SB

2271

ACST Notes 2
Alaska Council on Science and Technology

Announcements, Positions, Updates, Summaries of Findings December 15, 1982

RESEARCH PROJECTS UPDATE

"Research and Development of a Monitoring Program for Management of Near-shore Bottomfish Assemblages"
Completion date: June 30, 1983

The major accomplishments of the first six months of this project include: Preliminary analyses of the 1981 data base, completion of 30 days of field work, and computerization of all field data.

In the statistical analyses the population parameters necessary to generate power curves from the 1981 commercial and experimental survey samples were determined for the major species. The species of interest for this project were: yelloweye rockfish; quillback rockfish; black rockfish; yellowtail rockfish; and dusky rockfish.

It became apparent from analyses of the baseline data that populations of bottomfish are structured by depth, consequently many of the characters used as monitoring indicators will be depth specific. The baseline data for both commercial and survey sampling was analyzed in three depth zones: 10 - 25, 26 - 40, and 41 - 60 fathoms.

Field work commenced in July and ended on August 7, 1982. In the experimental (survey) fishing portion of the project a total of 2,140 fish were caught in 45 separate trials or hauls. The fishing trials were divided between three major study areas--Cape Edgecumbe, Biorka, and Big Branch--and within each area effort was partitioned into the three depth zones mentioned above. The effort in each depth zone was divided into fishing for demersal (bottom-dwelling) and pelagic (schooling) species, as sampling strategy is different for the two groups of species. The study design provides replication of fishing trials in each depth zone, a factor which will allow estimate of catch per-unit-effort (CPUE) for each species of interest with statistical measures of reliability.

Seven commercial catches, with a total of 3,401 bottomfish, were also sampled by field crew. Species identification and individual lengths were obtained on all specimens. Detailed information on catch location, depth, effort, and gear type were obtained for all seven commercial catches.

Diving activities were confined to counting bottomfish at key sites where fixed transects had been established in 1981. A total of 1,031 black rockfish, yellowtail rockfish, and lingcod were tagged and released during the thirty day field effort. None of these specimens have been recaptured to date, nor were any reported by commercial or recreational fishermen. However, dozens of tagged black rockfish were observed underwater off St. Lazaria Island at depths between 50 and 80 feet. No attempt was made to collect these fish. In addition to observing the 1982 tagged fish, a few black rockfish that were marked in summer 1981 were also sighted, indicating that tag retention of at least a year is expected in these waters.

Data preparation and computerization commenced immediately after the field season. This portion of the study was done in Seattle at the University of Washington. All of the cards were read into the University of Alaska computer system where the data was reorganized into the files that will be used in subsequent analyses.

Lewis Haldorson
University of Alaska/Juneau

"Effective Teachers in Rural Alaska"
Completion date: June 30, 1984

The purpose of this study is to identify and escribe the teaching approach of teachers who are effective in rural Alaska. It is expected to produce useful information on the characteristics of rural teachers which can be used in teacher selection and in university programs preparing teachers for village Alaska.

Initial activity to date has been centered on research design issues and identification of a sample of effective rural teachers. Design issues cover the type of setting in which to examine teachers--for example, one type of setting only, such as isolated, multi-grade village schools; or various rural situations, such as the above, plus the mixed native and white classroom in a regional town. Each teaching situation presents its own special problems.

Another design issue requiring attention is the creation/selection of a comparison group for the sample of effective teachers. Several alternative strategies are being examined, such as comparing experienced and inexperienced rural teachers and comparing the sample of effective rural teachers with a sample of effective teachers in an urban white context. In identifying a sample of effective rural teachers to study, through observation, interviews and videotaping, local school board members have been interviewed in a random ten percent sample of rural Alaska schools. In addition nominations have been sought from university faculty involved in training native teachers.

The project is seeking a small group of teachers on which there is a general concensus that these teachers exemplify effective and appropriate approaches in rural Alaska.

This research is still in the initial stages and there are no findings to date.

Judith Kleinfeld
Institute of Social and Economic Research
University of Alaska/Fairbanks

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PUBLICATIONS AVAILABLE. Please check appropriate title, fill in name and address and mail to: Alaska Council on Science and Technology, Pouch CV, Juneau, AK 99811

Technical Briefs
__Waterproofing Earth-sheltered Home
__Window Insulation
__Converting Clothes Dryer to Hot Water Heat Source
__Solar Kiln to Dry Wood
__Greenhouses
__Arctic Home Construction & Insulation Techniques
__Off-Peak Electric Heating System
__Willow Rake - Farm Land Development
__Home Built Wind Energy
__Solar Heating Domestic Hot Water System

General Reports
__Synopses of Grants - Northern Technology Grants Program
__Synopses of Research Activities Funded
__Results of Joint Mtg. Between Polar Research Board & ACST - Scientific & Tech. Research Needs in Alaska
__Federal Involvement in Scientific Research & Development in Alaska

Research Needs
__Communications & Information Transfer
__Transportation
__Rural Primary & Secondary Education
__Living Resources & Habitat Protection
__Seismology
__Energy
__Agriculture & Animal Husbandry
__Minerals
__Health and Human Life
__Natural Hazards

Research Results
__Smoke Detector Testing in Rural Alaska
__Storm Surge Climatology & Forecasting in Alaska

Name:_____

Address:_____

_____

Senator Vic Fischer
Alaska State Legislature
Pouch V • Juneau, Alaska 99811 • (907) 465-4954

May 16, 1983

TO: All Senators

FROM: Senator Vic Fischer

RE: SB 227--Alaska Council on Science and Technology

SB 227 continues the existence of the Alaska Council on Science and Technology but extensively modifies its purpose and functions. The main features of this bill are:

1) repeal of the council's grant making authority (sec 4);

2) repeal of the northern technology small grants program (sec 5);

3) elimination of the laundry list of purposes, powers and duties of the council (streamlining of functions);

4) gives the council a role in development and implementation of federal Arctic Science Policy;

5) moves the council to the Office of the Governor (OMB);

6) removes designated seats on the council and increases size to nine members; and,

7) continues the council through 1987.

I believe this bill meets most of the needs and concerns of the legislature, the governor's office, and the Alaska scientific community. It should assist Senator Murkowski in promoting the Arctic Research and Policy Act. It repeals the grants process which has generated concern among some legislators. It meets the Governor's need for scientific advice within the OMB. It allows for greater private sector involvement on the council.

SB 227 is the result of an extensive sunset hearing held jointly by the Senate and House State Affairs Committees. It has the support of the Governor as well as the council itself. The bill has a zero fiscal note because the council is a reduced continuation item in the Governor's budget (less than 50% of last year's budget).

ALASKA STATE LEGISLATURE
SENATE STATE AFFAIRS COMMITTEE
SENATOR VIC FISCHER, CHAIRMAN
POUCH V, JUNEAU 99811
(907) 465-4954

M E M O R A N D U M

TO: Senator Don Bennett, Co-Chair
Senate Finance Committee

Senator Bob Mulcahy, Member
Senate Finance Committee

FROM: Senator Vic Fischer, Chair
Senate State Affairs

DATE: April 13, 1983

RE: Senate Bill 227

I would appreciate it very much if you would consider waiving SB 227, relating to the Alaska Council on Science and Technology from the finance committee. This bill has a zero fiscal note because the council is a reduced continuation item in the Governor's budget.

The purpose of this bill is to reorganize the council and to eliminate certain grant programs which the council now administers. These changes resulted from an extensive sunset hearing held jointly by the Senate and House State Affairs Committee and has the concurrence of the Governor's office and the Council. As a result, the Governor has requested less than 50% of last year's budget for the Council. Therefore this legislation will result in a substantial net savings to the state treasury.

ALASKA STATE LEGISLATURE
SENATE STATE AFFAIRS COMMITTEE
SENATOR VIC FISCHER, CHAIRMAN
POUCH V, JUNEAU 99811
(907) 465-4954

March 30, 1983

TO: Senate State Affairs
Committee Members

FROM: Senator Vic Fischer,Chair
Senate State Affairs Committee

RE: Draft proposal on the Alaska Council on Science and Technology

Enclosed is a draft proposal on the Alaska Council on Science and Technology for your consideration.

The main features of this draft are:

1) repeal of the council's grant making authority (sec 4);

2) repeal of the northern technology small grants program (sec 5);

3) elimination of the laundry lost of purposes, powers and duties of the council (streamlining of functions);

4) gives the council a role in development and implementation of federal Arctic Science Policy;

5) moves the council to the Office of the Governor (OMB);

6) removes designated seats on the council and increases size to nine members; and

7) continues the council through 1987.

I believe this draft meets most of the needs and concerns of the legislature, the governor's office, and the Alaska Scientific community. It should assist Senator Murkowski in promoting the Arctic Research and Policy Act. It repeals the grants process which has generated concern among legislators. It meets the Governors need for scientific advice within the OMB. It allows for greater private sector involvement on the council.

Representative Abood and I have agreed to present both our committees with proposals for committee sponsorship which meet the above concerns. I would appreciate any comments you may have on this draft as soon as possible.

February 14, 1983

TO: Sen. Vic Fischer, Chairman
Senate State Affairs Committee

FROM: Brian Rogers

RE: Alaska Council on Science and Technology

You requested that I look at the current situation of the Alaska Council on Science and Technology and provide you with a brief memo outlining possible courses of action. During the past few weeks I have discussed the role and future of ACST with Chris Noah (executive director), David Hickok (chairman), and T. Neil Davis (former chairman) of the Council and Pat O'Rourke, Chancellor of the University of Alaska-Fairbanks. I am also aware of discussions between ACST members, the University, and the Governor's Office of Strategic Planning in the Office of Management and Budget.

The ACST was created by the legislature in 1978 to advise the legislature and governor on Alaska science policy. It was attached to the Office of the Governor. Unfortunately Gov. Hammond made little use of the Council's expertise. In 1979, the northern technology small grants program was given to the Council by the legislature. By 1980, the Hammond administration decided by executive order to transfer the Council to the Dept. of Environmental Conservation. The legislature objected, and the Council was moved once again by executive order to the Department of Administration, for administrative purposes only. The FY 1982 capital budget contained $5 million (reduced by line item veto) to fund special research projects by the Council; in FY 83 another $500,000 was appropriated for such projects. The Council established a peer review process for these research projects which has won national acclaim; the legislative auditor has reportedly criticized the Council for funding too many research projects at the University of Alaska (audit report pending at this time). In the FY 84 operating budget, Gov. Sheffield deleted all funding for ACST and, until recently, did not respond to requests for a meeting with Council members. The Alaska scientific community has been concerned about the possible termination of ACST at the same time that legislation is pending in Congress to establish an Arctic Science Policy.

Indications are now that the Sheffield administration did not intend to abolish the Council with the cut in funding. A recent meeting in Juneau between Council members, Governor's staff (Allen Blume and Ben Harding) and Gordon Harrison (head of the Office of Strategic Planning within the Office of Management and Budget) helped alleviate some of the ACST concerns. The governor's people indicated that Governor Sheffield does intend to make use of the Council and is considering a move of the Council to OSP/OMB. Ironically, this would put the Council back where the legislature intended: assisting the Governor and legislature in planning policy. Still up in the air are questions of whether the Council will have its own staff (probably not as an independent office, but perhaps staff designated within OSP); the level of funding, if any, for the research grants program, and the relationship between the Council and the legislature (given the current relations between OMB and the legislature). Also not settled is whether a transfer would be accomplished by executive order or by legislation.

The Council is scheduled for sunset review this year. Given the fact that legislation will be necessary to continue the Council's existence, the State Affairs Committee may wish to explore possible statutory changes with the Governor for inclusion in the continuing legislation. Questions which could be addressed include:

- -placement of ACST in the Office of Strategic Planning, or movement to the University of Alaska
- -increasing the size of the Council (now 7 members; many recommend an expansion to 9 adding two non-state members)
- -establishing a "task force" approach to scientific problems identified by the Council
- -giving statutory authorization and guidance for operation of the research grants program (mini-NSF?)
- -requiring the executive director be a scientist who can him/herself be the governor's science advisor when the entire Council is not available
- -establishing a mechanism for increased use of University research/academic faculty to meet state research needs identified by the Council
- -methods for addressing legislative needs for scientific and technological advice during sessions and through the interim
- -staff needs of the Council
- -the Council's role in development and execution of a national Arctic Science Policy

I would be glad to provide you with analysis of any of these or other questions as needed by the committee.

ALASKA STATE LEGISLATURE
SENATE STATE AFFAIRS COMMITTEE
SENATOR VIC FISCHER, CHAIRMAN
POUCH V, JUNEAU 99811
(907) 465-4954

April 5, 1983
3:00pm

Butrovich Room
Capitol Bldg.

Members Present

Senator Vic Fischer, Chair
Senator Tim Kelly
Senator Arlis Sturgulewski
Senator Pat Rodey

SB 27--Toll free telephone calls

Held over pending House State Affairs Committee action on new proposal.

SB 115--Individual rights of police officers

Senator Rodey (prime sponsor) explained the provisions of the bill. He said that police officers support the bill but that police chiefs oppose it.

Chief Joe Ciraulo, Juneau Police Department (also representings other police chiefs in S.E. Alaska) spoke against the bill. He felt that having a representative of an officer present at each stage of a disciplinary hearing was unnecessary. He also opposed having to get a search warrant to search an officer's locker.

Senator Rodey said that management policies which address some of these problems can change over time. This bill offers uniform rights for all officers.

Senator Sturgulewski asked if this bill would change present policies regarding disciplinary investigations. Chief Ciraulo answered "yes".

Senator Kelly asked if this bill would apply to only local police departments. Senator Rodey responded that the bill would apply to all peace officers in the state.

Senator Fischer stated that this bill requires a written complaint pursuant to a disciplinary action and asked if that is current practice in the Juneau Police Department. Chief Ciraulo said that he thought so.

John Strutko, an Anchorage police officer, spoke in favor of the bill. He felt that it was a good management tool and that officers should not have to give up their civil rights when they put on a badge.

Senator Kelly asked if there was anything in this bill which is not already covered in the negotiated contract with the Anchorage Police Department. Mr. Strutko stated that the provisions prohibiting involuntary polygraph tests were not in the contract.

Richard Ross, Kenai Police Chief, spoke against the bill. He felt it would be a statutory interference with his municipal personnel system. He felt this system works well. He saw some merit to the polygraph provisions.

Senator Fischer asked if police officers have full fifth amendment rights under the present system. Mr. Ross answered "yes". Senator Fischer then asked if officers would lose their jobs for refusing to answer questions relating to a disciplinary investigation. Mr. Ross said "no".

Ed Martin, Kodiak Chief of Police, spoke against the bill. He said that most of the procedures in this bill are now covered in current state and federal statutory and constitutional law as well as most personnel systems.

Holli Ploog, Attorney for the Anchorage Police Officers Association, spoke for the bill. She stated that current laws limiting polygraph tests exempt police officers. She favors the use of a polygraph exam as a hiring tool but opposes its use as an investigatory tool during employment. She said that locker searches without permission were probably unconstitutional. She said that the Fairbanks Police Officers Association also supports this bill as do many officers in other departments.

Brian Porter, Anchorage Police Chief, spoke against the bill. He said that the bill is a special interest of the Anchorage Police Officers Association but is not supported by other police organizations. He felt that it was inappropriate to use a criminal law standard of proof in a personnel disciplinary matter.

Senator Rodey commented that various blue ribbon commissions have recommended approaches similar to this bill.

Rick Potter, an Anchorage police officer, spoke for the bill. He said that thirteen states have similar legislation. He opposes compulsory use of polygraphs.

Louis Bencardino, Seward Chief of Police, spoke against the bill. He said the bill would cause unneeded expenditures in overtime and other costs.

Senator Kelly commented that he is in favor of police rights but that he does not favor putting provisions into state law that are already incorporated into labor contracts.

Jean Krause, President of N.E.A. Alaska, spoke for the bill. N.E.A. believes that all employees should have full due process rights.

It was the consensus of the committee to hold the bill over.

SB 153--Punishment for obstructing a private citizen who assists a peace officer

---

Senator Rodey (prime sponsor) explained the bill.

Senator Kelly moved and asked unanimous consent that the bill pass from committee with individual recommendations. There was no objection.

SB 218--Disclosure of information

Senator Kelly asked that the bill be held over.

SB 227--Alaska Council on Science and Technology

Senator Fischer said that this bill is the product of the extensive hearing the committee held on the sunset of the council and that it addressed all the concerns identified at that hearing.

Senator Rodey moved and asked unanimous consent to pass the bill from committee with individual recommendations. There was no objection.

