opportunity should be provided for each of the sub-categories of non-governmental groups to express their natural concerns.

Criteria can and should be decided by scientists, engineers, and other specialists chosen to represent necessary inputs, but decisions on objectives and standards are affected by a variety of political considerations.

In discussing recommendations 10, 11, 12, 13, and 14 (page 12), and recommendation 4 (page 18) of Engineering for Resolution of the Energy-Environment Dilemma: A Summary, it was pointed out that to meet the public need monitoring records must be open for examination by any interested person, that there will be great value in a national data bank, and that citizen organizations will need to learn how to ask the data bank the proper questions. It is imperative that opportunity be provided in the methodology for setting standards so that views of all affected parties can be expressed and receive attention.

In setting standards, regional and subregional differences must be taken into consideration because of the variation that exists in carrying capacity of the land, water, and air resources of the specific sites. To adequately evaluate the

environmental impacts of alternatives, it will be necessary to evaluate and balance the gains and losses to satisfy the requirements of local situations. Balancing values requires that amenities not readily quantified are considered along with measured benefits and costs in the evaluation process. The principal scale, which should regulate the establishment of standards, is a measure of value to the quality of life and not funds. As an example, it may be acceptable to select an alternative which permits the occasional killing of fish but not a fishery.

With the potential conflicts that can arise between energy and environmental resources, specifically concerning the question of power plant siting, it is necessary to urge federal support for research on our nation's future. Numerous changes are being made in our environment, some of which are irreversible, and a greater effort must be placed on developing reliable scientific predictions of the full impact of these changes.

More effective information dissemination procedures are required to provide the general public, concerned citizens, and decision makers a clearer understanding of the demand on environmental quality and energy resources. In addition, there is a need to provide non-legal forums or hearings where interested parties can express their views and contribute to the establishment of objectives.

Emphasis was placed on defining the establishment of goals and standards as a dynamic process that requires continuous updating as experience and knowledge provide clearer insights to the problems and their solutions. Nevertheless, interim objectives must be established with rigorous controls to permit decisions to be made on the construction and operation of energy systems including appropriate waste control facilities. To effect the standard setting process more precisely, it will be necessary to provide an adequate monitoring network that can quantify the steady-state conditions of a potential site both before and after the construction of the facility. The application of computerized mathematical models can be used to assist in predicting the water quality changes that may result from site development. Joint state boards have been formed in three regions of the nation to encourage interstate cooperation in the application of nuclear science by consolidating skills and expertise among member states. These boards inform, identify, and examine alternative uses of nuclear energy to serve the needs of the people and to maintain and enhance the amenities and aesthetics of life.

APPLICATION IN ENGINEERING PRACTICE*

Workshop E

Chairman:

Mr. William W. Stelle
Executive Committee
American Society of Civil Engineers
Power Division

Structural Engineer
American Electric Power Service Corp.
New York, New York

Rapporteur:

Mr. Paul Davis
Project Manager
EBASCO Services, Inc.
New York, New York

Discussion Leaders:

Mr. Richard N. Bergstrom
Partner
Sargent and Lundy
Chicago, Illinois

Mr. Jack E. Gilleland
Assistant to the Manager of Power
Tennessee Valley Authority
Chattanooga, Tennessee

Mr. Robert J. McAllister
Structural Engineer
Duquesne Light Company
Pittsburgh, Pennsylvania

Mr. William D. Patterson
Chief Consulting Environmental Engineer
EBASCO Services, Inc.
New York, New York

*Summary prepared by staff from Rapporteur's verbatim record.

J. E. Gilleland opened the workshop with a concise statement of the systems approach to long-range utility planning in connection with the need to provide for load growth which utilities are obligated to meet. (The policy issues of regulating growth are outside the authority of utilities.) Forecasts of future loads are converted to schedules of increased generation capacity requirements, and then into decisions on type of generation and location of facilities, including consideration of system efficiency and environmental impacts.

The planning process now extends over an eight to nine year period for a nuclear plant, about three times longer than a decade ago. This involves correspondingly longer forward projections of loads with equivalent uncertainties and contingency allowances.

