# Scientific and Technological Research Needs in Alaska

**Joint Meetings between the Alaska Council on Science and Technology and The Polar Research Board**




THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

# PROCEEDINGS OF THE JOINT MEETINGS

# BETWEEN THE

# ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

# AND THE

# POLAR RESEARCH BOARD

# AND INCLUDING

# PUBLIC COMMENTS

# TO ASCERTAIN

# SCIENTIFIC AND TECHNOLOGICAL

# RESEARCH NEEDS

# IN ALASKA

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Detailed Summary of Joint Alaska Council on
Science and Technology/Polar Research Board Meetings
During the Period September 17-21, 1979

## List of Speakers

| | |
|---|---|
| Lincoln Washburn | Chairman, Polar Research Board National Academy of Sciences |
| T. Neil Davis | Chairman, Alaska Council on Science and Technology, Geophysical Institute, University of Alaska |
| Jay Barton | President, University of Alaska |
| Linda Perry Dwight | Supervisor, Information Services, Arctic Environmental Information and Data Center |
| Juan Roederer | Director, Geophysical Institute, University of Alaska |
| Walt Parker | Former Co-chairman, Federal-State Land Use Planning Commission |
| Rosita Worl | Senior Research Analyst, Anthropology, Arctic Environmental Information and Data Center |
| Tom Osterkamp | Geophysical Institute, University of Alaska |
| Steven McLean | Program in Biological Sciences |
| Lou Rouwinski | Director, University of Alaska Museum University of Alaska |
| Frederick Bland | Professor of Human Ecology, Institute of Arctic Biology, University of Alaska |
| Roger Sheridan | Head, Department of Physics, University of Alaska |
| Richard Allison | Geology Department, University of Alaska |
| Robert Speed | Office of the Speaker, Alaska House of Representatives |

| | |
|---|---|
| Julius Rockwell | Private Citizen |
| Glenn Juday | Coordinator, Alaska Ecological Reserves Program, Institute of Northern Forestry |
| Vernon Ferwerda | Professor, Political Science, Renselear Polytechnical Institute; Associate for International Relations, Intersect, Inc. |
| Brian Rogers | Representative, Alaska House of Representatives |
| Tom Smith | Private Citizen |
| Dave Stanard | Private Citizen |
| Gunther Weller | Geophysical Institute, University of Alaska |
| Rocky Rhodes | Private Citizen |
| Carl Benson | Geophysical Institute, University of Alaska |
| Rich Seifert | Research Associate, Institute of Water Resources, University of Alaska |
| Don Hopkins | Private Citizen |
| William Sackinger | Associate Professor of Electrical Engineering, University of Alaska |
| Jane Galblum | Alaska Federation for Community Self-Reliance |
| Dave Norton | Arctic Outer Continental Shelf, Environmental Assessment Program |
| Jerry Smetzer | Executive Director, Fairbanks Town and Village Association for Development, Inc. |

# INTRODUCTION

One theme of the 30th Alaska Science Conference was the need for data on which to base future decisions concerning wise management of Alaska's resources. During the conference, held on September 17-21, 1979, in Fairbanks, joint meetings were conducted by the Alaska Council on Science and Technology (ACST) and the Polar Research Board (PRB) of the National Academy of Sciences. These and earlier meetings, held elsewhere in the state, helped facilitate an exchange of perceptions of science and encouraged discussion of the conduct of research and its applications in the Arctic. Following is a brief description of the informal and formal joint sessions.

## September 18, 1979

An informal joint session was held to plan the more formal meetings scheduled later. There was considerable discussion about the role of the newly created Alaska Council on Science and Technology.

## September 20, 1979

At the more formal joint meeting of the Alaska Council on Science and Technology and the Polar Research Board, members of both bodies presented a series of topics, each followed by a brief discussion period. Additional participants requested time for presenting their concerns.

The Role of the Alaska Council on Science and Technology

The seven-member Alaska Council on Science and Technology was created by legislative mandate in 1978 (Chapter 101, SLA 1978). Its membership represents a diversity of scientific disciplines and organizations which administer and conduct scientific research in Alaska. The council's purpose is "to review and recommend the scientific and technological research needs of state government, to issue research grants and contracts, to oversee the issued grants and contracts, to promote high standards of research for the priorities proposed by the Council and to address stated legislative or administrative requests for research."

Recognizing that the diverse membership composition leads to a diversity of opinions concerning its role, Chairman T. Neil Davis suggested in his opening remarks the following working interpretation of legislative intent and reasons for the ACST's existence:

1) to improve the contribution of Alaska's scientific and technological capabilities to state government, industry and to the public welfare;

2) to articulate the needs of policy making activities to the science and technological community;

3) to improve coordination of scientific activities in Alaska; and

4) to establish a funding mechanism between state government and science.

He further stated that he expects that the council will be developing a process by which it may define its role more clearly. (He pointed out) that the diverse composition of ACST membership is limited to the scientific disciplines represented by seven people. Furthermore,

the council is probably unique in the United States in that its membership is composed of both scientific and government people. It is equally responsible to both legislative and executive branches of state government, and it has statutory authority to enter into research grants and contracts.

Current memberships, affiliations, and scientific disciplines are as follows:

| NAME | AFFILIATION | SCIENTIFIC DISCIPLINE |
|---|---|---|
| T. Neil Davis<br>Chairman | Geophysical Institute<br>University of Alaska | Geophysics |
| Richard Holden<br>Vice-Chairman | Deputy Commissioner,<br>Alaska Department of<br>Transportation and<br>Public Facilities | Architecture,<br>Transportation,<br>and Planning |
| Mim Dixon | Private Consultant | Anthropology |
| David Hickok | Director, Arctic Environmental Information and Data Center | Biology and<br>Science Information<br>Transfer |
| Richard Straty | Auke Bay Biological Lab<br>Department of Commerce/<br>NOAA | Fisheries |
| Robert Burkett | Department of Fish and Game | Fisheries |
| Christopher Noah<br>Executive Director | | |

As a means of expanding ACST expertise, subcommittees or working groups are being considered. An informal seismology working group has already been formed, and one with expertise on the properties of snow, ice, and permafrost is being contemplated.

The council seeks additional involvement by the scientific/academic community and the general public in its meetings, workshops, and hearings. In Alaska the informal approach will probably stimulate maximum interest and participation, but it introduces uncertainty into the equitable allocation of the time available for such involvement.

## The Role of the Polar Research Board

In his opening remarks Chairman A. Lincoln Washburn briefly described the activities of the board and emphasized that the board members present were attending the conference in order to receive the views of the Alaska science community on U.S. arctic science policy and programs.

The Polar Research Board, established in 1958, serves as a national advisory group on research in the polar regions and adheres to the International Council of Scientific Unions' (ICSU) Scientific Committee on Antarctic Research (SCAR) on behalf of the National Academy of Sciences. The board's regional orientation and multi-disciplinary character involve it in a wide range of studies in the physical and life sciences, as well as studies of environmental matters. The board and its committees and panels comprise over 100 distinguished scientists drawn from diverse organizations and disciplines in the U.S. and Canada.