SJR 13--Urging repeal of the Jones Act

Greg O'Cleary, Maritime Trades, testified against the resolution. He said the Jones Act is a bill of rights for American Seamen. Repeal would affect 2000 workers.

Senator Fischer stated that the Administration has problems with the timing of this measure. There are political problems with related federal issues.

Greg Olsen, FOSS Alaska Lines, said that repeal would only decrease freight rates for a short time and reduce the overall quality of service.

The resolution was held over.

Meeting adjourned at 5:00 pm.

by
David Dye
Committee Aide

Chapter 66. Review of the Activities of Agencies, Boards and Commissions.

Section

10. Termination of state boards and commissions

Sec. 44.66.010. Termination of state boards and commissions. (a) Boards and commissions listed in this subsection expire on the date set out after each:

(1) Alcoholic Beverage Control Board (AS 04.06.010) — June 30, 1983;

(2) Alaska Transportation Commission (AS 42.07.011) — June 30, 1983;

(3) State Board of Parole (AS 33.15.010) — June 30, 1982;

(4) Alaska Public Utilities Commission (AS 42.05.010) — June 30, 1985;

(5) Repealed by § 20 ch 110 SLA 1981.

(6) Alaska Council on Science and Technology (AS 44.21.241) — June 30, 1983;

(7) Alaska Resources Corporation (AS 37.12.010) — June 30, 1992;

(8) Alaska Code Revision Commission (AS 24.20.075) — June 30, 1985;

(9) Rural Development Council (AS 44.47.160 — 44.47.190) — June 30, 1987;

(10) Older Alaskans Commission (AS 44.21.200) — June 30, 1985;

(11) Council on Domestic Violence and Sexual Assault — June 30, 1985.

(b) Upon termination, a commission listed in (a) of this section shall continue in existence until June 30 of the next succeeding year for the purpose of concluding its affairs.

(c) A commission scheduled for termination under AS 44.66.010 — 44.66.060 may be continued or reestablished by the legislature for a period not to exceed four years. (§ 3 ch 149 SLA 1977; am § 3 ch 101 SLA 1978; am § 10 ch 179 SLA 1978; am § 3 ch 44 SLA 1980; am § 1 ch 115 SLA 1980; am § 11 ch 131 SLA 1980; am § 11 ch 136 SLA 1980; am § 3 ch 172 SLA 1980; am § 1 ch 32 SLA 1981; am § 1 ch 64 SLA 1981; am § 4 ch 79 SLA 1981; am § 3 ch 101 SLA 1981; § 20 ch 110 SLA 1981; am Executive Order No. 48, § 5 (1981); am § 1 ch 65 SLA 1982; am § 31 ch 142 SLA 1982)

Revisor's notes. — In subsection (a)(6), the reference "AS 44.21.241" was substituted for "AS 44.21.200" to reflect the renumbering of that section by the revisor of statutes under AS 01.05.031.

Effect of amendments. — The first 1981 amendment substituted "1982" for "1980" in paragraph (3) of subsection (a).

The second 1981 amendment substituted "1983" for "1981" in subsection (a)(1).

The third 1981 amendment added paragraph (10) of subsection (a).

The fourth 1981 amendment added paragraph (11) of subsection (a).

The fifth 1981 amendment repealed

ACST
THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

February 2, 1983

Mr. Gerald L. Wilkerson, CPA
Legislative Auditor
Division of Legislative Audit
Pouch W
Juneau, Alaska 99811

Dear Mr. Wilkerson:

This repsonds to your letter of January 17, 1983 enclosing a copy of "A Performance Report on the Department of Administration, Alaska Council on Science and Technology, December 1, 1982."

There are many errors and misconceptions in your report. These we discussed in our letter of November 30, 1982 and personally in your office on January 11, 1983.

The following summarizes our position on your report.

1. From the title of your report you imply that the Council is a line organization of the Department of Administration. This is not true; the legislative record is clear that the Council's affiliation with the Department of Administration is for administrative "housekeeping" purposes only.

2. The Council rejects your assertion that the legislative intent associated with its statutory establishment and duties was to coordinate and centralize research information. We believe a number of legislators and administrative personnel associated with the Council's establishment and operation can testify to this matter.

3. The Council asserts that it has functionally defined Alaska research needs. That these statements are currently valid and offer priorities by research function or field (i.e., Transportation, Minerals, Natural Hazards, Agriculture and Animal Husbandry, Health and Human Life, Communications, etc.). The Council rejects your assertion that it is charged with the prioritization of research across a spectrum of Alaskan societal concerns. Such prioritization can only be done by policy makers in the executive and legislative branches; and properly so.

Comments on many of the details of your report are contained in our letter of November 30, 1982. The Council reaffirms the content of that letter, rather than to repeat its substance here, since there are clearly

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

basic differences of opinion between your office and the Council on a number of matters. These differences we view as honest questions of interpretation and here express our appreciation for the professional and courteous manner in which your staff conducted its analysis of Council affairs.

Sincerely,

David M. Hickok

David M. Hickok
Chairman

DMH:pb

cc: L. Rudd, Commissioner, Department of Administration
C. Noah, Executive Director, ACST

ACST
THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

November 30, 1982

Jerry Wilkerson
Director
Legislative Budget & Audit
Alaska State Legislature
Juneau, Alaska 99811

RE: Interim Letter #1, Carol Carroll, Auditor

Dear Mr. Wilkerson:

The Alaska Council on Science and Technology (ACST) appreciates the receipt of your interim audit findings dated November 8, 1982. In our meeting of November 17-18 the Council reviewed your findings and offers the following comments for your consideration.

Generally speaking, we agree with some of your substantive conclusions but question the rationale from which they are derived. In other cases we believe either the legislative history or the actual statute governing ACST operations has been misconstrued, at least in part.

As a place of beginning it is of basic importance to examine your statements: a) "The primary legislative goals were to coordinate and centralize research information in order to -----" (page 1, last paragraph) and b) several statements implying that the Council is mandated to "coordinate" state funded research, per se. An examination of the statute indicates that the word "coordinate" or its derivatives is used only in the following statutory references:

1. In Section 1. LEGISLATIVE FINDINGS "(3) expenditures are not adequately coordinated in the state to achieve the highest and best use of research dollars" (emphasis added).

2. In Section 44.19.182 (c) "8. coordinate its data and information needs with other research organizations in order to avoid unnecessary duplication;" (emphasis added).

By way of additional comment on the "coordination" role, it is well to be aware that an early draft of the ACST bill drew particularly strong opposition from state agency and university leaders. The context of this draft was that "state money may not be spent for research projects, unless, before commencing the research, the agency or person responsible for conducting the research submits to the council for its review and comment a scope of work proposal----". Consequently, the legislature rejected early the idea that the Council should "coordinate" research through any measure of review or sanction.

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

Broadly speaking, the legislative background of the establishing statute led the Council to consider its general mandates as being to survey research needs, to recommend research priorities, to award research grants and to provide advice to the governor and legislature upon request. In these general mandates, the Council asserts that it has, in fact, derived its research needs statements and data and information needs in a "coordinated" fashion with other research organizations, state and federal agencies, and the private sector. The proof of this statement is twofold: a) the Council drew expert membership for all its research needs committees from those agencies having cognizance and from involved university and private sector research or management organizations. (By this means coordination of research needs assessment by the Council was definitely achieved.); b) informational needs of ACST have also involved a large interagency and interorganizational coordinative network including particular relationship with the information transfer expertise of the state, federal and university library systems, the Arctic Environmental Information and Data Center (AEIDC), and the federal-state interagency Committee on Natural Resource Information Management (CONRIM); and c) in addition to meeting the informational needs of the Council itself (the statutory mandate), ACST has also vigorously supported the information transfer and dissemination function through grants, publications, and the support of numerous conferences. All of these contacts and activities, we believe, belie your comment that, "interaction with state agencies has been limited".

Much of your interim report dwells on your interpretation that the Council has a mandate to coordinate statewide research. This assumption, as earlier pointed out, has no statutory basis. Nevertheless, further comment is still appropriate, particularly on your conclusion drawn from questionnaires, that "the Council has had little effect on State research programs". Through our research needs reports, activities concerned with U.S. Arctic and Alaska science policy and legislative committee contacts we have had direct impact on several state research programs, including the following examples:

* The seismology program of the Division of Geological and Geophysical Surveys of DNR;

* The development of programs within ADF&G for the economic appraisal of fish and wildlife resources;

* The establishment of the Alaska Climate Center within the Arctic Environmental Information and Data Center, University of Alaska.

* The establishment of the airport weather program in Alaska rural villages within the DOTPF;

* The resolution of the rural village smoke/fire safety program within the Department of Public Safety;

* The acceleration of mineral mapping programs within DGGS;

* The general research programs conducted by the University of Alaska notably in the biological, geological, agricultural, atmospheric sciences;

and other examples of longer term impact such as the very large influence on public health research, both state and national.

Letters or testimony on these examples can be made available.

The implication of state sponsored research duplication also requires comment. The ACST, after considerable investigation, is unaware of any specific cases of research duplication, nor does your audit report identify any. Moreover, in scientific inquiry duplication is not necessarily bad. Redundant research is practiced in all fields of scientific or engineering endeavors as a means of conclusion verification. It is not bad, per se. More to the point of duplication in state government may be the practice whereby more than one agency investigates or analizes a particular problem, e.g. the current studies of the so-called "All Alaska gas pipeline". Nevertheless, here again, there may be valid state purposes served by duplicative efforts.

Finally, your comment under A3, page 2, is, in our opinion, particularly lacking in comprehension. This commentary makes two points. They are:

1. That the Council has been "ineffective in gathering research available to them through departmental budget documents, session laws, and various reports required by the legislature."; and

2. That the Council has limited itself to coordination of its own research budget----. When compared with the University of Alaska research budget it is clear that the Council has had little statewide effect on research coordination or on reduction of unnecessary duplication".

On the first point: germane session laws and legislative reports are reviewed by Council members and staff. Departmental budget documents, based upon our experience, are worthless as sources of information on research. A much greater comprehension of research activity can be ascertained from other sources previously mentioned. On the second point: our position is that the size of current budgets available to any organization is unrelated to either "research coordination" or reduction of unnecessary duplication. In discussion with you, we would be pleased

to point out the general sources of approximately 200 million dollars of research expenditures in Alaska, but the issue of coordination is primarily related not to the totality or share of these expenditures, but rather to specific problems and the means whereby they may be solved. It is with regard to achieving coordinated mechanisms for solving research problems that the Council members have spent so much effort on the introduction and passage of S.1562, the Arctic Research and Policy Act, in the Congress and also on the introduction in the upcoming state legislature of an Alaska science policy resolution.

In summary, the Council believes your first interim finding that ACST "has been ineffective in coordinating statewide research information" is inappropriate on the grounds that you have misinterpreted the statute and legislative history and have not fully comprehended the "coordinating" mechanisms which, on the record, the Council has utilized to meet its statutory requirements and service to the State generally.

Your second interim finding B. (page 2) was that "the Council has not complied with the intent of AS44-.21.242 (c) 3 requiring comment on significant research activities funded by the state during the preceding year" (emphasis added). Your narrative with this finding makes three points: a) the implication that comment upon significant research was not included in our annual reports; b) that the Council lacks the knowledge on the type and cost of research funded by state agencies; and c) that this alleged lack of our knowledge is due to the appropriation of research funds to agencies without requiring coordination through the Council or reports to the Council. The Council's response to this interim finding is as follows:

1. In our 1981 Annual Report (pages 8-14) the Council made specific comment on areas of state research, or the lack thereof, which in our view were most significant.

2. The Council absolutely rejects the notion that it is lacking in knowledge on the type of research pursued by state agencies, including the University of Alaska. Through its interdisciplinary membership, the involvement of state and university scientific personnel in Council affairs and reports and particularly close relationships with AEIDC and CONRIM, the Council as a body has a greater and broader understanding of state funded research as pertains to subject, type, and who is doing research than any other group of people in Alaska. We do, however, acknowledge that only partial information is available to the Council (or for that matter, anyone) on the costs of such research. On this point we agree that there is no requirement for state or university reporting on this subject. Thus, the only cost data available are furnished to the Current Research Profile (CRP) maintained by AEIDC through a voluntary response questionnaire system. A basic problem in this regard is that while cost information on particularly designated

projects sometimes appears in budgetary documents, it is often augmented with other funds from various agency sources. Furthermore, research funded from operational budgets is often undesignated, except in the CRP, after the fact, and again total costs from one or more sources may not be reported.

In summary, there is a dichotomy between knowledge of who is conducting research on what subjects and how much it may cost.

On page 3 of your interim report, under C., you raise the review of State research needs. It is the view of the Council that research needs in functional areas of activity (i.e., transportation, living resources, etc.) can be prioritized. This we have endeavored to do at minimum costs, a process largely involving the voluntary committee apparatus of cognizant experts. The Council is of the opinion that scientific or engineering expertise cannot, nor is it appropriate to, prioritize research needs between functional or subject areas because societal aspirations between, e.g. health needs research on one hand or natural hazard research on another, can only be prioritized in the political arena. Science and engineering expertise can properly indicate the gaps of knowledge needed for research attention to solve certain problems. The determination of society's priority to solve particular problems must be a reflection of the relative worth of the endeavor as determined by representatives of the people in the political process.

Point D (page 3) of your interim report is, we suggest, not wholly or directly related to the Council's administration of research grants. The administration of research grants by the Council began as a legislative response to our early research needs reports. Research funds were not initially requested by the Council for Council administration. Rather, it was perceived by the legislature that the Council could perform this task most effectively. A technique involving nationally accepted peer review processes was initiated and received national recognition in Science as a model of efficient and qualitative review of research proposals. As a deliberative body with scant staff the Council turned to the peer review process in order to evaluate the efficacy of scientific or engineering propositions advanced for research funding. Early on, during the receipt of proposals for research funding, several Council members went on the record over the problem of research advantage to University of Alaska proposers over the private or governmental sectors. As you are aware, University research organizations are only funded between 25 and 30 percent by direct state appropriation, although the total authorized appropriation by the legislature is 100 percent. Thus, when University research is authorized at about 48 million dollars by the legislature only about 14 million dollars represent direct state fiscal outlays of money. The remaining 34 million dollars authorized is expected to come from federal, state, and private grants and contracts. This situation forces University proposers to be highly experienced and capable competitors for research funds. Indeed by peer review standards their proposals to the

Council were generally superior to others received. This of course resulted in the high percentage of Council grant awards to University researchers.

The next part of your discussion on research grants involves University overhead charges. As you should realize, overhead charges in the University accounting procedure are real costs of performing research. They greatly transcend "administrative" costs. University overheads conform to audits conducted under federal regulations to all universities receiving federal dollars. Internal audits by the University and the state are cognizant of this fact, and those responsible in the University administration and the State Department of Administration are aware of this overhead audit procedure. There simply is no relationship between University "overhead" charges and the administrative costs of less than 10 percent experienced by the Council in the execution of research grant awards. The Council takes the position that a 10 percent cost for the processing of grant or contract awards will compare favorably with any similar state or federal activity.

Your point E (page 4) again, in our view, illustrates certain misconceptions. You state that "the primary objectives of the Council are duplicative of functions presently performed by AEIDC. This is not the case. As indicated earlier, the Council's primary functions are the ascertainment of research needs, the recommendation of research priorities, the awarding of research grant funds and the providing of scientific or technological advice to the executive or legislative branches upon request.

AEIDC's primary missions are scientific and technological information transfer and referral, information dissemination, and the execution of interdisciplinary problem solving research and investigations, primarily but not wholly in developing areas of new science and technology.

The Council has coordinated its informational needs with AEIDC and has cooperatively utilized their resources in information transfer and dissemination. AEIDC has no primary objectives in determining or prioritizing state research needs, commenting upon state policy in scientific or technological matters, or advising either the executive or legislative branches on state research programs. While AEIDC does have a major role in channeling research information to various public, governmental, and private sector users, AEIDC does not aspire to, nor is it equipped, as a University organization, to "coordinate" statewide research, per se.

From the foregoing comments the Council asserts that your interim report conclusions cannot be substantiated in logic, by the record, or by statutory reference. In summary, the Council has not coordinated State funded research on an a priori basis because it is not mandated to do so, nor was it ever conceived that it do so. Research grants of the Council, we believe, have been efficiently administered. The Council's primary functions are not duplicative of AEIDC.

Now, having, we believe, refuted most of your interim report analysis within this response, the Council nevertheless can agree with some of your conclusions and recommendations. We direct the following commentary towards your recommendations since we believe that the Alaska apparatus concerned with state science and technology policy and the administration of research grants can be improved.