After those planning stages, requisite approval procedures may greatly increase the lead time prior to operation and they may also increase uncertainties. While recognizing the right of the public to be concerned, its involvement should be at a sufficiently early stage so that appropriate accommodation can be made efficiently. This generally will result in compromises. However, attempting such compromises as much as ten years in advance of construction -- which is equivalent to fifteen years before commercial operation -- may result in freezing technology at less than best available. Similarly, changing requirements after plans have been approved can result in cost increases far

greater than potential benefits. For these reasons, it is not clear at what stage public involvement can be provided. Utilities can be expected to do the planning job well staying within approved procedures or environmental requirements.

Richard Bergstrom then outlined power plant engineering and how its scheduling relates to site selection and approval procedures. Preliminary design preceeds by one year the detailed design which must start six to eight months before field construction. All this is preceded by about six years work on which decisions are based regarding plant size and scope. The manpower commitment grows during this period from a few initial people to a peak of fifty to seventy five -- a total of two to four hundred thousand man hours of design time plus a substantial design commitment by a number of equipment manufacturers. The sequencing of these design stages was illustrated by a series of flow diagrams.

Established efficient design procedures are not well suited to regulatory procedures and public participation because of the large commitments that are made prior to regulatory and public involvement. However, no full disclosure is possible until design has resolved many of the decision problems regarding the plant characteristics which may be the basis for concern about probable environmental impacts. As a consequence, lead time prior to start of construction may be lengthened by two to three years.

A preferrable alternative is to provide for early approval of the site with review of generalized plant design criteria, the utility then being required to construct so as to conform with the approved criteria. Public interest, including protection of the environment, would be served better by thus separating the approval of the site from approval of the plant.

William Patterson, the third speaker, discussed new developments in site selection procedures subsequent to the system planning decisions on needed capacity additions. While the utility must continue to be responsible for conducting site selection, more factors must be taken into account. It is essentially a two-phase activity -- reconnaissance to locate potentially feasible sites, and then detailed study of them as a basis for evaluation and sequence of development. The first phase, in the office and the field, on the ground and airborne, spans factors that include natural features and culture, proximity to population centers, transportation facilities such as airports, seismic history and faults, and regional ecology. Because this phase only develops an inventory of potential sites, it does not provide for public involvement.

The second phase studies potential sites in greater breadth and depth so as to produce information on meteorology and air quality, hydrology, floods, water supply, aquatic and terrestrial ecology, and noise. Finally, public acceptance of the various sites is assessed and ranked. In this phase, site disclosure and

public participation are desirable and essential.

Nowadays, the siting teams involve a broad range of diverse scientific and engineering competence. This contrasts with former practice and it has developed through a difficult transition -- often made more difficult because the new disciplines may have been encountered first only in adversary proceedings which aggravated the inherent differences between engineering and the environmental and ecological sciences. However, the broad involvement of varied disciplines promises to be a principal key to resolving problems and conflicts.

Robert J. McAllister spoke on research and development in relation to engineering practice, distinguishing between software and hardware.

Software refers to overall land use considerations, criteria for site analysis and approval procedures. In these matters, existing technical information is fragmentary and, even worse, it is not organized in a manner that permits application to site selection and plant design. More attention is needed to procedures that assure effective public participation without self-defeating redundancy and delay.

Hardware refers to the equipment and processes to meet environmental quality requirements. These need so much R&D attention that priorities and coordination must be established -- possibly by the National Academy of Engineering. Technology of other industries such as the steel industry should be examined for possible adaptation. An important criterion for

priority might be the degree of impact on humans. A data bank and technical information exchange should be organized to avoid duplication.

General discussion explored the adequacy of existing environmental information and who is doing what in this field, with emphasis on the need for improved information exchange, including through engineering seminars. There were comments on criteria for planning especially in relation to nationwide considerations, and also regarding the status of modelling environmental processes, and about what the National Water Commission may recommend regarding water allocations for thermal power plants.

William W. Stelle summarized the workshop discussion as confirming the willingness and ability of engineers to design plants to meet public desires provided that the criteria requirements are furnished. At present, this is done inadequately for design purposes.