Members of the Polar Research Board of the National Academy of Sciences include the following:

Professor A. Lincoln Washburn, Chairman
Quaternary Research Center
University of Washington

Professor Robert A. Helliwell, Vice Chairman
Radioscience Laboratory
Stanford University

Dr. Wallace S. Broecker
Lamont-Doherty Geology Observatory
Columbia University

Dr. Jerry Brown, Chief
Earth Sciences Branch
Cold Regions Research and Engineering Laboratory

Professor Campbell Craddock
Department of Geology and Geophysics
University of Wisconsin

Dr. Albert P. Crary
Washington, D.C.

Dr. George H. Denton
Department of Geological Science
University of Maine

Mr. Joseph O. Fletcher
Deputy Director
Environmental Research Laboratory/NOAA

Mr. David M. Hickok, Director
Arctic Environmental Information and Data Center
University of Alaska

Dr. Hans O. Jahns
Exxon Production Research Company

Professor Mary Alice McWhinnie
Department of Biological Science
DePaul University

Dr. J. Murray Mitchell, Jr.
NOAA/EDIS

Dr. Clayton A. Paulson
Department of Oceanography
Oregon State University

Dr. Chester M. Pierce, M.D.
Harvard University

Dr. E. Fred Roots
Science Advisor
Department of the Environment
Government of Canada

Professor Gunter E. Weller
Geophysical Institute
University of Alaska

Dr. Laurence M. Gould
Department of Geosciences
University of Alaska

Dr. Charles R. Bentley, Chairman
Committee of Glaciology
University of Wisconsin

Dr. James H. Zumberge, Chairman
Committee on Permafrost
Arizona State University

Louis DeGoes
Executive Secretary

W. Timothy Hushen
Staff Officer

## SECTION I MAJOR ISSUES AND CONCERNS

Emerging from monthly ACST meetings and the joint PRB-ACST meetings were a number of comments which represent common concerns for the status of scientific research in Alaska and elsewhere in the Arctic and sub-Arctic. The following subsections summarize these shared concerns. Individual comments on these concerns follow in another subsection of this report.

### Need for National Policy and Program for Arctic/Subarctic Research

Members of the Alaska scientific community are concerned that there is no national policy for Arctic and sub-Arctic research, nor is there a comprehensive, interdisciplinary, national program for the conduct of Arctic and sub-Arctic research. This lack of national direction and coordination has led to piecemeal attrition of federal support to research facilities, lack of long-range planning, failure to reciprocate in international scientific exchanges, and uneven attention to and support of the various scientific disciplines. In contrast, research efforts in Antarctica benefit from a strong national program for research in that region.

### Need for Coordination of Research

Closely related to this lack of a national policy and program is the need for coordination of research efforts at both the state and local levels. This partly derives from the absence of a national program

and policy for Arctic and sub-Arctic research and partly from an agency-oriented, mission-oriented approach to the funding of research. State and local coordination would enhance cost effectiveness, lessen duplication of effort, and expose research "gaps".

A potential drawback of research coordination could be that it might restrain intellectual freedom and creativity of researchers, and that the process of coordination might create "haves" and "have nots" in the various scientific disciplines.

Need for Scientific Community Interaction with Society

There is a need to involve laymen in research activities and development of policies intended to implement the findings of research. While such people may lack academic credentials, they represent a "body of knowledge" which should be tapped.

Appropriate Technology

Technologies must be developed which are appropriate to the needs of people living in Alaska and to their environment, whether rural or urban. The importation of inappropriate technologies may be destructive to both cultures and ecosystems.

Education of and Communications with People Outside the Scientific Community

Policy makers and the general public will benefit more directly from research findings and become supporters of research if adequate communi-

cation existed between scientists and these groups. Demonstrating the "payoff" of quality research, particularly to legislators and executive departments, is important.

## Basic or Fundamental Research Undervalued

There was some concern expressed that the thrust of legislative intent when creating the ACST was toward applied research, without a corresponding appreciation for and support of basic research. It was pointed out at the joint meeting that studies of interest to Alaska must be problem oriented and, therefore, must have both pure and fundamental components. Another participant stated that the situation is really about what the State needs to know to make certain kinds of policy decisions. Sometimes, he remarked, the "need to know" requires very basic kinds of research, and sometimes can be met through application of existing knowledge. Another commented that it seemed that every time you go into applied problems, you end up half forcing yourself over into the basic questions. Earthquake prediction was cited as an example of the inseparability of basic and applied research. The ability to accurately forecast earthquake occurrence and magnitude is a very practical and current need in Alaska and elsewhere. Devising a reliable and accurate forecasting ability, however, requires basic research into the fundamental processes or basic elements which may account for such natural phenomena.

## Need for Information Systems Support

Currently, several information systems support scientific research in Alaska and make its findings more accessible and useful to policy

makers and the general public. A current research profile (produced by the Arctic Environmental Information and Data Center), an ecological reserves information system, and the University of Alaska Museum provide these information services to help disseminate existing knowledge to those who need it. They also help avoid duplication of research effort. Each of these systems, however, is facing a rapid increase in demand for its services without a corresponding increase in funding.

## SECTION II PRESENTATION SUMMARIES

### A. Lincoln Washburn, Chairman, Polar Research Board, National Academy of Sciences

The Polar Research Board is an arm of the National Academy of Sciences. Its membership is widely representative and includes individuals from government, industry, and academia. Most of the funding for the board comes from the National Science Foundation, the Office of Naval Research and the National Oceanic and Atmospheric Administration. The current base budget is about $256,000. The board operates through a number of standing and ad hoc committees.

The Polar Research Board has undertaken studies which include the evaluation of polar research objectives, plans and priorities. "Priorities," commented Chairman Washburn, "are always a problem." Resolution of differing views is attempted through special ad hoc committees.

Published findings and reports of the Polar Research Board are made available to the National Academy of Sciences. The board's opinions

are conveyed through resolutions and reports to the National Academy for further distribution to interested agencies. This is occasionally useful in supporting a particular point of view. Recent examples include resolutions addressing the need for long-range planning in antarctic research and the need for an ice-capable research vessel to operate in both the Arctic and the Antarctic.

The board represents the United States on the Scientific Committee for Antarctic Research (SCAR). Activities related to mineral exploration and exploitation in the south polar region are of particular concern. Other areas of interest include: priorities for glaciological research during the next 10 to 20 years, the mechanics of floating ice, priorities in permafrost research, biological oceanography, and the role of the earth's four major regions in climate change.

After describing PRB organization and activities, Dr. Washburn offered his appraisal of current problems. The Polar Research Board is involved in an overall effort to develop "a program strategy of polar research," the purpose of which is to update a document titled Polar Research and Survey, published in 1970. This update will yield a series of studies concerning the various aspects of polar research from both "problem-oriented" and "disciplinary" points of view. Comment from the Alaska Council on Science and Technology is anticipated and welcome.