Commentary on Recommendation No. 1

Leaving aside our rejection of your rationale on the Council's information base, the Council does believe it is a salutary recommendation that all research contracted or performed by state agencies be reported to a central informational entity. The Council could be this entity or the existing arrangements between the Council and AEIDC could be strengthened or any other appropriate unit of state government, including AEIDC, could be so designated.

Commentary on Recommendation No. 2

The Council believes it has, subject to the limitations imposed by staff resources, met its statutory obligations. In order to be effective the Council requires a much closer relationship to both the Executive and Legislative branches on policy issues of concern. The Council can respond in research priorities to specific policy issues. It cannot prioritize research needs across policy issues which are a reflection of societal aspirations.

Commentary on Recommendation No. 3

Again, setting aside the rationale for this recommendation, the Council agrees that the granting of research funds by a deliberative body may not be appropriate. Indeed, if you will go back into the legislative history of the Council you will find that the three rather disparate functions of the Council generally, i.e., policy advice, research funding, and technical subject problem analysis, were first proposed in three distinct bodies. These were: governmental policy assistance through a Council apparatus such as ACST; research funding through a line organization paralleling national and other state entities, in effect an Alaska Science Foundation; and technological subject expertise application through a private sector organizaton such as the newly formed Alaska Academy of Engineering and Sciences which could assemble expertise through Academy committees. The experience of the past four years reinforces the efficacy of this original conception.

Commentary on Recommendation No. 4

We agree and have endeavored to do so.

Other Recommendations to be Considered

The Council is in effect a voluntary organization. Members have devoted a great deal of their time to its deliberations. The staff is very small and is more administratively than scientifically oriented. An expansion of staff resources may be a consideration of merit. We should discuss this with you.

By way of conclusion to this response, the Council is attaching its own analysis of the questionnaire results it received from you. The analysis was done by Council member Neil Davis. We hope that this analysis may be useful to you.

Despite our disagreements with you on several points we have offered our comments in a constructive sense and hope we can share with you further dialogue eliminating our differences and which will be reflective of both the Council's strengths and weaknesses. Thank you for the opportunity to respond to your report.

Sincerely,

David M. Hickok

David M. Hickok
Chairman

DMH/pp

Enclosure

STATE OF ALASKA

THE LEGISLATURE

BUDGET AND AUDIT COMMITTEE

AUDIT DIVISION
POUCH W--ALASKA OFFICE BUILDING

JUNEAU, ALASKA 99811

November 8, 1982

David Hickok
Chairman
Alaska Council on Science
and Technology
Pouch CV
Juneau, Alaska 99811

Dear Mr. Hickok:

Re: Interim Letter No. 1

It is the policy of the Division of Legislative Audit to inform the auditee of any significant audit findings noted during the course of our audit. We would appreciate receiving a written response from you to help us evaluate the findings and recommendations presented below.

Since the audit has not yet been completed, information included in this letter should be considered confidential. A preliminary report which may or may not contain these findings will later be sent to you for your comments.

In order to facilitate the completion of our audit, please furnish this Division with your written reply within twenty days.

We have reviewed the activities of the Council in relation to the enabling legislation and the statutory duties and obligations set forth in Session Laws of Alaska 1978, Chapter 101. This review was performed in order to analyze the efficiency and effectiveness of the Council in meeting the objectives of the legislature. The primary legislative goals were to coordinate and centralize research information in order to (1) provide concise, relevant scientific information from which informed policy decisions could be made; (2) discover and eliminate unnecessary duplicative research funded by public monies; and (3) to identify areas where research gaps existed.

In the performance of our review, we found that the Council has been ineffective in meeting the objectives of the legislature and, in some cases, has failed to fulfill statutory duties. Due to the analysis presented below we believe the Council should be allowed to terminate.

A. The Council has been ineffective in coordinating statewide research information for the following reasons.

1. Research dollars are appropriated to other entities without requiring coordination with the Council. For example, the University of Alaska was appropriated $47.7 million for organized research in fiscal year 1982. None of this research was coordinated through the Council.

2. Other State agencies involved in research are not required to report to the Council about what research was funded or performed during the year. Council staff has suggested that some agencies do not consider that the Council's coordination function includes their research programs. Consequently, interaction with State agencies has been limited. Questionnaires received from agency personnel support the conclusion that the Council has had little effect on State research programs. Some State employees responding to our questionnaire were unaware of the existence of the Council. Due to this lack of interaction, substantial research monies are not coordinated by the Council and any duplicative research has remained undiscovered.

3. Even though we realize that the Council has been limited in its ability to effectively coordinate research because of the above problems, the Council has also been ineffective in gathering information on research available to them through departmental budget documents, session laws, and various reports required by the legislature. The Council has limited itself to coordination of its own research budget which has totalled $3.3 million from fiscal year 1979 to 1983. When compared to the University of Alaska's research budget alone, it is clear that the Council has had little statewide effect on research coordination or on reduction of unnecessary duplication.

B. The Council has not complied with the intent of AS 44-.21.242(c)(3) requiring comment on significant research activities funded by the State during the preceding

year. This information is required to be in the Council's annual report to the governor and the legislature. The Council is hampered in fulfilling this requirement by its lack of knowledge of the types and cost of research funded by public monies. As stated in section A., causes of this lack of knowledge are due in part to research monies being appropriated to other agencies without requiring coordination through the Council or without requiring agencies to report to the Council.

C. The Council is required by AS 44.21.242(c)(2) to annually review the research needs of the State of Alaska, as determined by the Council, and to prioritize those needs for funding. The Council has produced ten research needs reports since its inception, seven reports were prepared in 1980 and three in 1981. None of the needs reports have been annually reviewed and only one of the 1980 reports was revised in 1982.

Within the research needs reports, the Council listed ninety areas needing research. Eighty-five of these needs were listed as priorities in the 1981 annual report to the Governor and Legislature. We believe it would be more effective to limit the number of research needs identified as priorities because it is unrealistic to expect the legislature to fund eighty-five projects. Concise, effective presentation of research priorities should result in necessary research being funded by the legislature.

D. According to AS 44.21.242(b)(3) the Council may award and administer research grants and contracts. We reviewed each research grant awarded since FY 1981. During our review, we found that 79% of the grants were being awarded to the University of Alaska. Included in each research grant was a budget detailing costs for performance of the research. Each budget included overhead charged by the University to administer the grant. These overhead charges ranged from 25% to 62% of the grant awarded less any expenditures budgeted for research equipment. Total overhead charged amounted to $677,000 of the $2,700,000 awarded to the University during fiscal years 1981 and 1982. At this same time the Council expended at least $263,000 administering these same grants. We believe it is an inefficient use of public monies to unnecessarily duplicate research costs. Since the University of Alaska is receiving 79% of the grants and it is in the business of doing research it would be more efficient to directly appropriate the funds to the University thus saving the State, in this case, at least $263,000.

E. In addition to the above, we believe that the primary objectives of the Council are essentially duplicative of functions presently performed by the Arctic Environmental Information and Data Center (AEIDC), University of Alaska, Anchorage. AEIDC's Information Services section performs research data accumulation and centralization functions with the objectives of creating an awareness of research performed or being performed in Alaska, of identifying research needs or gaps, and to aid in avoiding unnecessary duplication of research. AEIDC publishes a yearly Current Research Profile from information accumulated in its data files. This profile outlines research performed in Alaska by subject, investigator, and funding source. This profile and the data files are the basic tools needed for coordination of research. We believe that it would be more efficient to coordinate research through AEIDC because it is presently equipped with the necessary tools for statewide research coordination.

We base our recommendation for allowing the Council to terminate on its ineffectiveness and inefficiencies as outlined above. It has not coordinated State funded research, it has not fulfilled various statutory obligations, it has been inefficient in administering research grants, and lastly its primary functions are, in themselves, duplicative of functions performed by AEIDC.

If the legislature determines that continuation of the Council on Science and Technology is in the best interest of the public the following recommendations should be implemented.

Recommendation No. 1

Legislation should be introduced requiring all State agencies to report to the Council on all research contracted or performed during the year.

As addressed in section A. the Council has little information and no control over almost all of the monies appropriated each year for research. Coordination in this type of situation is nearly impossible. Attempts to centralize information is made very difficult and time consuming when extensive researching of agency documents is required. Since it is unrealistic to expect all monies for research to be appropriated to the Council, a reasonable alternative is to require all agencies with research budgets to report to the Council on the ultimate allocations and expenditures of those funds. This would result in a more efficient means of collection and analysis of research information.

Recommendation No. 2

The Council should fulfill its statutory obligations as stated in AS 44.21.242(c)(2) and (3).

A. As addressed in section B. of the preceding analysis, the Council has not commented in its annual report on the significant research activities funded by the State during the preceding year. Since the legislature requires this information, we recommend the Council comply with this requirement.

B. As addressed in section C., the Council does not review or effectively prioritize its research needs. We recommend the Council comply with the requirement to annually review its research needs reports. We also recommend the Council rank its priorities by some criteria that would establish a direct relation to policy issues facing decision makers and limit the priorities to a realistic number.

Recommendation No. 3

The legislature should consider eliminating the authority of the Council to award research grants.

As addressed in section D. of the preceding analysis, the University of Alaska has received most of the research budget appropriated to the Council. By funnelling the money through the Council, unnecessary costs of at least $263,000 have been added to the cost of the research. Additionally, the Council has spent a large percentage of its time in reviewing, awarding and administering the grants to the detriment of its other duties. We do not believe that elimination of the authority to award research grants will adversely affect the ability of the Council to coordinate research information, if State agencies are required to report to the Council. Effective coordination can be accomplished by concise reports to the legislature and governor on projects funded that were unnecessarily duplicative, poorly done or invalid. Research needs can be effectively presented by analysis of information obtained from agency and University reports to the Council.

Recommendation No. 4

The Council should formally review its performance in accomplishing the goals and objectives of the program.

Periodic performance reviews are a valuable tool in measuring the effectiveness of management policies in achieving

program goals. Areas needing improvement or redirection can be identified and procedures updated to more effectively meet management's requirements. These reviews should result in information beneficial to the Council and can be used to measure its success in meeting program objectives.

If you have any questions regarding this letter, please contact me at 465-3815.

Sincerely,

Carol Carroll

Carol Carroll
Auditor
Division of Legislative Audit

STATE OF ALASKA

THE LEGISLATURE

BUDGET AND AUDIT COMMITTEE

AUDIT DIVISION
POUCH W
JUNEAU, ALASKA 99811

January 17, 1983

David Hickok
Chairman
Council on Science and Technology
326 4th Street #510
Juneau, Alaska 99811

Dear Mr. Hickok:

Enclosed is a copy of our preliminary audit report on:

A Performance Report on the Department of Administration, Alaska Council on Science and Technology, December 1, 1982.

We request that you submit a written response to this report by February 7, 1983. Your response will become an integral part of our final report. In your response, please clearly state your agreement or disagreement with each recommendation. If you agree, indicate the methods you will use or have used to implement the recommendation; if you disagree, you should indicate your reasons. In addition, the date the recommendation was fully implemented or will be implemented should be stated.

This report is confidential in nature and is not for public release pending final review and approval by the Legislative Budget and Audit Committee.

Additional copies of this report have been distributed to the Governor, the Commissioner of the Department of Administration, and the State Internal Auditor for their review.

Sincerely,

Gerald L. Wilkerson

Gerald L. Wilkerson, CPA
Legislative Auditor
Division of Legislative Audit

Enclosure

A PERFORMANCE REPORT ON THE DEPARTMENT OF ADMINISTRATION ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

December 1, 1982

Commissioner, Department of Administration	Lisa Rudd
Deputy Commissioners, Department of Administration:	
Administrative Management	Anselm Staack
Personnel Management	Eleanor Andrews
Telecommunications	Steve Gregg

Alaska Council on Science and Technology

Chairman	David Hickok
Member	T. Neil Davis
Member	Mim Dixon
Member	Richard R. Straty
Member	Robert D. Burkett
Member	Jay Hogan
Member	Charles Webber

STATE OF ALASKA

AUDIT DIVISION
POUCH W
JUNEAU, ALASKA 99811

THE LEGISLATURE

BUDGET AND AUDIT COMMITTEE

January 6, 1983

Members of the
Legislative Budget and Audit Committee:

In accordance with the intent of Titles 24 and 44 of the Alaska Statutes, the attached report is submitted for your review.

A PERFORMANCE REPORT ON THE
DEPARTMENT OF ADMINISTRATION
ALASKA COUNCIL ON
SCIENCE AND TECHNOLOGY

December 1, 1982

Gerald L. Wilkerson

Gerald L. Wilkerson, CPA
Legislative Auditor
Division of Legislative Audit

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PURPOSE AND SCOPE OF THE REPORT

Purpose

In accordance with the intent of Titles 24 and 44 (sunset legislation) we conducted an examination of the Department of Administration, Alaska Council on Science and Technology to determine if the Council has been operating in an effective and efficient manner and if there is a public need for the program.

As required by legislative intent this report shall be considered during the legislative oversight function in determining whether the Alaska Council on Science and Technology should be reestablished. The law currently specifies that this program will terminate as of June 30, 1983.

Scope

Our review consisted of evaluating the efficiency and effectiveness of the Council in (1) coordinating and centralizing research information in the State in order to identify and reduce unnecessary duplication, (2) determining and prioritizing State research needs; and (3) awarding and administering research grants in priority areas. We reviewed the following sources of information:

1. Applicable statutes and legislative intent
2. Budget documents
3. Research needs reports
4. Minutes of Council meetings
5. Correspondence files
6. Surveys of academic, private and governmental institutions
7. Surveys of Council members
8. Tests of records and documents of the Council, and
9. Any complaints filed with the Office of the Ombudsman, State Equal Employment Opportunity Office, or Human Rights Commission.

ORGANIZATION AND FUNCTION

The Alaska Council on Science and Technology was established by the 1978 Session Laws of Alaska, Chapter 101. There are seven Council members: two members are from executive agencies having significant research activities, two members from the Alaska academic community, two members from the general public who have significant activities or direct interest in research, and one member from the staff of the Legislature. Members are appointed by the Governor for overlapping three year terms.

The Council is organized under the Department of Administration which provides financial support. The Council has no regulatory function.

The Council was established to provide research data coordination through information centralization and review and to provide the scientific and technological community with a mechanism to advise decision makers on scientific issues. The purposes of the Council are as follows:

1. Review and recommend the scientific and technological research needs of State government
2. To issue research grants and contracts
3. To oversee the issued grants and contracts
4. To promote high standards of research for the priorities proposed by the Council
5. To address stated legislative or administrative requests for research.

REPORT CONCLUSIONS

Policy Issues

This report contains policy issues raised as a result of our evaluation of various Council endeavors. The final policy decisions affecting these endeavors are not within the scope of this review but require legislative consideration. In debating these issues, the legislative oversight committees should consider the findings and alternatives presented in this report so that the potential impact of policy changes can be evaluated.

Report Conclusions

In our opinion the continuation of the Alaska Council on Science and Technology is not necessary (see Recommendation No. 1).

In the event the Council is reestablished by the Legislature, certain changes must be made to enable the Council to effectively and efficiently perform the duties intended by the Legislature, and serve the public interest. These changes are outlined below.

1. Legislation should be introduced requiring State agencies and the University of Alaska to report to the Council on all research funded or contracted out during the year (see Recommendation No. 2).

2. The Council should comply with AS 44.21.242(C)(2)and(3) which require comment on significant State research activities and annual review of research needs. Additionally, the Council should more effectively prioritize research needs (see Recommendation No. 3).

3. The legislature should consider eliminating the authority of the Council to award research grants (see Recommendation No. 4).

4. The Council should formally review its performance in accomplishing the goals and objectives of the program (see Recommendation No. 5).

FINDINGS AND RECOMMENDATIONS

Recommendation No. 1

The Council on Science and Technology should be allowed to terminate.

We have reviewed the activities of the Council in relation to the enabling legislation and the statutory duties and obligations set forth in the Session Laws of Alaska 1978, Chapter 101. The review was performed in order to analyze the efficiency and effectiveness of the Council in meeting the objectives of the Legislature. The primary legislative goals were to coordinate and centralize research information in order to (1) provide concise, relevant scientific information from which informed policy decisions could be made; (2) discover and eliminate unnecessary duplicative research funded by public monies; and (3) to identify areas where research gaps exist. Furthermore, the legislature only intended the Council's coordination function to be a passive collection, commentary on, and dissemination of research information. The Council was never given the authority to actively control research funded by the State. It is in this sense that we use the term "coordination" in the following findings.