COMMENT

Although the Forum was not requested to express a position on any issue, and participants evidenced important differences as to objectives and strategies, there appeared to be consensus generally endorsing COPPS recommendations relative to:

- use of system approaches to meeting power requirements,
- consolidated certification procedures,
- effective provision for public information,
- responsible consideration of all interests, and
- enlarged coordinated research and development effort.

This consensus lends confidence to proceeding toward implementation of those recommendations.

One participant criticized the COPPS Report on the grounds that it reinforced the impression that energy and environment were incompatible; implied that research could solve all siting problems; over emphasized the importance of exotic new generating technology; overstated the ability of existing technology to reduce environmental disbenefits; understated the advantages of nuclear generation; and overemphasized the importance of new legislation to the solution of siting problems. This view did not seem to be persuasive with most Forum participants. Although this adverse comment pointed up certain needs for further study, it did not undercut the general conviction that action should be initiated generally along the lines of the COPPS recommendations.

The workshop chairmen reported that by and large in their sessions they found the COPPS Report sufficiently comprehensive and definitive to be the basis for considering action strategies.

However, underscoring the COPPS statement that its Report does not present complete and final solutions, Forum II made evident the need for further attention to certain aspects of the issues. A critical lack is definition of the mechanisms to implement major recommendations such as consolidation of procedures for approval of utility plans, and coordination of enlarged research and development efforts. While its Report describes essential performance characteristics of the needed mechanisms, the COPPS project did not extend to designing organizations and procedures. This remains a major task.

With regard to consolidated certification procedures, prerequisite to legislative action is clarification of questions such as the respective roles of the federal and state governments especially with respect to power systems and ecological conditions that are multi-state in extent. There are also a host of procedural questions related to assurance of due process and of the "full, fair" hearing. Of technical concern are questions regarding the content and character of planning -- how to define its areal extent and how to provide for compatibility with land use, regional and urban planning -- and in what depth environmental and ecological studies must be made. Some uncertainty was noted about the respective functions of long-range planning

and environmental standard setting. They interface and, obviously, they should be compatible, but each has a different role which should be clarified and kept distinct. A basic question raised is whether the site certification process should be limited to only direct issues regarding the proposed site, or whether the consideration might also encompass broader issues of environmental and societal impacts.

Comparably difficult questions must be resolved with respect to R&D coordination. These include the manner of assuring adequate funding, effective technical information exchange, and like administrative concerns. There also are equally difficult questions about how to plan and guide the substantive content of the R&D program, how to assure its technical quality, and how to decide which subjects are to receive funding support and at what levels.

COPPS and other studies and the Forum discussions confirm the existence of substantial competence and experience relevant to both the legal and the technical questions, but also that those resources have not yet been brought to bear fully and effectively. Forum II seemed to imply that answers to those questions could be provided sufficiently well for immediate needs. However, there will have to be concerted attention and effort to marshall the existing competence to provide answers in time to meet present urgencies.

A workshop on applications in engineering practice demon-

strated that even though site selection and plant design functions are so complex that they must be closely scheduled over a six or eight year period, they can encompass environmental protection considerations. In fact, site selection teams now cover a wide range of environmental sciences along with engineering, and plant designs can meet environmental protection criteria that have benefits which justify their cost. However, frequently such criteria are not supplied to designers in usable terms. For example, the goal of protecting a fishery must be translated into terms such as the constraints on in-stream temperature, turbidity, or salt concentrations. Such coupling of ecology with design engineering is not yet well worked out, and a good deal more progress must be made in it.

It was evident in Forum discussions that, in addition to the immediate tasks, there also is need for attention to some underlying issues. Some of these are in the realm of public policy and they may be the subject of lengthy public debate -- among these are whether limits should be set on industrial and population growth, and whether emerging public valuation of environmental quality will be reflected in changing lifestyle to a degree that will affect electric power loads. Other issues that arose are primarily concerned with far-reaching technological innovations -- how to exploit their potentialities, and how to avoid foreclosing possible technological

options. Among these questions are whether enough is being done to appraise the prospects and the possible benefits of basic changes in energy conversion, transmission, and utilization systems, or in location of energy-intensive industries. Less drastic innovations referred to modification of taxes and other economic incentives, and reorganization of existing systems to attain increased efficiency.