There is no coordinated national policy on polar research. In the Antarctic all research is organized under one entity, the National Science Foundation. No such coordination exists for arctic research because research interests are spread among a host of federal and state agencies, approximately 100 universities, industry and private individuals.

In conclusion, Chairman Washburn stated that the Polar Research Board came to the meeting to listen and to learn and its members appreciate that opportunity. He anticipates that the board will benefit greatly from council suggestions regarding the significance and problems of arctic research.

T. Neil Davis, Chairman, Alaska Council on Science and Technology, Geophysical Institute, University of Alaska

After describing the formation and purposes of the Alaska Council on Science and Technology, Chairman Davis summarized the council's attempts to get in touch with Alaska's scientific community and others with an interest in scientific research in Alaska. Earlier, the council distributed questionnaires to as many of these people as possible. More than 600 were returned from several thousand sent out. They suggest that certain biases exist in Alaska's scientific community, including: 1) emphasis on problems which might be solved by the respondent's area of research; 2) favoring of the existing distribution of researchers; and 3) problems viewed from either a state or national perspective, depending upon the respondent's employment affiliation. The major concern expressed by respondents was retention of environmental

integrity and non interference of the diversity in human life-style, as we manage and develop Alaska's renewable and nonrenewable resources. Other concerns were the need for a basic ecological data base, energy (and alternatives to existing energy sources), human activity and its impacts on ecosystems, self-sufficiency in human food requirements, development of technologies appropriate to northern regions and peoples, transportation, communication, waste products, pollution, and natural hazards.

A more detailed analysis of these questionnaire will appear in a separate report in the near future Chairman Davis concluded.

President Jay Barton, University of Alaska

The University of Alaska is the logical choice for carrying out the "bulk of the effort" on most of the proposed research projects. Its pool of scientific talent and its ability to train additional talent coupled with the credibility that university research has in answering the kinds of questions outlined at this meeting are all capabilities that lead to this choice. Maintenance of all these capabilities requires diligence on the part of the university to follow a "policy of reason in an age of unreason." President Barton pointed out that we are truly in the midst of a kind of counterrevolution in terms of the nation's attitude towards science and towards education. "It is far easier to escape from reason and often far more comfortable." He made a remark about the ancient Greeks that "for over a century the individual in ancient Greece had been face to face with his own intellectual freedom and had turned tail and bolted from the prospect." Credibility,

President Barton concluded, is built on reasonableness, objectivity, excellence, and dedication, and it is toward these four objectives that the University of Alaska must strive.

Linda Perry Dwight, Supervisor, Information Services, Arctic Environmental Information and Data Center

Ms. Dwight presented a brief overview of research in Alaska, the nature of that research, who is funding it, and where it is being conducted. This assessment was based on monitoring by AEIDC over the past six years to assist in dissemination of information and data well before it gets published, to create an awareness of what research is being done and to identify data gaps and help avoid duplication of research. Thanks to the voluntary cooperation of scientific investigators, about 95 percent of all ongoing research in Alaska has been identified by AEIDC. "Research," she said, "is defined as that effort which contributes new knowledge." Access to the AEIDC research profile is by a word processor search of indexes by investigator, subject, geographic region, funding agency, and affiliation.

The trend in Alaska research effort is as follows: in 1976 approximately 1,200 ongoing research project were identified; by 1977 this number increased to 1,540 projects and in 1978 there were 1,730. About 30 percent of them involved the physical environment and about 40 percent involved the biological environment. The remaining 30 percent were concerned with the man-made environment. Fluctuations in research effort by particular groups appear to be closely associated with recent federal executive acts and legislation, particularly the Antiquities

Act. The ratio of federal to state spending for research is about 3:1 during the past three years. Last year the federal government funded more than a thousand projects and the State of Alaska funded close to 300. Other major influences on the emphasis of research are related to oil and gas resources of the outer continental shelf and fisheries resources of the extended 200-mile fisheries limit.

Ms. Dwight remarked that the publication of an annual research profile has become so expensive that AEIDC is investigating alternative ways to make the information available.

Juan Roederer, Director, Geophysical Institute, University of Alaska

Dr. Roederer's stated concern was that research activities in the Arctic and sub-Arctic should be coordinated in a more cost effective way amongst the participating institutions, than the current piecemeal fashion through individual grants and contracts supported by a variety of federal and state agencies. "This would require," he continued, "a comprehensive interdisciplinary national program for arctic and sub-arctic research." The Polar Research Board has already made important progress along these lines and further cooperation on this matter would be useful.

Dr. Roederer views Alaska as a "giant natural laboratory" that offers fantastic opportunities to find out about the earth and its habitats, the bounty it offers and the threats it occasionally poses to mankind. "Geophysics of the Arctic and sub-Arctic has already reached a high level of maturity," he said. "The opportunities for research, parti-

cularly in Alaska during the coming decade, are absolutely unlimited." He believes that the time will come to effect a comprehensive quantitative interdisciplinary description of the state, including the outer continental shelf, to quantitatively describe and find ways to predict the multitude of geophysical hazards and to study Alaska's geothermal, solar, and wind energies and their effectiveness as alternate energy sources in remote population centers. "The time has come," he said, "for a coordinated effort to study the development of Alaska's climate and its influence on the climate of the rest of North America. The time has come to attempt a quantitative understanding of the phenomena occuring in the near-earth space environment."

There is already evidence in many National Academy of Sciences studies of the recognition of the need for coordinated research effort. A recent example is the priority recommendation from a geophysical research board report calling for a coordinated scientific effort to study and understand the energy transfer properties in the high latitude magnetic fields and regions of the magnetosphere.

Alaska is a very expensive place to conduct research. However, Antarctica is ten times more expensive. This suggests that at least some high-latitude research currently conducted in the Antarctic can be accomplished at a much lower cost in the Arctic.

Dr. Roederer proposed that the Polar Research Board, in conjunction with the Alaska Council on Science and Technology, give serious consideration to creating a national program of arctic and subarctic research en-

compassing many different disciplines and, of course, not just confined to research in Alaska, but American science, the American scientific community, and the international scientific community in general.

He also mentioned that the scientific community should begin to identify those research activities which require high latitudes. These can then be examined to determine which can be conducted more cost effectively in the arctic and subarctic regions of North America.

Further, U.S. institutions which participate or are interested in such research must be identified and their capabilities evaluated. We must also determine which research topics can be carried more cost effectively in a cooperative joint mode. Existing cooperative programs of arctic and subarctic research and disciplines, existing policies and programs and their possible ties to the research programs of other polar nations must be examined. Alternative methods of organization of national groups should also be analyzed. Only then can we venture to propose a strategy toward achieving a comprehensive national program of arctic and subarctic research.