In the performance of our review, we found that the Council has been ineffective in meeting the objectives of the Legislature and in some cases has failed to fulfill statutory duties. Due to the analysis presented below, we believe the Council on Science and Technology should be allowed to terminate.

A. The Council has been ineffective in coordinating statewide research information for the following reasons:

1. Research dollars are appropriated to other entities without requiring coordination with the Council. For example, the University of Alaska was appropriated $47.7 million for organized research in Fiscal Year 1982. None of this research was coordinated through the Council.

2. Other State agencies involved in research are not required to report to the Council about what research was funded or performed during the year. Council staff has suggested that some agencies do not consider that the Council's coordination function includes their research programs. Consequently, interaction with State agencies has been limited. Questionnaires received from agency personnel support the conclusion that the Council has had limited effect on State research programs. Some

State employees responding to our questionnaire were unaware of the existence of the Council. Due to this lack of interaction, substantial research monies are not coordinated by the council and any duplicative research has remained undiscovered.

3. Even though we realize that the Council has been limited in its ability to effectively coordinate research confirmation because of the above problems, the Council has also been ineffective in gathering information on research available to them through departmental budget documents, session laws, and various reports required by the Legislature. The Council has limited itself to coordination of its own research budget which has totalled $3.3 million from Fiscal Year 1979 to 1983. When compared to the University of Alaska's research budget alone, it is clear that the Council has had little statewide effect on research coordination or on reduction of unnecessary duplication.

On two separate occasions we have met and discussed our findings with representatives of the Council. After initial confusion over our use of the term coordination, the Council agreed that they do have a coordination function, as defined earlier in this report. Furthermore, the Council maintains that they have indirectly coordinated statewide research information by means of research needs reports, seminars, conferences, and policy proposals. However, we do not agree that this fulfills the Council's coordination function as envisioned by the Legislature.

The Legislature wanted information not only on research that needed to be done but also on research that was already completed or in progress. Additionally, this process of data collection was seen as a method to discover the use of public monies to fund research that was unnecessarily duplicative. By this the Legislature meant projects authorized and funded by one agency for information that was already available had the agency known of its existence.

Therefore, in our review of the Council, we expected to find a data file and retrieval system at the offices of the Council that would enable legislators or State agencies to readily obtain information on research in Alaska. For example, if a legislator wanted information on hydroelectric power research, he or she would be able to contact the Council and obtain information on projects completed, in

progress or contemplated by any State agency or the University of Alaska and the costs associated with that research. Also, he or she would obtain some commentary by the Council on the results of the research performed including whether it was relevant or valid.

Since we were unable to find information of this type at the Council Office, we concluded that the Council has been ineffective in this regard.

B. The Council has not complied with the intent of AS 44-.21.242(c)(3) requiring comment on significant research activities funded by the State during the preceding year. This information is required to be in the Council's annual report to the Governor and the Legislature. The Council is hampered in fulfilling this requirement by its lack of knowledge of the types and cost of research funded by public monies. As stated in Section A., causes of this lack of knowledge are due in part to research monies being appropriated to other agencies without requiring coordination through the Council or without requiring agencies to report to the Council.

The Council maintains that they have complied with this requirement. We again reviewed the Council's annual report to determine if the intent of the legislation was fulfilled. The Council's annual report is, in our judgement, a general review of research topics of interest to the State. There is no report or commentary on significant research funded by the State during the preceding year as required by the statute. There is no accumulation of costs. We believe that this is due to a lack of detailed knowledge on the part of the Council as we saw no information of this type at the Council's Office.

C. The Council is required by AS 44.21.242(c)(2) to annually review the research needs of the State of Alaska, as determined by the Council, and to prioritize those needs for funding. The Council has produced ten research needs reports since its inception, seven reports were prepared in 1980 and three in 1981. None of the needs reports have been annually reviewed and only one of the 1980 reports was revised in 1982.

Within the research needs reports, the Council listed ninety areas needing research. Eighty-five of these needs were listed as priorities in the 1981 annual report to the Governor and Legislature. We believe it would be more effective to limit the number of research needs identified as priorities because it is unrealistic to expect the Legislature to fund eighty-five projects.

Concise, effective presentation of research priorities should result in necessary research being funded by the Legislature.

The Council, on the other hand, maintains that their function is to identify research needs, while priorities for funding can only be determined by the Legislature. We can only reiterate that the Council is obliged to prioritize research needs and in our opinion; concise presentation of priorities is a more effective means of obtaining necessary research funding.

D. According to AS 44.21.2?2(b)(3) the Council may award and administer research grants and contracts. We reviewed each research grant awared since FY'81. During our review, we found that 79% of the grants were being awarded to the University of Alaska. Included in each research grant was a budget detailing costs for performance of the research. Each budget included overhead charged by the University for performance of research. These overhead charges ranged from 25% to 62% of the grant awarded less any expenditures budgeted for research equipment. Total overhead charged amounted to $677,000 of the $2,700,000 awarded to the University during Fiscal Years 1981 and 1982. At this same time the Council expended at least $263,000 administering these same grants. We believe it is an inefficient use of public monies to unnecessarily increase research costs. Since the University of Alaska is receiving 79% of the grants and it is in the business of doing research it would be more efficient to directly appropriate the funds to the University thus saving the State, in this case, at least $263,000.

E. In addition to the above, we believe that the primary objectives of the Council are essentially duplicative of functions presently performed by the Arctic Environmental Information and Data Center (AEIDC), University of Alaska, Anchorage. AEIDC's Information Services section performs research data accumulation and centralization functions with the objectives of creating an awareness of research performed or being performed in Alaska, of identifying research needs or gaps, and to aid in avoiding unnecessary duplication of research. AEIDC publishes a yearly Current Research Profile from information accumulated in its data files. This profile outlines research performed in Alaska by subject, investigator, and funding source. This profile and the data files are the basic tools needed for coordination of research information. We believe that it would be more efficient to coordinate research through AEIDC because it is presently equipped with the necessary tools for statewide data collection and retrieval.

In discussions with the Council, they have maintained that AEIDC has no primary objectives in determining and prioritizing research needs or in advising State policy makers, obligations which are important Council functions. Furthermore, the Council states, AEIDC's functions are information storage and retrieval, data dissimination, and problem solving. However, in a publication put out by the Council titled "Scientific and Technological Research Needs in Alaska", a result of joint meetings of the Council and the Polar Research Board, the supervisor of AEIDC Information Services stated the objectives of AEIDC included identifying research needs or gaps and aiding in avoiding unnecessary duplication. Also, in a research grant proposal written by a researcher employed at AEIDC, there is the statement that AEIDC does answer requests for information from governmental entities or in effect, gives advice as to what information is available and what is unknown. Additionally, the Council has stated that it uses the resources of AEIDC to perform its functions of information dissemination.

This evidence supports our conclusion that AEIDC does perform similar functions also attributed to the Council. AEIDC serves as a data collection and retrieval center, identifies research needs or gaps, and on request advises governmental entities on research information. In our judgement, AEIDC is a practical, cost effective alternative to the Council on Science and Technology.

We base our recommendation for allowing the Council on Science and Technology to terminate on our perception of the evidence presented above. However, if the Legislature determines that continuation of the Council is in the best interest of the public, the following recommendations should be implemented.

Recommendation No. 2

Legislation should be introduced requiring all State agencies to report to the Council on all research contracted or performed during the year.

As addressed in section A, the Council has little tangible information and no control over almost all of the monies appropriated each year for research. Coordination in this type of situation is nearly impossible. Attempts to centralize information is made very difficult and time consuming when extensive researching of agency documents is required. Since it is unrealistic to expect all monies for research to be appropriated to the Council, a reasonable alternative is to require all agencies with research budgets to report to the Council on the ultimate allocations and

expenditures of those funds. This would result in a more efficient means of collection and analysis of research information.

Recommendation No. 3

The Council should fulfill its statutory obligations as stated in AS 44.21.242(c)(2) and (3).

A. As addressed in Section B. of the preceding analysis, the Council has not commented in its annual report on the significant research activities funded by the State during the preceding year. Since the Legislature requires this information, we recommend the Council comply with this requirement.

B. As addressed in Section C., the Council does not review or effectively prioritize its research needs. We recommend the Council comply with the requirement to annually review its research needs reports. We also recommend the Council rank its priorities by some criteria that would establish a direct relation to policy issues facing decision makers and limit the priorities to a realistic number.

Recommendation No. 4

The Legislature should consider eliminating the authority of the Council to award research grants.

As addressed in Section D. of the preceding analysis, the University of Alaska has received most of the research budget appropriated to the Council. By funnelling the money through the Council, unnecessary costs of at least $263,000 have been added to the cost of the research. Additionally, the Council has spent a large percentage of its time in reviewing, awarding and administering the grants to the detriment of its other duties. We do not believe that elimination of the authority to award research grants will adversely affect the ability of the Council to coordinate research information, if State agencies are required to report to the Council. Effective coordination can be accomplished by concise reports to the Legislature and Governor of projects funded that were unnecessarily duplicative, poorly done or invalid. Research needs can be effectively presented by analysis of information obtained from agency and University reports to the Council.

Recommendation No. 5

The Council should formally review its performance in accomplishing the goals and objectives of the program.

Periodic performance reviews are a valuable tool in measuring the effectiveness of management policies in achieving program goals. Areas needing improvement or redirection can be identified and procedures updated to more effectively meet management's requirements. These reviews should result in information beneficial to the Council and can be used to measure its success in meeting program objectives.

ANALYSIS OF PUBLIC NEED

Limited Analysis

The following evaluations of the Council's activities relate to the public need factors defined in the "sunset" law. These evaluations are not intended to be all inclusive, but address those areas we covered in our review.

I. The extent to which the board, commission or program has operated in the public interest.

A. The Council has promoted high standards in the research it has funded.

B. The Council has made an attempt to inform the public about new technologies and scientific advances through support of symposiums and conferences in Alaska.

C. The Council has been involved in developing an arctic research policy culminating in a bill before the United States Congress.

D. The Council has identified various research needs of Alaska and attempted to bring these needs before the public.

II. The extent to which the operation of the board, commission, or agency program has been impeded or enhanced by existing statutes, procedures, and practices which it has adopted, and any other matter, including budgetary, resource, and personal matters.

A. The Council has been impeded in performing its statutory duties by the absence of any condition requiring State agencies and the University of Alaska to report to the Council concerning research funded or performed.

III. The extent to which the board, commission or agency has recommended statutory changes which are generally of benefit to the public interest.

A. The Council has contributed to public discussions in an attempt to develop an Alaskan science policy which could lead to a more coordinated research program in Alaska.

B. The Council has assisted the Office of the Governor in development of an Alaskan position on the future of the Naval Arctic Research Laboratory. The fundamental Alaskan position was

to seek a federal/state partnership in both use and financing.

IV. The extent to which the board, commission, or agency has encouraged interested persons to report to it concerning the effects of its regulations and decisions on the effectiveness of services, economy of services, and availability of services which it has provided.

A. The Council has developed a peer review committee of scientists and technicians who review and comment on research proposals submitted to the Council. This has promoted high research standards in the research funded by the Council.

V. The extent to which the board, commission or agency has encouraged public participation in the making of its regulations and decisions.

A. The Council has made extensive use of the public in determining the research needs of Alaska. Scientists and technicians in government, education, and private industry have participated in workshops to discuss research needs. Various research needs reports have evolved from these meetings.

B. The Council encourages public participation in its discussions by public announcement of its meetings.

C. The Council participates in the Alaska Science Conference held each year in Fairbanks. Questions and comments concerning the Council and its function are solicited from interested parties.

VI. The efficiency with which public inquires or complaints regarding the activities of the board, commission or agency filed with it, with the department to which a board or commission is administratively assigned, or with the Office of the Ombudsman have been processed and resolved.

A. We found no instances where the Council did not respond to public inquires.

B. We found three complaints handled by the Office of the Ombudsman. Each was resolved efficiently and to the satisfaction of the complainant. The Council implemented the recommendations of the Ombudsman.

VII. The extent to which the board or commission which regulates entry into an occupation or profession has presented qualified applicants to serve the public.

A. The Council does not have a licensing function.

VIII. The extent to which State personnel practices, including affirmative action requirements, have been complied with by the board, commission or agency to its own activities and the area of activity or interest.

A. We found no problems in this area.

IX. The extent to which statutory, regulatory, budgeting, or other changes are necessary to enable the agency, board, or commission to better serve the interests of the public and to comply with the factors enumerated in this subsection.

Please refer to the previous section, Findings and Recommendations.

APPENDIX A

ALASKA COUNCIL ON
SCIENCE AND TECHNOLOGY FY'83
Summary of Questionnaires

Questionnaires were sent to 165 persons to obtain information about the Council from the public. All names were systematically chosen from a list of peer reviewers provided by the Council and from participants in the Council workshops on research needs. We received 70 responses to our questionnaires. All but eight responses were from the original persons contacted. Many of the responses included thoughtful written comments. Due to space limitations, comments had to be shortened, and many could not be included.

	Private Sector			Federal Government			Research Institutions			State Government			Total		
	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown
1. Have you had any contact with the Council on Science and Technology?	11	2	0	21	0	0	17	0	0	15	4	0	64 91%	6 9%	0 0%
If no, please make any comments you may have in the space provided at the end of this survey.															
2. The Council has the obligation to reduce duplicative research funded by the State. Do you feel the Council has been effective in meeting this goal?	6	1	1	12	0	5	10	3	3	7	5	3	35 63%	9 16%	12 21%

If yes, please explain.

1. Attempt to guarantee monies they allocate are wisely spent.
2. Meetings help researchers get acquainted with each others activities.
3. Research needs reports.
4. Has reduced duplication with their own funds but this is a small portion of State funded research.
5. The Council has reduced duplication through their peer review committee.
6. Council emphasis on avoidance of duplication.

If no, how could they become more effective?

1. More information to the public and to scientists.
2. State level centralization of all research.
3. Need more time.
4. Need more than lipservice from State research agencies.

(Continued on next page).

	Private Sector			Federal Government			Research Institutions			State Government			Total		
	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown
5. Surveyed opinions on water resource needs but this survey was in itself duplicative of similar tasks by other agencies.															
6. Monitor all research for validity, quality.															
7. Need power to review and pass judgement on all funding.															
3. Are you aware of any instances where planned research was not funded because the Council advised that the information was already available?	1	10	0	3	14	1	4	12	0	0	15	1	8 13%	51 84%	2 3%
4. Do you believe the Council has been successful in bringing the scientific and technological community into closer contact with State policy makers?	9	1	1	13	1	14	1	1	1	9	4	1	45 78%	9 15%	4 7%
5. Are you aware of the research needs identified by the Council as priorities within Alaska?	8	3	0	18	3	0	14	1	1	8	9	0	48 74%	16 25%	1 1%
If yes, do you feel they are relevant to State needs? 1. Not only are they relevant, but they should be used by the Legislature and the agencies in the budget process. 2. They have very successfully outlined State needs in seismic area. 3. Yes, very much so, however, I also believe that scientific needs don't coincide with policies and doubt that needed work will be funded with out the usual political games.															
6. Do you feel the Council has influenced public policy on scientific issues facing the State?	4	3	3	7	5	8	9	4	4	3	6	3	23 38%	18 31%	18 31%
Please explain. 1. Not in business long enough. 2. Has brought research needs before policy makers. 3. Has not received needed publicity. 4. Arctic Research Policy. 5. Council is a candle in the darkness. 6. Threats to shut the Council's Offices have															

	Private Sector			Federal Government			Research Institutions			State Government			Total		
	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown
10. Do you believe there is a public need for this program?	11	0	0	21	0	0	16	0	0	12	3	1	60 94%	3 5%	1 1%

Please explain.

1. ACST is a vehicle by which structured communication can flow back and forth between the technical and scientific community and the executive branch of government.
2. State needs to establish priorities.
3. Need a coherent program to define needs and priorities and to account publicly for them.
4. Make public aware of lack of information.
5. Need a statewide focal point for coordination of research efforts. I believe this role should be strengthened.
6. Reduce duplication if effective.
7. Provides a unique Alaska emphasis with more direct feed back to management agencies.
8. Need a coordinating mechanism for use of State funds.
9. Coordination provides more effective research.
10. The need is for an organization in state government to fund and promote research.
11. Needs tenure to be effective.

11. Any other comments?

Private Sector

1. Impressed by foresight in planning and implementation of the Council Connection to public policy is appropriately distant. If ties were too close the quality of science might greatly diminish.
2. New ideas from Northern Technology available to the public.
3. Very high level reviews of proposals were obtained by donation of time, knowledge and experience by scientists in Alaska - at very low cost.