Two areas of great concern recurred frequently through Forum II: (a) environmental standards, and (b) public involvement. Provision for protection of the environment is acknowledged to be a proper responsibility in planning and design of electric power facilities but there are challenges to existing environmental standards as being unsuitable, and questions are raised as to whether the costs of compliance properly reflect public valuation of the benefits. A good deal of discussion was related to what environmental standards should be and how they should be applied. Rigorous standards induce technological advances but, unless based on valid technical and economic justification, they impose unnecessary costs contrary to the public interest. Nationwide standards avoid possible economic discrimination against an area that strives for high quality environment, but they are insensitive to the differing values of the various regions. The report of the workshop on environmental standards suggests that uniform nationwide criteria

might set goals and minimum quality levels, while regional standards could reflect the environmental and economic values of the people affected. It was generally considered that there should be progressive evolution of standards with increased knowledge of environmental processes and with improvement of technology, but little agreement was evident on what quality levels should now be selected or at what rate quality levels should be raised. Related to this was recognition of the frequent disparity between needed environmental protection based on technical studies versus public perception -- public resistance to nuclear generation because of uninformed fear of radiation hazard might be one example of this. The workshop on the environmental standard setting process brought these issues into focus and it emphasized the COPPS recommendation for in-depth examination of that process.

Effective public involvement is accepted as an essential element in viable decision-making on plant siting and other energy-related matters. Forum discussions, especially the workshop on public information, sharpened attention to this subject. Noteworthy was the optimism about reestablishment of the former well-founded public trust in electric utilities as being truly associated with public objectives. But this is dependent on a high level of candor about matters that formerly were of little interest -- e.g. potential side-effects on environment, including land use and long range planning.

The workshop report makes clear that valid public information can temper the damaging energy-environment conflicts, but it is not a simple routine or a poultice panacea. Time and effort must be committed to making information meaningfully responsive to public concerns, including presentations that are comprehensable to laymen. This points to the need for involving people expert in communicating with the public on complex technical matters.

Forum II implies strongly, as does the entire COPPS experience, that resolution of energy-environment issues is a complex process that will have to extend through a lengthy period. As pointed out in Dr. Lewis' introductory remarks, the process will advance in stages related to availability of major technological innovations. This suggests the need, expecially during the transition period, to monitor both the progress being made and also the emergence of unforeseen new problems including interactions of energy sub-systems and sub-systems of other social functions.

APPENDIX A - FORUM II ATTENDANCE

March 7-8, 1972

Forum II Participants - by Affiliation

Academic		33
Government		71
Federal	47	
State and Local	22	
Foreign	2	
Non-academic technical		65
Environmental orgs.		8
Utilities		47
Industry		40
Press		24
TOTAL		288

Forum II Participants - by Geographic Region

Northeast	44
Mid-Atlantic	61
Southeast	22
Central	35
West	25
District of Columbia	72
Canada	3
Foreign (England, Sweden)	2
Press	24
TOTAL	288