The main obstacles to a big national effort in the Arctic and sub-Arctic are the political, military and strategic implications of a greater national commitment to polar research. The major countering forces are the needs of people living in the Arctic and sub-Arctic and the needs of people elsewhere for the resources of these northern regions.

Another meeting participant suggested that rather than approaching the organization of a national program, the Alaska science community should consider how it might organize a model interdisciplinary approach to northern research to spur national initiative.

Roederer believes that many scientists do not want to see the creativity or freedom of the individual greatly regulated. There is great strength in having researchers pursue their own interests without a great bureaucracy or overly bureaucratic system being involved. There is a need for institutions to coordinate research efforts. However, the minute you get past the individual, over-regulation at the national level may occur. Any national program for arctic and subarctic research would have to allow maximum individual flexibility, freedom, and initiative.

Walt Parker, Former Co-chairman, Federal-State Land Use Planning Commission (FSLUPC)

Since the June 30 termination of the Joint Federal-State Land Use Planning Commission, there is no longer a formal federal/state relationship that is authorized by Congress or the state legislature in Alaska. There are, however, some coordinated joint activities based on executive branch initiatives. Such as those between public and land management agencies in Alaska and those agencies concerned with transportation and ecological reserves. During its existence, the Joint Federal-State Land Use Planning Commission identified four major needs in the state--transportation, wildlife management, research coordination and data systems. The problems interact and the commission made recommendations regarding a coordinating mechanism to provide for this.

When a situation becomes highly politicized (he used the issue of caribou and oil pipelines in the Arctic Wildlife Range as an example) there is not a strong national scientific forum to resolve differences between agencies. There is some question about whether or not some of the agencies are really qualified to conduct research. Often too, the commission perceived, "good research" was poorly implemented, giving rise to a lack of overall credibility.

The net result of these problems is that there is no scientific base strong enough to carry research today in the areas where scientific impact should be reasonably firm. In Alaska, we need to proceed rapidly from the results of basic research to applied research, to keep up with development in the state. The Alaska Council on Science and Technology is going to have to grapple with this in the Alaskan setting.

The commission recommended the establishment of an independent institute or organization dealing with all aspects of arctic research. When asked for his personal views regarding the best way to proceed, Mr. Parker responded, "An organizaton which has a regional presence here on the scene in Alaska, which also has a strong presence in Washington, D.C. would be indicated, in order to provide a much higher level of oversight for agency-sponsored programs. This would also begin to provide the level of coordination . . . needed in the international sector now." He listed several illustrations of that need.

Rosita Worl, Senior Research Analyst, Anthropology, Arctic Environmental Information and Data Center

Introducing her subject, Ms. Worl commented, "Scientists engaged in research in Alaska tend to be intensely involved with their own projects and they tend to focus only on that field . . . and they are also very well aware of the research needs." The AEIDC compilation shows that physical and natural investigation dominates the scientific field in Alaska, both in terms of the numbers of the programs and also the funding levels. "Alaska, particularly rural Alaska, is at a threshold of rapid change and development activities which demand that social scientific investigations expand as well," Ms. Worl emphasized.

The scientific community needs to develop an interdisciplinary approach which will enable it to present its findings to policy makers. Where there are conflicting findings, these conflicts would be outlined for the policy maker. Ms. Worl believes that we need to involve citizens in the managerial decisions and scientific investigations because they represent a body of knowledge which scientists should use. "For ethical reasons," she said, "we should be offering then (at the same time) some of our comments."

Perhaps the issues surrounding the bowhead whale best exemplify the developing research needs and orientation that must be pursued. We cannot pretend that we are making decisions based on scientific findings if they are actually being made on political considerations.

Charles Evans, Senior Research Analyst, Biology, Arctic Environmental Information and Data Center

Mr. Evans reviewed the status of scientific knowledge of the whale as an example of the need for coordinated research. Lack of scientific knowledge concerning the beluga, or white, whale has been attributed to the fact that the beluga whale has not been the subject of any intensive commercial harvest. The regulation of bowhead whale harvests is based on a general concern for all species of whales, rather than specific scientific knowledge about the bowhead. There are very capable people studying the bowhead, but their efforts are disorganized. "We not only have a scientific problem," he noted, "but also a people problem." The scientific problem is that research is oriented to the mission of the funding agency (e.g., regulation of harvest, preservation of habitat). The people problem concerns such diverse groups as those who depend on the whale for a large part of their livelihood and citizen groups throughout the world involved in "saving whales." This is an example of the need for a very strong coordination of research on the resource.

Regarding citizen involvement in scientific investigations, Mr. Evans said that we need to develop techniques (or the technology) to bring together in a research program, in field activity "people who are involved in, who are the recipients . . . of that research and the people who are performing it." He asserted that right now, "we have no communication at all. Credibility is . . . zero." Bringing in nonscientific personnel could lead to some compromises that may not be acceptable to the research scientists. Until the population is ready to

accept the findings of research, those findings will probably not be implemented.

The identification of "citizen experts," Mr. Evans said in response to a question, may benefit from the development of "subsistence resource groups" at the local level. An example cited was the recent planning of a research strategy for walrus with a subsistence committee in Nome. Also, in educational matters, local people are certified by the State of Alaska as being in a "recognized expert category."

Mr. Evans was asked to comment on the appropriate focus of a coordination of interdisciplinary review. He responded that it has to have a strong local presence and have an international concept. "We see the northern people organizing themselves at an international level . . . and they are addressing the same scientific questions that we are raising here."

Tom Osterkamp, Geophysical Institute, University of Alaska

Dr. Osterkamp stated that his remarks paralleled what had already been said, except for the punch line. "It is clear," he said, "that it would be desirable for the Polar Research Board to have some local input on the research needs and priorities that they are considering." He emphasized that "it is absolutely necessary that the Alaska Council on Science and Technology have such input, "especially in the physical sciences."

Dr. Osterkamp stated that "the council is serving a dual role analogous to the Polar Research Board and the National Science Foundation. We would like to see something created on the local level that would be similar to the permafrost panel and the panel on glaciology to provide some sort of input from the local level." He urged that a committee in the areas of snow, ice, and permafrost be created.

When asked if this might be a duplication of efforts at the national level, Dr. Osterkamp said that it would not be because the Polar Research Board addresses national problems and is funded with federal monies. There are a number of problems associated with life and living in Alaska which are very local in nature. Many have sought funding to address some of these problems, but they are usually told that because they are local problems, the State should fund the research. The federal government is more concerned with national research needs, especially those associated with resource extraction.

Dr. Osterkamp stated that the people who have lived here for a relatively long period of time have a very profound feeling for many of the problems that exist. It is because of this intimacy with Alaska and its problems that the role of this proposed committee would also be to provide some input and some liaison with national organizations such as the Polar Research Board. The proposed committee would be responsible to the Alaska Council on Science and Technology.