	Private Sector			Federal Government			Research Institutions			State Government			Total		
	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown	Yes	No	Unknown
7. Do you feel it is government's responsibility to promote scientific and technological inquiry?	13	0	0	21	0	0	16	0	0	14	2	0	64 94%	2 6%	0 0%

8. If this program were eliminated what effect, if any, would it have on your agency, institution, company, or the public interest?

1. State funding would be lost.
2. The idea is good, should not be eliminated.
3. Would lose valuable vehicle for those in research to bring forward research topics, also raises the quality of research.
4. State government could lose its easy access to scientists.
5. Coordination of state and federal research would suffer resulting in more potential for duplication.
6. Loss of broad view of research needs.
7. Would lose peer review committee
8. ACST guided research to topics relevant to Alaska - if not continued research maybe less relavent.
9. Vested interests too often get funded for "research" that has no relevance. ACST should have greater advisory status.
10. Fourteen responses stated there would be little or no effect.

9. Are there other organizations in the State performing the same duties?	2	5	1	1	18	2	2	12	1	7	5	3	12 20%	40 68%	7 12%

Please list if yes.

1. Appropriate Technology.
2. Nearly every agency, school has research functions and policy roles.
3. Department of Fish and Game.
4. Geological and Geophysical Survey.
5. Arctic Environment and Information Data Center.
6. University of Alaska direct department budget funding.
7. Many of the Council's tasks are duplicative of work done by other agencies.
8. Individual agencies: APA, APEC, APUC, Dept. of Admin., Division of Telecommunications.

(Continued on next page).

4. I am concerned about the tone of this questionnaire. It seems to have missed the point on most important issues. I don't think ACST has been useful so far but the idea needs to be encouraged and the Council upgraded and given authority to be creative and useful - good idea badly handled.
5. Provides unbiased research - perhaps need an Alaska Science Foundation.
6. More funds for more research.
7. Need more publicity.

Federal Government

1. More publicity.
2. I was quite puzzled over what ACST was receiving for the overhead charge of 50% from the University of Alaska. Would like an itemization of overhead charges. In my opinion the Council's policy of not doing so could lead to misuse of public funds.
3. Needs to be better funded.
4. Council is to be commended on the development of the peer review process.
5. Public needs someone to ensure that only relevant, broad-reaching research is funded.
6. ACST should institute a policy of not funding agencies outside the State if qualified and prepared agencies within the State are ready to do the work.

Research Institutions

1. As a very active researcher on policy issues in Alaska, I see a strong need for ACST.
2. More publicity
3. Needs more funding. It is a relatively low cost program which has great potential. Needs to mature in procedures and priorities.
4. Council provides a scientifically sophisticated mentor for Alaskan decision makers.
5. The State has shown considerable wisdom in setting up the Council.
6. Budget should be increased by $5,000,000 so they can effectively carry out the funding for Alaskan research problems.

(Continued on next page).

State Government

1. Should be similar to the National Science Foundation.
2. Must be assured existence for seven years.
3. The existence of this body is important but must have a breath of knowledge about on-going research Statewide to make meaningful decisions.
4. Need a clearing house activity to control and restrict duplicative research and to monitor overall quality of funded projects.
5. My impression is that ACST's advise was virtually ignored by the Legislature and Executive. Media reported on the grants program, otherwise it didn't seem to accomplish much.
6. Alaska could well profit from a carefully designed long range program of research and development in limited areas.
7. ACST has not had sufficient support to achieve its true potential as a policy guidance tool.
8. Can provide focus on research needs and a forum for exchange.
9. Publish a list of on-going projects and projects under consideration.

APPENDIX B

ALASKA COUNCIL ON
SCIENCE AND TECHNOLOGY
APPROPRIATIONS COMPARED
WITH EXPENDITURES
For the Fiscal Years 1982 and 1981
UNAUDITED

	1981-1982		1980-1981	
	Authorizations	Expenditures	Authorizations	Expenditures
Operating Programs				
General Government				
Alaska Council on Science and Technology (operations)	$ 603,000	$ 544,000	$479,200	$475,652
Capital Programs				
General Government				
Alaska Council on Science and Technology (grants)	2,500,000	972,000	300,000	28,845
	$3,103,000	$1,516,000	$779,200	$504,497

Expenditures include encumbrances and are reported on a budgetary basis.
Amounts differ per books.

AN ANALYSIS OF RESULTS OF
LEGISLATIVE BUDGET AND AUDIT QUESTIONNAIRE RESULTS
November 21, 1982
Neil Davis

In 1982, the Alaska Legislative Budget and Audit Division sent out 165 questionnaires regarding the ACST. Results:

90% of 71 respondents had had contact with ACST; private sector--85%; federal government--100%; research institutions--100%; state government--75%.

81% of 42 stating opinions said ACST has been effective in reducing duplicative research funded by the state; private sector--86%; federal government--100%; research institutions--77%; state government--60%.

Seven respondents were aware of instances where planned research was not funded because ACST said information was already available; private sector--1; federal government--2; research institutions--4; state government--0.

81% of 53 stating opinions said ACST has been successful in bringing scientific and technological community into closer contact with state policy makers; private sector--80%; federal government--81%; research institutions--93%; state government--60%.

76% of 63 responding to the question were aware of research needs identified as priorities by ACST; private sector--70%; federal government--86%; research institutions--94%; state government--50%.

91% of 47 stating opinions thought the ACST's identified priorities were relevant to State needs; private sector--100%; federal government--94%; research institutions--93%; state government--75%.

58% of 38 stating opinions said that ACST has influenced public policy on scientific issues facing the State; private sector--57%; federal government--55%; research institutions--75%; state government--38%.

97% of 66 stating opinions said it is the government's responsiblity to promote scientific and technological inquiry; private sector--100%; federal government--100%; research institutions--100%; state government--88%.

77% of 53 stating opinions said that there are no other organizations in the state performing the same duties as the ACST; private sector--66%; federal government--100%; research institutions--86%; state government--42%.

95% of 61 giving an opinion said there is need for the ACST; private sector--100%; federal government--100%; research institutions--100%; state government--79%.

* * *

NOTE: The tabulation above is reported in percentages of those responding with opinions. It differs from the Budget and Audit tabulation only in that the Budget and Audit tabulation is given in percentages of total respondents, regardless of whether or not there was an opinion.

The Budget and Audit tabulation includes listings of specific comments made by respondents. There were approximately 150 specific comments listed. The following table places these into four categories: "Generally favorable toward ACST", "Generally unfavorable toward ACST", "Constructive criticisms", and "Other". Comments placed in the "Other" category do not fit in the three previous categories: they deal with issues not directly relating to ACST or outside the control of ACST; For example, two of them are criticisms of the Budget and Audit questionnaire, and a sizable fraction state that more time must elapse before a proper evaluation can be made.

Responding Sector	Favorable	Unfavorable	Criticism	Other
Private Sector	18	2	3	5
Federal Government	25	0	6	1
Res. Institutions	29	2	7	7
State Government	24	7	8	4
Totals	96	11	26	17

Percentage of specifically favorable comments: 64%

Percentage of specifically unfavorable comments: 7%

Percentage of favorable and constructively critical comments: 81%

COMMENTARY ON RESULTS

The results of this survey are overwhelmingly in favor of the role and performance of ACST. There is valuable constructive criticism of ACST that both ACST and State government should heed, but the results of the survey argue stongly for the continuence of ACST.

The results of this survey tell almost as much about state government as about ACST. The results seem to bear out the contentions voiced by Harvey M. Sapolsky in his article in Science, 160, April 16, 1968 that state government in general is less predisposed toward utilizing scientific and technological input to governmental activities than is federal government. Even though a strong majority of respondents from state government show recognition of the value of ACST and its role, they are less unanimous than the respondents from the private, federal and research sectors in believing that there should be a state role at all and that ACST is fulfilling an important gap that previously existed in Alaska's state government.

SELECTED LISTING OF SPECIFIC COMMENTS

Particularly Favorable Comments

Council is a candle in the darkness.

The State has shown considerable wisdom in setting up the Council.

[The Council has] operated as an effective clearinghouse.

Council is commended on development of the peer review process.

Council is only unbiased look at needs.

Council has acted as a go-between with scientists and legislators.

It is a relatively low cost program which has great potential. Needs to mature in procedures and priorities.

[ACST] attempts to guarantee the monies they allocate are wisely spent.

[ACST] raises the quality of research.

I am aware of one instance where we did not fund a proposal because ACST knew the proposal was already funded.

All listed reponses to Questionnaire Question 8: If this program were eliminated what effect, if any, would it have on your agency, institution, or the public interest?

Private Sector Responses

My company uses the research results supported by ACST. Research areas need to be identified and projects funded in these areas.

State funding needed due to federal cutbacks.

The idea is good, should not be eliminated but should be charged up with larger creative energies--needs intellectual leadership and larger goals and objectives.

Would lose valuable vehicle for those in research to bring forward research topics, also raises the quality of research.

State government would lose its easy access to scientists.

Federal Government Responses

Public awareness needs to be awakened.

Could delay timely responses to destructive land phenomena.

Do not feel federal government can meet all the needs of the state.

Coordination of state and federal fish and wildlife research programs would suffer, resulting in more potential for duplication.

Increased confusion about research directions.

Loss of non-partisan broad view of needs.

Critical research needs not identified.

Screening of research proposals is valuable and would be lost.

Very little. [May refer to impact on agency or on public welfare ??]

None. [May refer to impact on agency or public welfare ??]

Research Institution Responses

Encourage the proliferation of very narrow research operations done within agencies and direct legislative funding of whatever research idea and investigator who has enough political support.

Scientific research is guided by the funding sources. ACST guided research to that relevant to Alaska--if not continued research may not be relevant.

Communication void across agencies working in same areas.

Vested interests too often get funded for "research" that has no relevance to State needs. ACST should have greater advisory status on state funded research.

Would remove a mechanism for research coordination and possible source of funding.

Public have to pay a higher price for outside consultants.

No single voice for Alaskan scientific affairs.

State Government Responses

Scientists need a special interest group because science requires interpretation before it can be useful.

None Whatsoever. [Refers to state agency or public interest??]

Minor. [Refers to state agency or public interest??]

It is important to know that some agency is looking for duplicative research funded by state monies--might commit ourselves to research already funded thru other sources.

There is no other agency funding some of the projects funded by the ACST.

Would not have a list of research needs.

Back to "flying by the seat of our pants."

Would be unfortunate if our fledgling attempts at policy directed research were eliminated.

COMMENTARY

Question 8 is perhaps the most important one in the questionnaire. The responses to it seem to argue strongly for continuence of ACST. It is unfortunate that the wording of the question leaves it ambigious as to whether a response refers to impact upon the responder's agency or upon the public welfare.

STATE OF ALASKA 1984 LEGISLATIVE SESSION
FISCAL NOTE

Revision Date:

REQUEST
Bill/Resolution No.: SB 227
Title: Alaska Council on Science and Technology
Sponsor: Senate State Affairs
Requestor:
Date of Request:

FISCAL DETAIL
Agency Affected: OMB
Program Category Affected:
BRU, Program or Subprogram(s) Affected: Division of Strategic Planning

EXPENDITURES/REVENUES: (Thousands of Dollars)

	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89
OPERATING						
100 PERSONAL SERVICES						
200 TRAVEL		60.0	60.0	60.0		
300 CONTRACTUAL		40.0	40.0	40.0		
400 SUPPLIES						
500 EQUIPMENT						
600 LAND & STRUCTURES						
700 GRANTS, CLAIMS						
800 MISCELLANEOUS						
TOTAL OPERATING		100.0	100.0	100.0		
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND		100.0	100.0	100.0		
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME		0	0	0		
PART-TIME						
TEMPORARY						

SOURCE OF FUNDS TO OFFSET FISCAL IMPACT OF BILL: None

ANALYSIS: Attach a separate page for analysis

Prepared By: Gordon S. Harrison (gsh) Phone: 465-3568
Division: Division of Strategic Planning Date: 3-16-84

Approved by Commissioner: [signature] Date: 3-19-84
Agency: Office of Management and Budget

Distribution (by Agency preparing fiscal note):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

12/1/83

COMMITTEE REPORT

SENATE

4/4/83 FURTHER: Finance

Date: April 5, 1983

Mr. President:

The Committee on Scate Affairs has had SB 227

Relating to the Alaska Council on Science and Technology; and eff. date.

under consideration and (a majority of the committee) (the committee) reports it back with the following recommendations:

[✓] do pass [ ] do not pass

[ ] do pass with attached amendments(s)

[ ] replace with CS for ______ [ ] same title [ ] new title

and recommends ______

[ ] AND attaches a "Letter of Intent" [ ] New Fiscal Note

[ ] reports it back without recommendation

[ ] referred to the ______ Committee

MEMBERS SIGNING DO PASS

Tim Kelly

Zero fiscal note

MEMBERS HAVING OTHER RECOMMENDATIONS:

do pass

CHAIRMAN

[illegible] ACSI.

Hickel

1 - not resp. to both bodies - Ex. only
2 - policy + needs assessment
- elim. grant [illegible].
3. - not [illegible] to coord. all [illegible] in [illegible].
4. - Rel. dot Fed. Arct. Res [illegible]

---

5 - issue reports (Ed Weeks)
6 - resp. to reques from Leg.

Gov. - continue in some form
Gordon Harrison - assist bill drafts

Rogers → off. of Gov.
7 - cancel Nortech
Erickson - Gov's office

FISCAL NOTE Revision Date , 1983

I. REQUEST

Bill/Resolution No.: SB 227

Title: "An Act relating to the AK Council on Science&Tech. & providing for an effective date."

Sponsor: State Affairs

Requestor: Sen. V. Fischer

II. FISCAL DETAIL

Agency Affected: Office of the Governor

Program Category Affected: Exec. Operation

BRU, Program of Suoprogram(s) Affected: OMB

EXPENDITURES/REVENUES: (Thousands of Dollars)

	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88
OPERATING						
100 PERSONAL SERVICES		-0-	-0-	-0-		
200 TRAVEL		-0-	-0-	-0-		
300 CONTRACTUAL		-0-	-0-	-0-		
400 COMMODITIES		-0-	-0-	-0-		
500 EQUIPMENT		-0-	-0-	-0-		
600 LAND & STRUCTURES		-0-	-0-	-0-		
700 GRANTS, CLAIMS, ETC		-0-	-0-	-0-		
TOTAL OPERATING		-0-	-0-	-0-		
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND		-0-	-0-	-0-		
FEDERAL FUNDS						
OTHER (Specify Source)						

POSITIONS:

FULL-TIME		-0-	-0-	-0-		
PART-TIME		-0-	-0-	-0-		
TEMPORARY		-0-	-0-	-0-		

III. SOURCE OF FUNDS TO OFFSET FISCAL IMPACT OF BILL:

There is currently 100.0 for FY 84 for the Alaska Council on Science and Technology within the Office of Management and Budget/Division of Strategic Planning Budget.

IV. ANALYSIS: Attach a separate page for any analysis

Prepared By: Michael A. Nizich, Director Phone: 465-3616

Division: Administrative Services Date: 4/6/83

Approved by Commissioner: Lawrence Uhlman Date: 4/6/83

Department: Office of the Governor

Distribution:

Original to Legislative Finance

Copy to Office of Management and Budget (for Legislature introduced bills)

Copy to Department (for Governor introduced bills)

Copy to Sponsor

Copy to Requestor (if different from Sponsor)

3/8/83

FRANK H. MURKOWSKI
ALASKA

COMMITTEE ON ENERGY AND NATURAL RESOURCES
COMMITTEE ON FOREIGN RELATIONS
COMMITTEE ON VETERANS' AFFAIRS

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(907) 456-0233

March 23, 1983

The Honorable Vic Fischer
Alaska State Legislature
Pouch V, Capitol
Juneau, Alaska 99811

Dear Vic:

Thank you for your kind offer of assistance with regard to the Arctic Research and Policy Act.

I wanted you to know that the bill was ordered to report out of the Senate Governmental Affairs Committee last week and that quick Senate adoption looks likely. We are likely to face a tougher time, nowever, in the House. The bill will be referred to the Subcommittee on Science, Research and Technology of the Committee on Science and Technology.