APPENDIX A - FORUM II ATTENDANCE

March 7-8, 1972

Forum II Attendees

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ELECTRIC LIGHT & POWER

Mr. Fred Jones
PITTSBURGH PRESS

Ms. Sally Lindsay
SATURDAY REVIEW

Mr. Bob Adamson
ELECTRICAL WEEK

Mr. Hal Conner
COPLEY

Mr. Michael Lock
British Embassy

Mr. Norm Davis
N-VIRONMENT

Mr. Ray Shuster
POWER ENGINEERING

Ms. Madeleine Polinger
CHEMICAL & ENGINEERING NEWS

Mr. Benjamin P. Tyree, Jr.
ENVIRONMENT REPORTER

Mr. Dave Howell
ENERGY DIGEST

Mr. Larry Hobart
APPA NUCLEAR POWER NEWSLETTER

Mr. Don Curry
ELECTRICAL COMPANIES "HIghlights"
NEWSLETTER

Mr. Henry T. Simmons
NEWSWEEK

Ms. Fran Palmer
TRENDS PUBLISHING

Mr. John Cross
McGraw-Hill

Mr. Wilson Clark
ENERGY DIGEST

Mr. A. N. Wecksler
Cahners Publishing

Mr. Norman Jacobson
AMERICAN NUCLEAR SOCIETY

APPENDIX B - FORUM II PROGRAM

March 7-8, 1972

Tuesday, March 7, 1972

Plenary Session - Dr. W. Deming Lewis, Chairman

9:30 a.m. - Welcome
Mr. Clarence H. Linder

9:40 a.m. - COPPS Report, Introductory Statement
Dr. W. Deming Lewis

9:50 a.m. - COPPS Report Highlights

Need for Electric Energy Supply
Mr. Abraham Gerber

Environmental Protection
Mr. Roland C. Clement

Systems Approach
Mr. William R. Gould

11:30 a.m. - Open Discussion

12:30 p.m. - Lunch

2:00 p.m. - Panel I: Needed Federal and State Legislation

Mr. Sheldon Oliensis, Chairman
Mr. Charles A. Ehren, Rapporteur

Discussion Leaders
Mr. Paul L. Clifton
Mr. Austin Gavin
Dr. Gordon J. MacDonald
Professor William H. Rodgers, Jr.
Mr. Charles R. Ross

3:45 p.m. - Panel II: Research and Development Needs

Dr. George E. Watkins, Chairman
Mr. Grant Bethers, Rapporteur

Discussion Leaders
Dr. R. A. Bell
Dr. Daniel C. Drucker
Mr. G. O. Wessenauer
Dr. Merrill Whitman

5:15 p.m. - Adjournment

Wednesday, March 8, 1972

9:00 a.m. - Workshop Sessions

Workshop A: Consolidated Certification Process

The Honorable Willis F. Ward, Chairman
Mr. James C. Woodruff, Rapporteur

Discussion Leaders
Mr. Malcolm M. Baldwin
Mr. William B. McGuire
Mr. Paul H. Shore

Workshop B: Research and Development/
Program and Organization

Mr. Raymond A. Huse, Chairman
Mr. Peter A. Lewis, Rapporteur

Discussion Leaders
Dr. Richard E. Balzhiser
Mr. Howard R. Drew
Dr. Ruth Patrick
Dr. Herbert H. Woodson

Workshop C: Public Information

Mr. Julian S. Stein, Jr., Chairman
Mr. Edgar N. Pike, Rapporteur

Discussion Leaders
Mr. David Bird
Mr. Herbert H. Brown
Mrs. Bernard H. Flood
Mr. Floyd L. Goss
Mr. Vernon F. Stricklin

Workshop D: Environmental Standard Setting Process

Dr. Gerard A. Rohlich, Chairman
Mr. James E. Kerrigan, Rapporteur

Discussion Leaders
Dr. Daniel S. Eppelsheimer
Dr. John C. Geyer
Dr. Lois K. Sharpe
Dr. James H. Wright

Workshop E: Application in Engineering Practice

Mr. William W. Stelle, Chairman
Mr. Paul Davis, Rapporteur

Discussion Leaders
Mr. Richard Bergstrom
Mr. Jack E. Gilleland
Mr. Robert J. McAllister
Mr. William D. Patterson

12:00 p.m. - Lunch

1:30 p.m. Plenary Session, Dr. Denis M. Robinson, Chairman

Workshop Reports

The Honorable Willis F. Ward, Chairman
Workshop A: Consolidated Certification Process

Mr. Raymond A. Huse, Chairman
Workshop B: Research and Development/
Program and Organization

Mr. Julian S. Stein, Jr., Chairman
Workshop C: Public Information

Dr. Gerard A. Rohlich, Chairman
Workshop D: Environmental Standard Setting Process

Mr. William W. Stelle, Chairman
Workshop E: Application in Engineering Practice

2:45 p.m. Floor Discussion

4:15 p.m. Concluding Remarks

Dr. Denis M. Robinson
Mr. Clarence H. Linder

4:30 p.m. Adjournment