Steven McLean, Program in Biological Sciences, University of Alaska

Dr. McLean reported on the bilateral scientific exchange between the United States and the U.S.S.R. Two main areas of activity that influence Alaska are environmental monitoring in conservation of northern ecosystems and the study of the biological structure and function of northern ecosystems. Because the Soviets have such vast areas of northern forests and tundra in their country, they are ahead of this country in their interests in developing and exploring for human use in these northern regions.

The Soviet model is not necessarily the best one, but we can profit from their experience. The bilateral exchange program is based on reciprocal exchanges, and its first phase, begun about five years ago, was one of exchange of information, including the structure and conduct of northern science and how research results are published. Only through direct contact among scientists of both countries has it been possible to make use of their results.

The second phase of the bilateral exchange involves sending Alaskan and other arctic scientists from North America to Soviet research sites. One recent exchange visit to a biological research station associated with a major new hydroelectric project, similar to the proposed Susitna Dam Project in Alaska, reminded Dr. McLean of the similarities and the head start that the Soviets have in investigating and setting up the framework for investigation of the impact of a large project on natural northern ecosystems.

The third phase of the bilateral exchange and according to Dr. McLean, perhaps the most important, is American scientists doing research in the Soviet northland and learning a great deal about the interpretation of Alaska's systems from this comparable observation. In addition, areas of the Soviet north, previously closed, are rapidly becoming open to American scientists.

The main difficulty in the bilateral scientific exchange is that the United States needs to reciprocate the Soviets' very generous support. Dr. McLean concluded that we need to fund support specifically for reciprocal visits that are not tied to a particular research activity.

Lou Rouwinski, Director, University of Alaska Museum

The University of Alaska Museum has a support role for research efforts in Alaska. This role is primarily unrecognized and yet continues to grow. The museum, in addition to its well-known functions of public education, is the sole repository for systemic collections in Alaska, including an archaeology collection ranked as "one of the most important collections of northern cultures in the world." The museum archives are used daily by university researchers and students, private consultants, employees of state and federal agencies and others.

These and other museum functions that support research are labor intensive, requiring skills and the knowledge of trained professionals. Increasing the level of museum services to researchers can only be

achieved by developing more information systems and computerizing information already in existence.

There has been a rapid increase in the demand for museum services, frequently related to federal and state legislation. Funding for museum services, however, has not kept pace with this new demand, primarily because the research budgets do not include money for them.

"Many of the recommendations which the Alaska Council on Science and Technology is likely to make," Mr. Rouwinski said, "will involve research which is dependent upon . . . adequate support services" by the University of Alaska Museum. He urged that the council consider the needs for adequate support to meet the demands of research activities in Alaska.

Frederick Bland, Professor of Human Ecology, Institute of Arctic Biology, University of Alaska

"Inadequate attention has been paid to the research areas of human biology and the medical sciences in Alaska," Professor Bland stated after listing two Alaska-based research facilities closed in 1967 and 1973. "There should be some sort of programmatic support for these disciplines in Alaska." Support equivalent to 1/50th of the National Science Foundation's Antarctic budget would be very useful in establishing ongoing research. There are many areas, including human health and human biology in the Arctic, that have not been researched.

Dr. Bligh (Director of the Division of Life Sciences, University of Alaska) expanded on Professor Bland's comments by stating that man is going to be in arctic areas in increasing numbers. We therefore have

only "a limited time in which to understand the ecosystem . . . a new ecosystem, a shifting one, with man being superimposed upon it, in which he can do terrible things to the ecosystem if he doesn't know precisely what he is doing." Dr. Bligh asserted that we must gather a vast amount of knowledge about precisely what man is doing to himself and the environment. There is no question the State of Alaska would be able to finance all the research we need to know about man in the Arctic. It is absolutely imperative that we are part of the circumpolar organization concerned with human health and human activities. We desperately need federal as well as state support."

Roger Sheridan, Head, Center of Physics, Head, Department of Physics, University of Alaska

Dr. Sheridan urged recognition of fundamental basic research, a study of the fundamental scientific laws themselves and an investigation of the nature of these laws. He emphasized that this kind of research is going on in Alaska, but for Alaska science to have a firm foundation and international stature, it must have a firm foundation in basic research.

He recommended that the council seek some kind of membership or input from that particular area in science and that future Alaska Science Conferences devote at least one session to this area. "Heretofore," he continued, "the subject matters selected for science conferences generally addressed the application of fundamental laws, rather than the laws themselves." In response, a representative of the American Association for the Advancement of Science (AAAS) stated that the conferences tend to be hosted by organizations working in particular areas of science and that the AAAS would "think about that a little more."

Richard Allison, Geology Department, University of Alaska

Other nations, including the U.S.S.R. and Japan, are making major research efforts to better understand widely separated areas of time in the earth's history. The Russians have made an enormous effort to bring international standards of correlation into their sections of study.

"Alaska has not been studied in this regard," Allison said. "Only closed file private company reports exist. From an external or international viewpoint, this type of public research in Alaska is dismal and small. Our science is not funded in the same way as other nations, which accounts for Alaska's position."

Robert Speed, Office of the Speaker, Alaska House of Representatives

Representing a joint house/senate committee, Mr. Speed explained that the committee's task is to develop state policy for rapid development of renewable resources and the renewable energy base in Alaska. The committee should encourage development of the renewable energy base for in-state use and find appropriate means of financing both research and development on new technologies and energy projects in Alaska. "It is going to become more important than ever that we have an educated population to deal with scientific knowledge and to make that knowledge useful," he said. "Scientific terminology is becoming more and more important to the legislative process."

Mr. Speed believes that it is very important that a great deal of effort in scientific thought and scientific investigation in Alaska be developed and coordinated to tie in with appropriate technology. Alter-

native technologies can be implemented in Alaska relatively easily because of our small population and we have a great deal of money which can be used to help Alaska become more self-sufficient and a better place to live.

Coordination of scientific research at the state and federal levels is needed to apply the information and the data base currently available to the social and economic problems which are developing. Energy, agriculture and housing are three areas where appropriate technologies can benefit Alaska. Mr. Speed encouraged the establishment of a "close back-and-forth relationship with the policy makers because they can't work in a vacuum. They need to know what the scientific community needs in order to establish a policy that will work."

In response to a question about the facilitation of large and small energy projects using grants and loans, Mr. Speed replied that "the National Conference of State Legislatures is urging the U.S. Department of Energy to change their small hydro- and geothermal grants." This change would allow the technical people to work on refining a general renewable energy policy.

Regarding geothermal energy policy, Mr. Speed explained that there are major decisions necessary in terms of how geothermal energy relates to ground water and state policy on mineral rights. The joint legislative committee will be working on the development of a comprehensive geothermal policy to coordinate the State's efforts in that field and to provide funding mechanisms. The Alaska Renewable Resources Corporation

will be a major funding source for smaller project research and development, but not for large projects. These larger projects will require different funding methods such as general obligation or revenue bonds.