I have already spoken with Don Fuqua, the Chairman of the Full Committee, about the bill, and I will soon be meeting with Doug Walgren, the Chairman of the Subcommittee, about the prospects for the bill's consideration. We may have an opportunity to bring each of these Representatives up to Alaska sometime this summer in order that they may see the problems we face firsthand, and I may ask you for some help in that regard later on. In the meantime, I believe it is important that the State continue to take an active interest in Arctic policy issues occurring at the State level. That interest will reap benefits and will give the State a stronger hand in the State-Federal partnership within which Arctic issues will be addressed in the years ahead.

I appreciate your continued interest in this issue. Let us keep in touch.

Sincerely,

Frank H. Murkowski
United States Senator

TO: Sen. Victor Fischer
FROM: Brian Rogers
RE: Alaska Council on Science and Technology draft

Enclosed is a draft proposal on ACST for your consideration. The main features of this draft are:

(1) continues council through 1987;

(2) moves council to Office of the Governor [OMB is implicit, but was not made explicit due to legislative/executive disputes over OMB];

(3) removes power of grant-making from council;

(4) eliminates laundry-list of purposes, powers and duties of council [streamlining functions];

(5) repleals northern technology small grants program;

(6) gives council a role in development and implementation of federal Arctic Science Policy;

(7) increases membership to 9 members; removes designated seats on council;

(8) requires all agencies to submit notification of commencement of research activities and copy of final research reports to Office of Governor and council;

(9) establishes post of Alaska Science Advisor.

I believe this draft meets most of the needs of the Alaska scientific community, the legislature, the governor's office, and the council. It should assist Senator Murkowski in promoting the Arctic Research and Policy Act; it repeals the grants process now in disfavor among House Republicans; it meets the governor's need for scientific advice within OMB. A possibly controversial section is the creation of the Alaska Science Advisor. One item I considered, but did not put in, is enforcement of existing statutes requiring agency researchers (and consultants) to provide copies of research results to the state library and other sources so the research is not lost. You might wish to consider making it a class C misdemeanor not to file the reports required by law to spur compliance. [Such a section would certainly bring attention to the bill; you could argue that a person who deprives the public of the results of state-funded research is guilty of theft.]

I will call you this afternoon to discuss this bill.

(1) of 6

IN THE SENATE OF THE STATE OF ALASKA

THIRTEENTH LEGISLATURE - FIRST SESSION

A BILL

For an Act entitled: "An Act relating to the Alaska Council on Science and Technology, and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*Section 1. LEGISLATIVE FINDINGS. The legislature finds that

(1) there exist in this state scientific and technological research capabilities which have the potential to contribute significantly to the processes of state government, to industry, and to the public welfare;

(2) the scientific and technological capabilities and knowledge of the state should be available to assist in issue analysis and fact-finding necessary for governmental policy-making activities;

(3) policies for expenditures by the state on science and technology research and development need to be designed or redesigned to achieve the highest and best use of research dollars;

(4) state agencies need to improve initiatives to ascertain the extent of existing knowledge on subjects, problems, or issues of concern prior to the initiation of new research;

(5) existing organizations concerned with production, transfer, and dissemination of scientific and technological knowledge in Alaska need to be more effective in the execution of their missions; and

(6) state agenices and consultants need to comply with

2 of 6

existing law to produce, and properly file, research and other investigative and analytical reports on the completion of research, investigative, or analytical projects.

*Sec. 2. AS 44.19 is amended by adding a new section to read:

ARTICLE 3E. ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Sec. 44.19.241. COUNCIL ESTABLISHED. (a) There is established in the Office of the Governor the Alaska Council on Science and Technology. The council consists of one member representing the Office of the Governor and eight members who are appointed by the governor upon the recomendations of the state's scientific, engineering, and related communities and organizations. Members have overlapping three-year terms. The council shall elect one of its members as chair. A chair may be elected for successive terms as chairman and serves until a successor is designated. Five members constitute a quorum.

(b) There is established in the office of the governor the position of Alaska science advisor. The science advisor is in the exempt service and serves at the pleasure of the governor. The governor shall appoint the science advisor after consultation with the council. The science advisor shall act as executive secretary to the council. Administrative costs for the council shall be borne by the office of the governor.

(c) Council members receive no compensation but are entitled to the travel and per diem provided by law for members of boards or commissions.

Sec. 44.19.242. PURPOSES. The council shall consider problems and developments involving the fields of science, engin-

eering, and technology and related activities affecting more than one state agency and shall recommend policies and other measures designed to:

(1) provide access to existing scientific and technological information and expertise necessary to the ascertainment and articulation of public policies or programs for the advancement of state needs or objectives;

(2) identify research or investigative needs, including areas requiring additional emphasis, in order to provide adequate bases of knowledge relevant to the development of public policies or programs for state economic or societal strategies;

(3) achieve more effective utilization of the scientific, engineering, and technological resources and facilities of state agencies, including the University of Alaska;

(4) further cooperation in science, engineering, and technology through policy, program and facility agreements between the State of Alaska and local governments, the academic community, the private industrial and business sector, the agencies of the federal government, and the governments of Canada;

(5) foster development and implementation of a national Arctic science and research policy; and

(6) perform such other duties as the governor or the legislature may assign.

Sec. 44.19.243. POWERS AND DUTIES. (a) The council may

(1) convene committees, task forces, conferences, public hearings, and other meetings necessary to carry out the public's purposes;

(2) request and receive from any agency of the state

government the assistance and data needed to carry out the requirements of this section; and

(3) assist the Arctic Science Policy Council and the Arctic Research Commission in identifying policy and program needs in national Arctic science and research policy.

(b) The council shall

(1) biannually submit to the governor and the legislature the findings of the council, including a listing, description, ranking, and justification of research needs, and a commentary on significant research activities of the preceding two years funded by the state and including the relationship of that research to the state's needs and priorities;

(2) promote and enhance high standards for research activities conducted by the state;

(3) at the request of either the governor or the legislature, advise in a timely fashion on inquiries concerning scientific investigation or comment;

(4) recommend one or more persons to the governor for appointment as the Alaska Science Advisor; and

(5) assist the governor in making nominations for presidential appointments to the Arctic Science Policy Council.

Sec. 44.19.244. REPORTS. (a) Biannually, within 10 days of the convening of each legislature, the council shall submit to the governor and the legislature a comprehensive report on the state of science and technology in Alaska, the issues surrounding scientific and technological research in Alaska, recommendations on additional research needs of the state, and a summary of

5 of 6

significant state research activities conducted during the preceding two years.

(b) Each state agency which conducts significant research activities shall, upon commencement of each research project, notify the office of the governor and the council of the project description, cost and source of funding. Upon completion of each research project, each state agency shall notify the council and shall forward the results of the project.

Sec. 44.19.245. DEFINITIONS. In AS 44.19.241-44.19.246, "council" means the Alaska Council on Science and Technology established in AS 44.19.241.

Sec. 44.19.246. SHORT TITLE. AS 44.19.241-44.19.255 may be cited as the Science and Technology Act.

*Section 3. AS 44.66.010(a)(6) is amended to read:

(6) Alaska Council on Science and Technology (AS 44.19.241) -- June 30, 1987 [1983].

*Section 4. AS 44.21.241-44.21.255 (Alaska Council on Science and Technology) are repealed.

*Section 5. AS 44.46.080 (d) (Northern Technology Grants) is repealed.

*Section 6. The unexpired terms of members of the Alaska Council on Science and Technology on the effective date of this Act shall continue until their original termination. New appointments made by the governor to fulfill vacancies on the council shall be made for terms which will result in three members terms expiring in 1984, three in 1985, and three in 1986.

*Section 7. This Act takes effect July 1, 1983.

6 87 6

OFFICE OF THE VICE CHANCELLOR
FOR RESEARCH AND ADVANCED STUDY
Rm. 10, Arctic Health Bldg.
901 Koyukuk Avenue South

UNIVERSITY OF ALASKA, FAIRBANKS
Fairbanks, Alaska 99701

March 7, 1983

Mr. Christopher Noah
Executive Director
Alaska Council on Science and Technology
Pouch CV
Juneau, Alaska 99811

Dear Chris:

I was pleased to read in the ACST Notes of February 28 that the Council has at least the possibility of renewed life. It would be most regrettable, in my view after watching its activities, were the Council to be eliminated and its funding cancelled. This Council has been one of the wise voices speaking during the recent years of change and development in Alaska—and speaking with the ratifying support of dollars to back new ideas in science and technology.

If we do not have an Alaska Council on Science and Technology, something else will have to be created sooner or later to replace it. Far better to leave it in place and not (once again) convey the impression to all who observe us that we oscillate this way and that in Alaskan political decisions, without any well formulated policy or purpose.

Yes, I do hope that this Council may have some continuity and proceed with its essential work.

Sincerely,

Keith B. Mather
Vice Chancellor for Research
and Advanced Study

KBM/afs

P.S. Marshall
707 A St.
Anchorage, AK 99811

10 February 1983

The Honorable
Vic Fischer
Pouch V
Juneau, AK 99811

Dear Sir:

The Governor's decision to eliminate FY84 funding for the Alaska Council on Science and Technology came as an unwelcome surprise, considering his favorable campaign stance towards it and the Alaskan science and engineering community. Its termination is shortsighted, because it provided a responsive agency on the State level in a field of what should be increasing endeavor given the course of local development. There is a need for programs supporting science projects special to Alaska. Furthermore, scientific and engineering knowledge for public policy purposes transcending agency missions or interests is no longer available.

On a larger scale, this event may adversely affect Alaskan efforts in the U.S. Congress for a Federal Arctic Science Program. This program, which has passed in the Senate, requires State participation and funding to 25%. It is inexcusable that the U.S. has no organized arctic science program given the size and significance of Alaska.

I strongly urge you to lobby and vote for the preservation of the Council.

Sincerely,

PS Marshall

P.S. Marshall

LAKE STREET, (BOX 737)
KA, AK. 99835 PHONE: 907-747-6276

PUBLIC OPINION MESSAGE FORM

Messages are transmitted via computer lines to the Capitol Building in Juneau and hand-delivered to the Legislators' mail boxes directly outside the Legislative chambers. Messages left after-hours on the recorder telephone will be transmitted the following day.

* All messages must be accompanied by your name, mailing address, and telephone number so that legislators can respond to you.
* All messages must be delivered by the signing individual, either brought in person to the Legislative Office or provided by telephone.
* Messages are limited to 50 words.
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* You may address any individual legislator, several, or all State legislators. If you are uncertain about the appropriate legislators to include for your message, the Legislative Office will be happy to assist you.
* You are encouraged to follow your Public Opinion Message with a letter or call to the Legislators, giving greater detail or back-up information. Addresses and telephone numbers are available at the Legislative Office.

DATE 25 Feb 83

YOUR NAME Jan Straley

REPRESENTING

MAILING ADDRESS PO Box 273 Sitka Alaska 99835

Home Telephone 747-5431

Business Phone 747-6850

TO:

RE: FY 84 budget - Alaska Council on Science & Technology

MESSAGE: 50 words

Please DO NOT eliminate funding of this program. It is an invaluable assest to the science and research community. Please maintain funding at FY 82. or higher level. It is a unique opportunity for an individual in a non-academic community to contribute quality knowledge and information to the state's resources and educational base besides providing otherwise unattainable information. If this program is slated for cuts or elimination please contact me immediately and let me know the reasons why the Alaska Council on Science and Technology is being considered to be abolished. Thank you Jan Straley

Use Reverse if Space is Needed

THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

1982 ANNUAL REPORT

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

JUNEAU, ALASKA

JANUARY, 1983

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

1982 Annual Report

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A. BACKGROUND AND STATUTORY CHANGES

The Council on Science and Technology was established in recognition of the fact that many decisions were being made by policy makers without sufficient scientific information. It was further realized that as oil revenues grew so would the number of large-scale development projects. The need for scientific and technological advice on the projects themselves and the need to identify what research should be undertaken to address these issues gave further impetus to the creation of the Council.

Interest in the Council came from many areas and all worked with the executive and legislative branches to develop a type of advisory body that would include university, state, private and federal researchers. The catalyst came in 1977 when an ad hoc committee of representatives of these groups met at the annual American Association for the Advancement of Science Conference in Anchorage. An additional catalyst was the availability of funds from the National Science Foundation to study approaches leading to the establishment of a state science mechanism that would be most suitable for Alaska. This study resulted in the submission and ultimate passage of House Bill 722 in the 1978 legislative session.

As defined by the statute the main tasks of the Council are to:

- identify and prioritize state research needs;
- provide advice to the governor and legislature; and
- set standards for research and establish review procedures for research proposals.

The initial administrative functions were handled by the Division of Policy Development and Planning in the Governor's office. DPDP began the initial search for members and presented recommendations for Council membership to the governor in the areas specified in the statute:

- two members from the university,
- two members from the private research community,
- two members from state agencies with research activities, and
- one member from the staff of the legislature.

On October 3, 1978 the Council members were appointed by Governor Hammond.

As the statutory responsibilities of the Council grew they began to tax the administrative capabilities of the governor's office. These duties were transferred by administrative order to the Department of Environmental Conservation in 1980 and then to the Department of Administration in 1981.

In 1979 a bill was passed giving the Council responsibility for the administration of the Northern Technology Grants program. For three succeeding years the Council received appropriations of $50,000, $175,00, and $230,800 which resulted in grant funds for 117 projects.

Also in 1979 the Council's statute was altered to include coordination with the Alaska Renewable Resources Corporation. After two meetings during 1979-1980 it was determined by the Renewable Resources Corporation that they would prefer to forge ahead with their program without Council advice.

In 1981 the Council established the scientific and technological account to fund research projects that addressed state needs. An initial appropriation of $300,000 allowed the Council to distribute funds via the competitive grant process to six successful grantees. To date 33 projects have been funded using $3,024,600.

Finally, the Council statutes were altered by the addition of the Council as an advisory body to the Alaska Energy Center. After several initial meetings the Council had little subsequent contact with this agency.

Throughout its history the Council has relied on a small staff consisting of the Executive Director, Administrative Assistant and Secretary. Additional support has come from the Chairman's home institution whether in Juneau, Fairbanks, or as it is presently in Anchorage. It has been a strong policy of the Council to keep staff numbers low and to call for scientific expertise on an as-needed basis through volunteer services, to assist the Council whether in proposal review, prioritization of research needs or other advisory services.

B. SUMMARY OF MAJOR ACTIVITIES 1979-1982

The concept of the Alaska Council on Science and Technology was quite new in the United States and especially to Alaska when it was begun in 1978. After a brief organizational period and the basic administrative tasks completed the Council was able to begin to effectively carry out its charge. Because of its broad mandate and limited resources it was necessary for the Council to decide very early how to accomplish its primary goals. Realizing it could not immediately achieve all of the objectives of its enabling legislation the Council formally adopted a plan which would address the most pressing needs of the state. Operating under this framework the Council's major activities have included:

- assistance in the development of state and national policy for the growth and enhancement of Alaska and Arctic scientific and engineering programs;
- determination of state research needs;
- allocation of grants for scientific and technological research and application;
- dissemination of scientific and technological information; and
- the input of scientific and technological expertise in the formulation of state resource and development policy.

1. SCIENCE POLICY

In an effort to coordinate science on a state level and to provide better coordination with the federal government, the Council has undertaken the responsibility to provide its views on how a coordinated arctic science policy

could be developed. Besides providing general information on arctic research, science and technology, the Council has worked to insure the state of Alaska has a strong voice and role in arctic science policy commensurate with its geographic location. This has been accomplished through testimony at state and federal hearings, sponsorship of resolutions and most especially in close cooperation with federal officials. The Council sponsored formal state hearings to ascertain the community's opinions and facts as background for a state science policy. Other hearings were held to determine the impact of federal cutbacks on cold weather research. Council members provided testimony on legislative resolutions clarifying the state's position on science and technology. The Council has also provided briefing materials and expertise to the governor's office for the state administration's testimony supporting arctic science in Washington, D.C.

2. RESEARCH NEEDS REPORTS

Because of the multi-disciplinary nature of most of the issues facing the state, the Council decided not to present research needs broken down into scientific disciplines but rather on categories of issues. The Council settled on an approach which had been tried by other organizations: to ask the experts what research needs they felt were priority in the areas they knew best. A listing of the ten research needs categories appears as Appendix A. A recent analysis of the research needs reports shows that 65% of the recommendations were adopted, resulting in changed directions in programs and/or funding.

3. ADMINISTRATION OF GRANTS PROGRAMS

Research Grants

This program was begun in 1981 when the Council received $300,000 for "geophysical hazards and other research" via a general fund appropriation. Over the life of the program 33 projects have been funded, with 18 supported in 1982. All projects were reviewed using adherence to the aforementiond research needs reports for general guidance. The following specific selection criteria were also used: 1) Significance to Alaska; and 2) Quality of the proposal and proposer. Categories of funding paralleled the Council's research needs reports in health, seismology, transportation, natural hazards, energy, communications, agriculture, education, minerals, and living resources. See Appendix B for a brief progress report on each project.