Julius Rockwell, Private Citizen

Mr. Rockwell reflected on early research efforts and how funding was managed. The six or eight agencies that funded oceanographic research agreed that they wanted to close the information gap and prevent researchers from unknowingly reinventing the wheel. These informal gatherings were effective in coordinating research efforts between agencies in the early 1960's.

## September 21, 1979

On the concluding day of the 30th Alaska Science Conference, the joint meeting of the Polar Research Board and the Alaska Council on Science and Technology resumed and included another period for public comment.

Glenn Juday, Coordinator, Alaska Ecological Reserves Program, Institute of Northern Forestry

Major adjustments in land tenure and large-scale resource development in Alaska were the principal stimuli for the creation of the ecological reserves program. The purpose of the cooperative federal and state agency effort is to identify important scientific research and educational areas around Alaska, to achieve appropriate management for them,

and to establish an information-sharing network. According to Mr. Juday, the need for this system of ecological reserves is to have field research areas as basic information units to give us information on how ecosystems work in Alaska.

The reserve areas are composed of three types: 1) pristine, undisturbed control areas; 2) previously disturbed areas useful in studying recovery; and 3) experimental manipulative areas. Eighteen of the 222 identified areas in Alaska now have official formal reserve status.

To effectively apply the information gained from these areas, a computerized information management program is being developed. This enables retrieval of information by site number, land status, USGS quadrangle, geologic and physiographic province, and a key word list of 50 topics. "The power of this system comes in our ability to integrate these indices." Juday continued, "The first level of information is concerned with site features, location, size, ownership, special land classification, status, etc. The second information level, currently being developed, includes seven categories such as vegetation, endangered species, previous research use, etc. The third level contains complete documentation reports with data tables, research conclusions, and extensive descriptions of each of the major different physical features of the site. In addition, a site-specific bibliography is being prepared.

Mr. Juday concluded with an appeal that it would be extremely useful to this whole effort if the value of this approach were officially recognezed by the Council on Science and Technology and by the Polar Research Board.

Vernon Ferwerda, Professor, Political Science, Renselear Polytechnical Institute; Associate for International Relations, Intersect, Inc.

Professor Ferwerda described what is essentially a proposal for technology assessment, in its broadest sense, or an assessment of the impact of modern technology on the people of the Arctic, their values and their environment. It is to be jointly undertaken by the Inuit Circumpolar Conference and the United Nations Environment Program in 1980.

Notable in a resolution emerging from an earlier Circumpolar Conference was a request for full Inuit participation in the various decision making processes affecting their region and that the rules for arctic resource development more specifically provide for an Inuit-controlled technology assessment program. A basic question to be addressed in the study is, "Will the arctic people be a twentieth century casualty of modern technology?" It will also look at the impact of modern technology on the fragile arctic ecosystem.

An interesting observation by a Canadian with past United Nations affiliations was that Canadian Eskimos are really part of the "third world," in terms of parallel interests with U.N. delegates from "third world" nations. Professor Ferwerda invited interested Alaskan scientists and others to meet with him concerning the joint study.

Brian Rogers, Representative, Alaska House of Representatives

Representative Rogers congratulated the council on its speedy formation and getting right to work. The roster of scientific and technical expertise being developed by the council is important in making policy makers aware of who the local experts are. He also indicated that it is important to recognize that expertise is not confined to Alaska, nor should we fail to take advantage of outside expertise.

Representative Rogers expressed support for the council's development of a proposal review process which he views as one of the main reasons for the formation of the council. He also encouraged the use of the council's working groups to coordinate research efforts in the state. The legislature and the state as a whole will benefit from those efforts. "Our problem again and again, is that we contract the same study over and over again because no one knows if it's already been done several times. In terms of the need for scientific and technological research and coordination of the research, the council has finished the 'appetizer' and the main meal is yet to come," Rogers said.

He reported that the Northern Technology Small Grants Program, administered by the council, drew a response of about 180 projects (worth $200,000) deemed fundable. Since only $50,000. was appropriated, a supplemental appropriation of $150,000. is being drafted, with the possibility of an additional $50,000. request.

He felt that time is running out. "Unless we do some research and development in several areas, it's going to be too late. We are going to put large amounts of money into outmoded hardware and outmoded technology and create further problems." Alaska is going to get a major research development and deployment effort going, and the Council on Science and Technology has an important role to play in the process." He outlined the following major areas of needed research: 1) applied research in the basic human needs of food, energy, shelter, health, communications, and transportation and the knowledge to meet these needs at a reasonable cost; 2) basic Alaska-oriented research in the north (this should be considered in investing the state budget surplus); and 3) Alaska development (both private developers and government monitoring of the environment).

The State of Alaska will have an enormous amount of money available in the next five years. "The Council on Science and Technology should have an expanded role in helping the state avoid huge mistakes in spending or investing its billions." He expressed the hope that the council will consider whether or not the legislature should make a block sum of money available to the council to administer and fill in the holes in the state's research program. This was followed by a discussion of various methods of managing such a block sum and the means of identifying which research should be funded.

Tom Smith, Private Citizen

Mr. Smith directed his remarks to the realm of the applied sciences as it relates to Alaska's economy, and argued for increased emphasis on

resource inventory in Alaska. Because Alaska is currently dependent on crude oil production (about 90 percent of its revenues) Alaska needs to extend and diversigy its economic base in the near future. More important is the need for a labor intensive economic base. "By way of intelligent preparation for extending our economic base, we greatly need to enhance our data base for certain specific resources in Alaska . . . mainly the nonrenewable resources."

Specifically, he urged the council to consider and endorse an accelerated program of detailed geological mapping by state-funded institutions and agencies. Mr. Smith's major point was that current maps delineating the location of minerals and materials are grossly inadequate and outdated. Discussion followed concerning the availability of detailed geologic mapping and the lands properly mapped by state agencies and priorities for that mapping.

Dave Stanard, Private Citizen

Mr. Stanard introduced himself as representing only himself and his family. He described his background and experience in Alaska, which began in 1953. His concerns were that since World War II many of the people that have migrated to Alaska have brought with them their dependency on an urban-oriented technology. "This is not appropriate to the maintenance of a steady state ecosystem and that this urban technology bias is destructive of the environment."

He stated that the most important aspect of experimentation is the redefinition of individual ways of life and that when there is some kind

of deliberate effort on the part of individual citizens to resolve a more fit way of living with each other and their environment, that should be supported. "The most important thing that is going on is going on at a fully decentralized level and the people are having to investigate what makes long-range sense."

He added that "we imported a set of experiences to Alaska that did not arrive in that developing ecosystem sense, out of the landscape. The history of our moving into areas is that we destroy the indigenous culture."

Gunter Weller, Geophysical Institute, University of Alaska

Dr. Weller believes there are undesirable consequences of not having a plan for the organization and conduct of scientific research in Alaska. Our current approach to problem solving is to assemble competent people to tackle the problems. There is no single institution that can be thrown into the breach. At the conclusion of the research effort, funding ceases and the assembled research team disintegrates. Dr. Weller felt this to be a pretty wasteful process.

To overcome this wasteful approach, Dr. Weller urged the establishment of a plan to keep major institutions involved in polar research alive and relatively well-funded. He suggested that the creation of a U.S. Polar Research Institute might be a solution. He quoted from a position paper prepared by the Norwegian Polar Institute: "In contrast to Antarctica, a reasonably well-organized effort, international scientific cooperation in the Arctic is rather poorly developed and organized."

If the scientific research gap in the Arctic between the U.S. and the U.S.S.R. is not bridged, or at least diminished, Dr. Weller warned that there is a danger of unwanted consequences of future political and legal arrangements within the central Arctic. He suggested a forum on science in Alaska or the Arctic, which might focus on this inadequacy in long-range planning. This forum would be a significant step to get the political approval necessary before detailed scientific planning. In addition, Dr. Weller urged the council to consider the need for suitable logistical support, including a polar research vessel, in the Arctic.

In response to a question about why the seemingly obvious need for coordination of research effort has not occurred, Dr. Weller stated that it is because science in Alaska has been funded by individual agencies and because these agencies are very protective of their own territory and research. He also said that there have been attempts to coordinate research programs, but these efforts have been ineffective because of the lack of fundamental U.S. committment to integrate, coordinate, and conduct scientific investigation in the Arctic. "There would be tremendous savings of research resources by putting all these components together," he said.

A meeting participant pointed out that when this "putting together" occurs, there are going to be the "haves" and the "have nots" and that researchers don't trust anyone to decide who are going to be the "haves and who are going to be the "have nots". There is a fear that dealing with a single institution may mean that only those who are a part of the "establishment" will have the opportunity to do what they want in research.

Rocky Rhodes, Private Citizen

Mr. Rhodes approved of Dr. Weller's presentation concernign the need for a national organization for the overall policy and direction of scientific research which would not isolate the "haves" and the "have nots". The value of this national organization would be in the elimination of duplication, preservation of the continuity of expertise and the ability of the organization to isolate and identify problems that are not being studied. He recommended an efficient cataloging of various unsolved problem areas, to which individual scientists could address their own interests.

Carl Benson, Geophysical Institute, University of Alaska

Dr. Benson addressed his initial comments to the Polar Research Board. His concern was that there will be a dicision by default to reduce the U.S. national research strength in the Arctic. On behalf of the Alaskan Energy Hydrology Committee and other groups, he requested the federal executive level of government, through the Office of Science and Technology, to assess the problem and determine whether national interests are being neglected as a cumulative result of the action of separate agencies. He then cited the record of federal closures of two national laboratories, the planned closure of another laboratory and withdrawals of support for university-based research.

Dr. Benson next urged the Alaska Council on Science and Technology to look seriously at the problem of geologic hazards in Alaska, snow and

ice-related problems and air pollution problems. He suggests that a special effort be made to explain scientific problems, methods and goals, to the Alaska legislature and executive branch and to help develop telecommunications within Alaska.

In response to a comment about the lack of state interest in supporting basic research, Dr. Benson stated that one of the biggest problems with Alaska is that so many people are transient, which is detrimental to long-term development and commitment to the problems of living in Alaska.

Another participant commented on the traditional reliance of the university on the federal government for its major source of funding for research. This source will be drying up in the years to come, due to national concerns and the cutting back on research. He emphasized the extreme change in the state's financial situation, "if you think there ought to be a polar organization, now is the time to propose it. If you think now is the time for a research ship, now is the time to ask. The State of Alaska has to do these things because the rest of the country is not in an arctic area."

Another participant responded that it is up to the Council on Science and Technology to try to get the point across about the value of basic research and that the legislature needs a concrete proposal to react to. "We are on the verge of change right now in Alaska, and we have to react very quickly," he said. Discussion continued concerning the most

appropriate vehicle for funding requests and whether this should be the University of Alaska, or the Alaska Council on Science and Technology, or both.

Another participant expressed the view that the scientific community could go a bit further and educate the public, in addition to educating the legislators concerning Alaska's resources and their importance to the whole country and the international situation. "The legislature doesn't respond to scientists, they respond to the electorate," he said.

Rich Seifert, Research Associate, Institute of Water Resources, University of Alaska

Mr. Seifert recommended to the council that they should consider the importance of research in energy storage. Many energy sources (solar heat, wind, geothermal) are variable in nature, remotely located, or available at times other than when needed. From a physical location viewpoint, the storage and transportation of that energy becomes a very significant part of the development of such resources.

Mr. Seifert raised what he believed to be the most fundamental question facing the Alaska scientific community: "Can we find a way to live in this environment, in this beautiful state, which is sustainable within the framework of our technology and at the same time enhance our environment?" He then listed examples of research needs, including renewable energy resources and the storage of energy.

Don Hopkins, Private Citizen

Mr. Hopkins offered the council three related proposals for systems research and the justification for them. Outlining the decline of American civilization caused by the increasing waste of our human resources, he said that "we must define and test management for the use of more, much more, human brain power." His three proposals involved the state constitution, the state economy, and elementary and high school education. Alternative general plans for a way of life which will allow adequately for the "inherent selfishness" of man should be considered prior to a Constitutional Convention. Alaska needs research leading to the design of a strong self-sufficient state economy and ways to achieve it. Public education needs alternatives such as public support of private schools, according to Mr. Hopkins. In conclusion, Mr. Hopkins stated that he firmly believes that the rapid and extreme dispersal of lawful decision-making powers is the only way to save our civilization from extinction.

William Sackenger, Associate Professor of Electrical Engineering, University of Alaska

Professor Sackenger introduced the subject of the technology of permafrost by commenting briefly on polar research planning. "There is a problem defining national policy with respect to Arctic research. This is normally the responsibility of the federal government, but it has failed to carry out that responsibility. We need a national policy on Arctic research."

Other problems are United States' representation in international Arctic research activities and the lack of continuity of Arctic research. Regarding coordination, the emphasis and direction continually shift in

response to the priorities of mission-oriented agencies. While much of this requires solution at the national level, continuity of research could also be resolved at the state level and is a problem which could be addressed by the council. Professer Sackenger also believes there is a need for more formal organization and a more formal approach to managing Arctic research.

Concerning permafrost technology, Professor Sackenger explained that people living in Alaska are interested in using the land and permafrost is important to man's structures. The problem is identifying where the permafrost is located and then taking measures so that it does not thaw. "We are really looking at a three-dimensional mapping process." This process has to be both site-specific and complete. Remote sensing techniques, such as seismic and electromagnetic techniques, have not yet been exploited in looking for permafrost. Comparing the detailed three-dimensional mapping conducted by oil companies in delineating underground structures with the kind of information on permafrost available, Professor Sackenger cited organizational reasons. The technology is within reach for detailed three-dimensional mapping. "It is not here today and it takes a concerted effort to accomplish it," he said. Discussion of funding requirements followed.