The volunteer review system established by the Council has received praise from proposers and reviewers. Approximately 275 volunteer reviewers, including many national and international experts, reviewed 142 proposals submitted to the Council. Each proposal was reviewed by five experts in the particular field of the proposal. This comprehensive review allowed the Council to select the best of the proposals submitted. It is estimated that this method of review saved the state approximately $165,000 in direct expenditures and provided insight from worldwide experts that will enhance research direction critical to state needs. When completed this research will add another positive dimension to developmental decisions facing the state.

Technology Application Grants

The Northern Technology Grants Program began in 1979 with an appropriation of $50,000. Throughout the history of this program the ACST allocated $305,000 resulting in 117 projects. Halfway through FY82 the Council voted to suspend funding on new "Nortech" projects. This decision was reached for two reasons: 1. very few innovative proposals were being received and 2. to wait for an analysis of the projects currently funded.

Due to elimination of funding for this program and the corresponding reduction of staff positions, an adequate monitoring program for the 80 currently outstanding projects will not be continued. Projects are monitored on a "time and resources available" basis or in close coordination with other state agencies. The final evaluation of this program is not completed at this time, as more than 75% of the projects are still underway.

4. INFORMATION DISSEMINATION

Information dissemination has taken three forms.

First has been the publication of reports on:

- research needs and priorities;
- summaries of important meetings;
- position papers;
- results of research projects; and
- technical summaries of Northern Technology projects.

The audiences for these reports have varied. However, except for the reports delineating the research results of funded projects and those on science projects, the main purpose has been to inform on an issue or generally explain a project rather than to present an in-depth scientific analysis on science and technology in Alaska.

The second method of information dissemination has been sponsorship of conferences. This form of information transfer began in 1981 but it was not until 1982 when, with the sudden infusion of money, the Council was able to provide new, active methods of promoting scientific interchange. It sponsored 25 scientific and technological conferences, from "Women in Science" to the "6th International Symposium on Circumpolar Health". A complete list of Council supported meetings is attached in Appendix C.

In conjunction with the above, the Council also provided small grants for scientific articles, reports, poster sessions and displays. This type of support has resulted in increased awareness of non-scientists as well as increased communication between scientists.

The third form of increasing scientific and technological awareness has been through a newsletter. The Council decided to alter the initial format of its newsletter from one covering activities to Council actions. The resulting "ACST Notes", provides short, concise updates and progress reports on Council activities. "Notes" also provides a mechanism for readers to request ACST publications and results of research. Such requests run about 80-100 per month for the current twenty-seven publications available. See Appendix D

for a list of ACST publications. This material has proved useful for the average citizen as well as the researcher.

5. COORDINATION WITH OTHERS

Within Alaska

To eliminate potential duplication of effort the Council has worked closely with all state, and most federal entities within Alaska. In 1982, the Council staff and members have worked especially close with scientific and technological counterparts from:

- Division of Energy and Power Development, Department of Commerce and Economic Development
- Division of Policy Development and Planning, Office of the Governor
- Division of Emergency Services, Department of Health and Social Services
- Village Safety Officer Program, Department of Public Safety
- Division of Planning and Research, Department of Transportation and Public Facilities
- State Epidemiologist's Office, Deaprtment of Health and Social Services
- University of Alaska's Research Institutes

Outside Alaska

In its continuing effort to improve advisory services and grants administration functions the Council has contacted other states with similar science advisory groups. A survey of other states was also undertaken by staff to learn of similar organizations and to profit from their experiences. Besides identifying what other groups were doing in this area it was found that Alaska was most unique not only in its organization and functions but

by its administration of its grant program. The results of the survey are in Appendix E.

A typical sample of science and technology groups the Council worked extensively with outside the state in 1982 would include:

- Science Advisory Board of the Northwest Territories
- Polar Research Board of the National Academy of Sciences
- Cold Regions Research and Engineering Laboratory, U.S. Army Corps of Engineers

C. SUMMARY

In the development of a unique science advisory and granting agency successes and failures have been noted; but the process has been dynamic with the Council learning from its failures and capitalizing on its successes.

Of the many programs and activities undertaken by the Council several achievements stand out:

1. COORDINATION

Although coordination of the science community is not a statutory requirment, the Council has served as a de facto focal point for science in Alaska. For it does not "look after" one segment of the scientific or technological community but relies on the depth of knowledge from all: the university, consulting groups, private industry, the state and the federal government.

2. SCIENCE POLICY

The initiatives of the Council coalesced sixteen years of planning into a national arctic science policy which will soon hopefully be a reality with the expected passage of S.373 in the U.S. Senate. This will not only bring valuable research dollars into the state but for the first time formalize dialogue between the state and federal governments on science in Alaska.

3. RESEARCH GRANTS

Besides the actual granting funds for projects that add a scientific dimension to the "puzzle" surrounding state issues, the Council developed a highly successful review process never before used on the state level.

4. NORTHERN TECHNOLOGY

Despite some failures in this program many projects have been successful and lead to "state of the art" technological application in Alaska. However, a more important contribution should be noted: developing alternative technologies has made many Alaskans aware that alternative approaches may be used to solve many of the issues facing the state.

In conclusion it should be noted that for a relatively low expenditure of funds citizens of the state have gained: the use of volunteer experts; provision of science information in decisions; a forum for scientific and technological development and a unified arctic science policy.

ACST/ANNUAL REPORT

APPENDIX A

Research Needs Reports

- Agriculture and Animal Husbandry
- Communications and Information Transfer
- Health and Human Life
- Living Resources
- Minerals
- Natural Hazards
- Seismology
- Rural Education
- Transportation
- Water Resources

ACST/ANNUAL REPORT

APPENDIX B

Listing of ACST Funded Research for 1982

Title: Enhanced Oil Recovery in Alaska
Grant Amount: $120,000.
Completion Date: November 30, 1983

Purpose: A two-phase research project on enhanced oil recovery in Alaska. The first phase (funded), deals with the physical properties of the Alaskan crude oils. The second phase, (currently unfunded), which is the subject of a future proposal, will deal with the geological description of the formation properties of Alaskan reservoirs.

Application: Alaska owes most of its present and much of its future prosperity to revenues from oil and gas production within the state. As primary production rates begin to decline and secondary measures such as gas cap injection and water flooding reach the limits of effectiveness, the life of Alaskan reserves will be greatly extended through the design of appropriate enhanced oil recovery (EOR) processes.

Status: Technology for the exploitation of petroleum reservoirs is classified into three modes of production. The first, primary production, is dominated by the removal of reservoir fluids accompanied by declining pressures within the formation. For a typical petroleum reservoir, initial oil remaining in the formation when no more oil can be recovered by the above means is between 70 and 90 percent.

Usually the secondary recovery processes such as water flood or gas cap injection are initiated well before the primary recovery methods are not longer effective. Under ideal conditions, another 10 to 15 percent of the oil in place can be produced using secondary recovery processes. The reservoirs in Alaska are all in various stages of primary or secondary recovery.

The remaining oil and/or gas becomes a potential target for tertiary oil recovery.

The first step in the study of Alaskan crude oil properties was to accumulate and correlate all existing data on Alaskan crude oils. This information will be published in March, 1983. Petroleum companies have provided data from their files for use in this effort. Preliminary results suggest that the Alaskan crude oil properties deviate significantly from published correlations for other regions in North America. It is believed that the new correlations developed through this project will be useful to the operating companies in Alaska.

Partially through funds provided by ACST, the Petroleum Engineering Department has assembled equipment for a laboratory especially designed for the study of reservior fluids. This "PVT" laboratory is the first of its kind in the State of Alaska and should prove invaluable to work in years to come. The investigatiors hope to use this laboratory to study the properties of Alaskan crudes in more detail, and to refine property correlations. As a measure of

the importance of this activity, the reservoir fluid analyses provided by "PVT" laboratories are critical in the calculation of reserves, the design of a production policy, and the design of surface handling equipment. The development of more accurate correlations for fluid properties will be particularly useful for the design of enhanced oil recovery processes, and in general, will be useful in all phases of design for the efficient exploitation of Alaska's petroleum resources.

Christine A. Ehlig-Economides
School of Mineral Industry
University of Alaska - Fairbanks

Title: Effects of Commercial Television on Rural Alaska Children
Grant Amount: $77,714.
Completion Date: June 30, 1983

Purpose: In August, 1982 funds were awarded to support the third and final phase of a study on the effects of the introduction of satellite television on rural Alaskan children.

Application: Research conducted elsewhere in the United States suggests that television may be an even more important influence on minority culture than on majority culture viewers, particularly those who are isolated from alternative sources of information. Reports from this study will provide the state with the opportunity to assess some of the effects of satellite technology on rural Alaska, and to use the information gained in developing telecommunication policy. The information from this study will also be made available to those who participated in the study and to other interested citizens.

Status: During November 1982 data were collected from six villages, four in the Kotzebue basin area and two in Southeastern Alaska. Previous phases of the study, which was initiated in 1976 with funds from the National Science Foundation, included Athapascan and Aleut villages and two non-Native logging camps. Initially, communities in each area were paired so that one had television and one did not. All participating communities now have television.

In each village, students in grades three through eight, high school students who had previously participated in the study, and a sample of parents were interviewed. In addition a number of social, psychological, and education measures were administered to student participants. Those measures reflected television's role as a socialization or acculturation agent influencing sex roles, self-esteem, aggression, ethnic stereotypes, perception of social reality, language use, cultural identity, aspirations and expectations, and spatial-perceptual skills.

The Center for Cross Cultural Studies (CXCS) expects to release a non-technical report of the results of this study in late spring, 1983.

Norma Forbes
Center for Cross Cultural Studies
University of Alaska - Fairbanks

Title: Yukon-Kuskokwim Coastal Communtiy Harvest Disruption Study
Grant Amount: $79,888.
Completion Date: April 30, 1983

Purpose: When completed, this study will describe and analyze the past and present economy, culture and social organization of three communities on or near the Yukon River delta--Alakanuk, Sheldon's Point, and Scammon Bay.

Application: It will provide information necessary to predict the possible social effects that might result from a disruption in current subsistence harvest patterns in western Alaska following either upland or offshore oil and gas activities. The study sites have been chosen because of their proximity to the site of projected gas and oil development. If the continued viability of these and other communities in western Alaska is seriously valued, it is imperative that potential effects of proposed development on their social and economic systems be identified and analyzed.

Status: Seven points are evident so far: 1) Current subsistence harvest levels continue to be high, with households deriving from 30 to 80% of their protein from the extraction of local resources. The average yearly capital cost of resource extraction is $5,480. per household. In only a very small number of households, the majority in the larger community of Alakanuk, is there a large enough cash income to purchase the food, clothing and stove oil necessary to see a family through the winter without recourse to the area's renewable resources.

2) In order to harvest these resources (which include birds, marine mammals, fish, berries, eggs, greens, and shellfish) various strategies are employed. Families that have a higher annual income can afford to harvest a wider variety of resources and can afford to exploit those resources requiring relatively high capital investment. For instance, they can afford the gasoline to undertake the numerous trips to the edge of the shore fast ice necessary to harvest sea mammals in the springtime, while cash poor families are restricted to ice fishing in the slough adjoining the village. Also those with year round employment can paradoxically afford to retain salmon for winter use instead of selling it all during the commercial salmon season. Conversely families that have a medium or low annual income, mostly tied to commercial salmon fishing, are those most in need of dried salmon for winter use and seal meat in the spring, yet the least able to exploit these resources. Instead they must rely on the harvest of resources that have no commercial value and that can be obtained without high cash outlay for gasoline for snowmachines or outboards. Given the variety of income levels in the villages today, all resources are important, although the disruption of any one resource would affect families differently.

3) Third, an increase in a family's annual income not only results in an increased ability to purchase consumer goods and accumulate wealth, but also in an increased ability to participate in subsistence harvesting and reciprocal networks based on the exchange of subsistence products. While families with a relatively low cash income are only able to invest 15% of their income in the harvest of subsistence resources and do not harvest in amounts great enough to allow them to participate extensively in community exchange networks, families with a high cash income can and do invest a larger percentage of their income in the harvest of subsistence resources and consequently obtain the products necessary to participate extensively in inter-village exchanges.

4) The smaller communities, like the poorer families, have definite social limitations, e.g., less education and employment, and less well educated and employable individuals reside there. They have the advantage, however, that subsistence resources are easier and cheaper to harvest, as the population pressure on the area is not as great.

5) Fifth, it is impossible to separate the effects of a disruption in the commercial salmon fishery from the ability of villages to harvest resources for subsistence purposes. A disruption of the commercial salmon fishery would drastically reduce annual incomes of 92% of the families in the villages under consideration, with a corresponding decrease in their ability to harvest subsistence resources from the present village sites. What would follow a disruption of the commercial salmon fishery would be increased dependence on welfare and/or the revival of seasonal camps for such activities as fall whitefish or spring pike fishing.

6) At present in the study area, the distance people go for resources is often very great, and reflects the point of origin of the harvester rather than the most proximate location of the harvested.

7) Present village populations are not simply concentrations of historically adjacent populations, but draw from broad, overlapping areas. All three villages under study are composed of separate and separable family groups which are themselves closely knit but which only in the last ten years are beginning to be consolidated through intermarriage and the effects of intercommunity distribution and exchange networks, both modern and traditional.

In conclusion, the harvest disruption of key species such as salmon or sea mammals would not only result in economic hardship but in extreme social disruption in the study area. The villages are not as permanent as they might appear to be.

Ann Fienup-Riordan
325 East Manor Street
Anchorage, Alaska 99501

Title: Effective Teachers in Rural Alaska
Grant Amount: $145,718.
Completion Date: June 30, 1984

Purpose: This study will examine how teachers who are effective in village Alaska go about the business of teaching. How do they teach reading, for example when students speak a language other than standard English? How do good teachers organize the classroom when they have twenty students ranging from the first to the sixth grade? How do they set standards for academic performance and student behavior when students come from a culture with different rules for conduct?

This study will identify a group of teachers whom both village communities and professional educators regard as unusually successful teachers. It will describe in practical terms exactly what these teachers do in the classroom and how they work with the community.

Application: The potential benefits of this research are immense. This study will develop more practical, applied methods of training teachers for village classrooms. Better trained teachers will ultimately result in better education for Indian and Eskimo children in isolated villages.

The results of this research will include:

1. Inservice workshops for rural teachers on effective teaching methods.

2. University education courses which deal with practical teaching problems in rural Alaska.

3. Professional papers and popular articles on rural teaching.

4. A 30 minute videotape showing what effective village teachers actually do in the classroom.

Status. During the first five months of this project, the research literature on teacher effectiveness has been reviewed. Investigators have talked to University faculty, representatives of National Education Association-Alaska, school superintendents, and village teachers about possible approaches and problems (e.g., validity of gains in standardized test scores with small numbers of students, obtaining permissions from all students to videotape rural classrooms). Three exploratory studies have been conducted to test different ways of identifying effective teachers.

A research team has been organized consisting of seven university faculty and research associates. Most members teach courses on rural education. By participating in the research itself, the team will be familiar with the results and can apply what is learned in their work.

The first problem in t s study is to identify a group of especially "effective" teachers in village Alaska. Experienced rural teachers will be selected who meet three or more of these criteria: 1) teachers nominated as unusually effective by professionsl colleagues; 2) teachers viewed as especially successful by village communities and students; 3) teachers viewed as outstanding by school district administrators; and 4) teachers whose students have greater than average gains on achievement tests.

Next, these teachers will be interviewed and observed. Investigators will see whether they are using the specific teaching practices that national research has found important to good teaching (e.g., assigning setting high standards, teaching to whole groups rather than using an individualized teaching approach).

The Alaska Department of Education's Effective Schooling Project is promoting the use of such teaching practices throughout Alaska schools. The Department wants to know whether or not the national research on effective teaching applies to rural Alaska. This study will provide the Department with this critical information.

In addition, we will see what unusual teaching stategies effective rural teachers have developed for the special teaching conditions in Alaska--small schools, multi-grade classrooms, and students with a different cultural background and frame of reference.

Judith Kleinfeld
Bill McDiarmid
Institute of Social and Economic Research
University of Alaska - Fairbanks

Title: Monitoring Program of Near-Shore Bottomfish
Grant Amount: $72,710.
Completion Date: June 30, 1983

Purpose: The developing bottom-fishery for inshore stocks of rockfish and lingcod in southeast Alaska is the subject of this project. A major goal is to develop a monitoring strategy that will provide information needed to manage this valuable resource.