Jane Galblum, Alaska Federation for Community Self-Reliance

Ms. Galblum explained that the purpose of the Alaska Federation for Community Self-Reliance is to promote self-reliance in small-scale

technology, the use of renewable resources and to improve the quality of life for individuals, as well as cut down energy use in the state and the country.

She complimented the council on the Northern Technology Small Grants Program and encouraged the continuation of this effort. She also remarked that under the Department of Energy small grants program for appropriate technology, Alaska has the highest per capita level of proposals of any state in the union. When asked her view of how to improve the small grants program handled by the council, Ms. Galblum stated that it would be good to have a research branch as well as the technology aspect. She also recommended small grant demonstration projects and larger grants to enable application to commercial-size ventures.

Ms. Galblum indicated that her organization was attempting to share its experiences with other people through a statewide newsletter and a resource library.

Dave Norton, Outer Continental Shelf, Environmental Assessment Program

The thrust of Dr. Norton's presentation was that the degree of quality, more than quantity, of the environmental assessment research, can have a tremendous multiplying effect on such things as bonus bids in oil leasing. Good environmental assessment can cause the oil industry to bid a great deal more for lease tracts. The point of this is that monies appropriated for research are going to be for applied research

and that this is a reactive mode of funding that Dr. Norton expects to continue for some time. Examples of the effect of good environmental assessment research on oil lease bidding, may be useful in helping to convince legislators who consider funds as mere outlay, that are devoted to applied research reather than looking at them as an investment.

Jerry Smetzer, Executive Director, Fairbanks Town and Village Association for Development, Inc.

Mr. Smetzer approved the council's philosophy on the purposes of small technology grants and encouraged expansion of the program. He added that emphasis on technology, rather than research, was appropriate, in that research is within the purview of other established institutions where it belongs.

He was concerned about the location of the Alaska branch of the U.S. Geological Survey and urged that first consideration be given to Fairbanks because of the major investments by the state and federal governments and others in science institutions at the university. Any other Alaska location, he said, would be a waste of tax dollars invested in the Fairbanks area, and would detract from the quality of science at the university and the U.S.G.S. far into the future.

## Section III - Comments and Concerns From Other Public Meetings

Beginning with its first formal meeting on December 13, 1978 and at nearly every succeeding monthly meeting, the council has received comments from members of the scientific community, state government, and other interested persons. The following is a synopsis of those comments and concerns.

### December 13, 1978

#### Dr. Jay Moor, Division of Policy Development and Planning, Office of the Governor

Dr. Moor gave a brief description of technology transfer needs and problems in other states and Alaska. There is no coordination or dissemination of remote sensing technology or information in Alaska. Other needs identified were a user survey, an identification of the technology transfer process and evaluation of programs and their technological needs.

#### Peter Keating, Division of Policy Development and Planning, Office of the Governor

Mr. Keating said that data collection and retrieval are not coordinated in Alaska or between the federal and state governments. Because of this he proposed that a code retrieval system be established and legislation implemented to coordinate it.

Bill Luria, Division of Policy Development and Planning, Office of the Governor

Mr. Luria described the Alaska Office of Northern Technology and its functions--to promote alternative technologies in Alaska, to coordinate alternate technologies and to review grants.

John Halterman, Deputy Director, Division of Policy Development and Planning, Office of the Governor

Mr. Halterman explained the budget of the council and that a work plan is needed from the council in submitting its budget to the Budget Review Committee.

February 20, 1979

Tony Begg, University of Alaska

Mr. Begg said that science and technology should be funded to make energy cheaper and more abundant through exploring alternative sources such as tide power, organic and inorganic waste utilization and manufacturing of applicances that can run on compressed air. He also suggested converting wood scraps into food for termites, which would then be fed to ducks for human use.

Clarissa Quinlan, Director, Division of Power and Energy Development, Alaska Department of Commerce and Economic Development

Ms. Quinlan presented a brief overview of her organization's activities, which included energy studies related to solar power, wind power, tidal utilization, small wind and hydroelectric projects and the proposed Susitna hydroelectric project. She expressed concern about the degree

of federal involvement in the Susitna project. She also expressed a desire to work with the council through an arrangement similar to that between her office and the Governor's Office of Northern Technology.

Bill Spear, Commissioner, Alaska Renewable Resources Corporation

Mr. Spear described the activities and plans of the Renewable Resources Corporation. He pointed out many ways in which the council and his organization could interact. He mentioned that the council could give valuable advice to the Renewable Resources Corporation on general priorities for funding and the review of proposals.

Steven Brown, Community College, Southeast Alaska

Mr. Brown expressed the view that there is a need for early direction and guidance in preparing educational programs, especially at the state community college level. He said the problem is not only one of advice, but of communication and information dissemination as well.

May 9-10, 1979

The council heard comments from the following visitors:

Representative Brian Rogers - The Northern Technology Program, its operation and future outlook;

Representative Patrick Carney - Agriculture production in Alaska and the need for coordination of research;

Dr. Vern Stilner - The status of mental health research and administration in the state;

Commissioner Ernst Mueller - Regarding the state science adviser in Alaska;

Dr. Jay Moor - Establishment of a State Technology Applications Coordinator;

William Spear and Jack Milnes - Establishing ties between the council and the Renewable Resources Corporation.

June 11-12, 1979

The council heard presentations from the following persons:

Vera Alexander, Polar Research Board - Discussed the Science Conference and the joint ACST/Polar Research Board meeting;

Christy Miller, State Disaster Office - A comprehensive approach to addressing seismic safety and geologic hazards in Alaska;

Lynne Hale, Arctic Environmental Information and Data Center - Distributed a paper on and discussed the status and problems of reindeer herding in the state;

James Wise, Arctic Environmental Information and Data Center - Explained the state and national intergovernmental climate programs and suggested possible roles for the council in this area;

Larry Underwood, Arctic Environmental Information and Data Center - Participated in the PRB/ACST discussions and provided an introduction to the state's participation in the Experimental Ecological Reserves network;

Glenn Juday, Institute of Northern Forestry - Provided an overview of the state's efforts to identify and establish a program of Experimental Ecological Reserves;

Walt Parker, Federal-State Land Use Planning Commission - Provided a status report of the Federal-State Land Use Planning Commission's end product and presented insights on topics for the council to consider. He offered to repeat his presentation in September for the benefit of the Polar Research Board and absent council members.

Mike Crane, Arctic Environmental Information and Data Center - Discussed his project to compile and use OCS data;

Bob Rogash, Private Citizen - Presented his views on the Northern Technology Grants Program and energy conservation;

Bruce Baker, Division of Policy Development and Planning - Presented a description of the Naval Arctic Research Laboratory (NARL) situation from the Governor's perspective and requested comments from the council on how to address the problem.