Alaskan small-vessel fishermen are turning to new fishery resources to augment their traditional catches of salmon, halibut and crab. Near-shore bottomfish are accessible alternate resource for many of these fishermen, and expansion of markets will undoubtedly mean increased effort on these fish stocks. This project is designed to help avoid the short-lived, boom-and-bust nature of fisheries for underutilized or non-traditional species. The ultimate goal is to provide long-term, sustained production of local bottom-fisheries for small-vessel fishermen.

Application: Innovative, long-range plans are needed to insure the commercial viability of the fishery prior to increased exploitation. This project was designed to identify those characteristics of the exploited fish stocks that will provide the most economical and useful indicators of overfishing.

Status: The chief accomplishments of the research project are:

1) Completion of 30 days of test (survey) fishing aboard the M/V Searcher in the vicinity of Sitka Sound - a total of 2,140 fish were sampled with automatic jigging machines. Assessment techniques that were developed in this study will provide the mechanism for future repeat censuses in three major study areas and three depth zones. Procedures were established for estimating catch-per-unit-effort (CPUE) through standardization of gear type, fishing techniques, and accurate logging of fishing time and catch.

2) The dockside sampling of 3,401 bottomfish caught by the commercial fleet in order to monitor species composition and CPUE. Changes in commercial catch composition or catch rates may be useful indicators of changes in fish stocks.

3) Tagging of 1,031 rockfish and lingcod in the Sitka Sound region - none of these specimens have been taken by either commercial or recreational fishermen; however, dozens of tagged fish were sighted by project divers, indicating that tag retention was satisfactory.

4) Underwater censuses of juvenile and pre-recruit fishes were conducted by diver-biologists in key in-shore areas adjacent to major study areas and fishing grounds. These fish stocks were found to be highly structured by depth; consequently, inventories of juveniles in shallow waters may provide an index of future stock numbers.

Lewis Haldorson
University of Alaska, Juneau

Title: Sixty Seconds of Science
Grant Amount: $62,006.
Completion Date: December 31, 1982

Purpose: "Sixty Seconds of Science" is an award-winning series of radio programs written and produced at the University of Alaska's Arctic Environmental Information and Data Center. Ten 60-second programs are distributed each month for broadcast by public and commercial radio stations statewide. The series airs on 85% of the radio stations in Alaska.

Application: The overall goal of this project is to increase public knowledge and understanding of the role of science and its relevance to our lives. These science programs informally educate a broad and diverse audience including the general public and the science-literate public. In Alaska, young people and rural residents are higher-than-average radio listeners.

Status: "Sixty Seconds of Science" was developed in 1980-1981 under a grant from the National Science Foundation. Funding for the project was continued (1981-1982) through the Alaska Council on Science and Technology. Durings its two years on the air, "Sixty Seconds of Science" won an award as a finalist in the International Radio Festival of New York, 1982, and has won three awards for excellence from the Alaska Press Club, 1981 and 1982.

Topics cover the spectrum of science in Alaska, from the natural wonders of the arctic such as pingos, glaciers, and the aurora borealis to the animal life which inhabits this northern world, such as polar bears, whales, lemmings, and reindeer. The program attempts to answer some of the most commonly asked questions such as "What is hypothermia?" "Why to leaves turn colors in the fall?" "Why is a glacier blue?" and "What are petrochemicals?" It also explains subjects more out of the ordinary from Alaska's "drunken forest" and tropical underwater boulder patches to the sex life of a shrimp and the elephant seal's inflatable nose.

Nan Elliot, Producer
Arctic Environmental Information and
Data Center
University of Alaska - Anchorage

Title: Biogeochemistry of Arsenic Mine Drainage
Grant Amount: $83,500.
Completion Date: October 1, 1983

Purpose: Groundwater levels of arsenic high enough to pose human health problems have been discovered in the Ester Dome area near Fairbanks, Alaska. Ester Dome is historically a site of major lode-gold mining. Placer mining is presently active here and lode mining is being revitalized. The discovery of arsenic has aroused interest to determine the biogeochemical processes involved in the release of heavy metals such as arsenic from mine material and mine wastes into streams and groundwaters.

An iron-and sulfur-oxidizing bacterium call Thiobacillus ferrooxidans is known to be responsible for heavy-metal leaching and acid production in waters draining from sulfide deposits throughout the world. Since sulfides and heavy metals are commonly associated with lode-gold deposits and are sometimes associated with placer deposits, it was reasoned that this bacterium may play a role in the heavy-metal contamination of subarctic streams and groundwaters that are impacted by gold mining.

Application: The fact that T. ferrooxidans is ubiquitous in subarctic streams impacted by mining illustrates that preventing heavy-metal pollution will be problematical. On the other hand, its presence also indicates that biohydrometallurgy (microbial mining) may be successfully employed in Alaska. A lode mine operation designed using this biotechnology could efficiently extract more valuable metals (gold, molybdenum, zinc, antimony, copper, etc.) with less shipping costs than conventional separation technologies. In addition, because more heaving metals can be recovered for profit (using bacteria), fewer heavy metals would be left in the tailings for T. ferrooxidans to leach into nearby streams and groundwaters.

Status: The first step in the study was to determine if Thiobacillus ferrooxidans was present in subarctic streams affected by gold mining activities. Large numbers of these bacteria were found in 90% of the placer mine drainages sampled. Measurable amounts of dissolved arsenic were also found in 30% of the streams affected by placer mining activities.

With the discovery that T. ferrooxidans exists in subarctic streams affected by mining activities, a second phase of the study began -- to determine whether or not these bacteria are directly involved with the leaching of heavy metals from mine material into surface waters and groundwaters. Some active zones in tailings from abandoned lode mines were examined. Waters draining through these tailings are highly acidic, contain very large numbers of Thiobacillus ferrooxidans, and have dissolved arsenic concentrations as much as 500 times greater than the Environmental Protection Agency's recommended limit of 50 parts per billion for potable water. The presence of

dissolved metals (such as arsenic in water that has drained through mine tailings) indicates that heavy metals are leaching from the tailings under acidic conditions. The results also suggest that the bacterium, T. ferrooxidans, may be directly involved in the leaching of arsenic and other heavy metals into subarctic streams impacted by active and abandoned mines.

To investigate the mechanisms of arsenic leaching in more detail, the third phase of studies were begun. This phase includes several types of laboratory studies. A Thiobacillus ferrooxidans strain (isolated from a creek in the Fairbanks area impacted by a placer mine) is being used for laboratory studies in which we have been able to assess the amount of arsenic that can be biologically leached from gold-mine material. This strain is able to withstand dissolved arsenic concentrations exceeding 900 parts per million. The results of several experiments support the contention that heavy-metal leaching occurs in localized zones and not in the neutral pH streams where T. ferrooxidans and dissolved heavy metals have been detected. Further studies are being conducted to distinguish between biological and nonbiological dissolution of heavy metals and to describe the growth kinetics of T. ferrooxidans.

E.J. Brown
Institute of Water Resources
University of Alaska - Fairbanks

Title: Northern Plant Documentation Center
Grant Amount: $29,541.
Completion date: July 1, 1983

Purpose: The Northern Plant Documentation Center at the University of Alaska, Fairbanks, was established to meet the need for accurate information on the distribution of plants in Alaska by state, federal, and private (industry) land managers in order to exploit natural resources and comply with regulations that guide the development of wildlands. Although the requisite information might already be present in museum collections, until the advent of computerized data management, these sources could not be efficiently used.

Application: A fundamental step in the process of industrial development on state and federal lands in Alaska, pursuant to NEPA and other related legislative acts of Congress and the State Legislature, is a prior assessment and evaluation of social and environmental impacts that could result from a given project. The standard against which environmental impact is evaluated has become known as the environmental baseline, which is established in large part from inventories of biological resources. These inventories for a state as large and as varied as Alaska can become major efforts in themselves.

Since plants are the foundation of our ecosystem, a knowledge of vegetation and flora is paramount to describe the pre-impact conditions against which changes can be measured. With floristic details, there is documentation for vegetation analysis and knowledge of what plants are restricted and rare and suitable for protection under the Endangered Species Act.

Status: The Northern Plant Documentation Center has continued to place in its computerized file the label data from herbarium specimens at the University of Alaska Museum. Specimens are withdrawn, taxon by taxon, identifications are verified, label data are checked and missing elements are added, and the data (10 to 13 fields commonly, with the potential for 31 fields) are entered via a terminal linked to the University computer. Hard copy is proofed and corrected, after which reports of various types can be written. The project is labor intensive, and progress is incremental without quantum leaps. Each batch of specimens adds to the data base and thereby also to its usefulness both in terms of taxa and geographic areas covered.

Other accomplishments during the first six months include: proofing and editing of the first 10,000 entries for vascular plant specimens entered prior to the start of ACST funding; proofing and editing of some 9,000 records entered from the Moss Flora of Arctic Alaska; activation of SELGEN program for global commands; development of routine to check quadrangle against latitude and longitude; updating of our registry of type (nomenclatural) specimens; development of list of bryophytes by site along the Dalton Highway for the Moss Flora

of Arctic North America project workshop, an ACST sponsored meeting; preparation for the loading of specimens cited for the Alaskan Arctic Slope; and entered the data from 6,035 vascular plant specimens.

David F. Murray
Alan R. Batten
Institute of Arctic Biology
University of Alaska - Fairbanks

Title: Solar Radiation Assessment for Alaska
Grant Amount: $165,964.
Completion Date: September 30, 1983

Purpose: This project, the assessment of the solar radiation potential for Alaska, was designed to collect solar radiation data, which are of special interest for solar energy application.

Application: To undertake a complete assessment of the solar energy available in the four main climatic regions of Alaska in a form directly usable by the "solar energy community" within the State, and to disseminate solar radiation data to users through the newly formed Alaska State Climatic Center.

Status: The investigators are compiling a large amount of data which, when reduced to a form directly usable to the solar community, will enable the people of Alaska to have available to them a complete assessment of the solar energy available in all four climatic regions in Alaska.

The four climatic zones in Alask are: a) coastal maritime, b) transitional, c) continental interior and d) arctic. It is essential that data be obtained in each region, so data collection stations have been established in Kodiak, Anchorage, Fairbanks, and Barrow. The divisions into climatic zones, also form the logical breakdown of radiation regimes since each zone represents particular conditions of cloudiness, type of clouds, ground reflectivity, humidity, temperature, etc. These parameters are relevant in determining solar energy potential. The stations are also located within some of the largest populated parts of each climatic zone where the information is anticipated to be of primary interest; however, data can be extrapolated to bush communities in the same climatic zone.

Besides the stations in this study, there are only three other stations in Alaska (Fairbanks-National Weather Service, Palmer-University of Alaska and Barrow-GMCC), none of which measures the direct beam or energy received on a south wall or slope. Such measurements are essential for all solar energy applications.

Since this program commenced in Fairbanks, the project investigators have received requests for solar radiation data from architects, building contractors, design engineers, students as well as many persons interested in solar energy from different regions in Alaska. This data is also utilized by scientists in various fields including many with grants from ACST, State of Alaska and Federal Government. These scientists are in areas not directly related to solar energy, they work in agriculture, hydrology and the health field.

Gerd Wendler
Geophysical Institute
University of Alaska - Fairbanks

Title: Taiga Forest Management Model
Grant Amount: $63,236.
Completion Date: September 30, 1983

Purpose: The purpose of the project is to integrate existing data (collected mostly by the Forest Soils Laboratory of the University of Alaska and by the Institute of Northern Forestry of the U.S. Forest Service) into computer models which will allow prediction of forest growth and yield for managment purposes. These data can be divided into (1) aboveground tree growth, biomass accumulation and nutrient contents (this study is focusing solely upon nitrogen because it is most limiting in these forests), (2) decomposition of the forest floor organic matter, (3) climate data, (4) transfers between trees and forest floor (nitrogen uptake or response of growth to soil nitrogen, litterfall).

Application: The primary value of these models is prediction of the consequences of different harvest and silvicultural practices (e.g., whole-tree harvest, slash burning, thinning) and different rotation periods. It is not expected that these predictions will be exact, but precise enough to guide experimental forest practices work. For example, current and future field experiments will be used to check model predictions of harvest and of key related variables, especially soil nitrogen reserves.

Status: The first part of the study, underway now, is data reduction and statistical analysis, placing data in a form useable in the computer models. Biomass and density growth of white spruce stands have been described and suitable statistical models have been fitted to the data. There are publications submitted and in preparation on these topics. Data on decomposition have been gathered but not yet analyzed.

The second part of the study, integrating data into models, has begun. A large computer model (FORCYTE) obtained from University of British Columbia, is being modified to describe Alaskan white spruce growth. The model is very detailed, predicting stem growth and density, biomass growth, nitrogen distribution, decomposition, yield, economic performance and energy efficiency. It is too early to comment on the applicability and precision of this model. Present and continuing (1984+) modification and tuning of this model is supported jointly by this ACST grant, by the U.S. Forest Service through contracts, and by the Forest Soils Laboratory. We feel that this model, once fully modified for Alaskan forests, will represent a very significant step, bringing interior Alaska up to the state of the art in forest productivity and management modeling. Smaller, simpler, special purpose models are also being developed to predict forest biomass growth and yield and forest floor nitrogen reserve, following the lines of the simpler FORTNITE models of Oregon State University and University of Washington.

Without such models, field information on such related variables is interpretable only with guesswork and cannot be evaluated as well in terms of future growth, optimal harvest time or timing of forest treatments like thinning. With the model, ongoing data can be utilized to fine-tune forest practices for changing biological and economic conditions and for different site qualities. In fact, measures of site quality may not become available or manifest until 10-20 years of growth and/or field data collection; having a working model to interpret the consequences of such factors in 'midstream' is very important practically. It should be emphasized that such field research is just beginning in interior Alaska, but long term plans of the Forest Soils Laboratory and Institute of Northern Forestry will incorporate these models and results of their studies will be used to regularly modify and improve the models.

John F. Fox
Institute of Arctic Biology
University of Alaska - Fairbanks

Title: Study of Wind Characteristics for Applied Wind Power
Grant Amount: $149,408.
Completion Date: March 31, 1983

Purpose: To initiate a continuing program to further the successful application of wind power in Alaska. Tasks will be to computer-base analysis of 50 or more of the 195 Alaskan land locations for which wind data is available; and the analysis of the detailed characteristics of the wind field in the Fairbanks environs, since some data indicate a possible wind power potential in the Fairbanks area.

Application: Successful application of wind power requires information on the wind resource (including possible machine-threatening turbulence and extreme speeds), on suitable machines and on windmill performance in various wind regimes.

Status: The first year of a planned multi-year program has yielded considerable information; described below. Detailed reports on these and other tasks are in preparation.

Turbulence and extreme speeds. Contemporary properly installed windmills (WECS, wind energy conversion systems) have design goals of 15 to 25 years lifetime and survive wind speeds of 100 to 125 MPH. Alaskan WECS history shows failures ranging from within a few days to many years with only routine but careful maintenance. Expected extreme wind speeds for Alaska are, for the coastal regions, 80mph (every 2 years) to 120mph (every 100 years). These values are for 30 ft. height, and will be larger at expected windmill hub heights of 50 ft. or more.

High wind speeds less than the extreme values also can lead to fatigue failure, since the latter is often due to the accumulation of many small stress damages. Such accumulation often occurs in highly turbulent winds involving series of gusts. This, in practice, WECS selected for very windy sites should have appropriate test histories that confirm well engineered mechanical, as well as electrical and aerodynamic, design.

Environs Wind Survey. A task well along named Fairbanks Environs Wind Survey has two main objectives: (1) to determine the wind power potential in an area outside Fairbanks and (2) to establish methods and criteria that may be useful to wind-survey other Alaskan areas with similar land features, i.e., populated areas on often-sheltered plains with adjacent hills, ridges, etc. For instance, at the Fairbanks International Airport (460 ft. altitude) the average annual wind speed is 5.4mph while atop (3000 ft.) Murphy Dome (at the Air Force Station) it is about 14.3mph and well suited for year-round windmill use.

Since these results are from normally quiet interior Alaska, surveys of other areas with exposed ridges at about 1800 ft. or more should uncover sites with useable wind power potential.

Tunis Wentink, Jr.
Geophysical Institute
University of Alaska

Title: Persistence of Herbicides in Agricultural Soils
Grant Amount: $132,973.
Completion Date: February 28, 1985

Purpose: The objectives of the research are to determine the persistence of five commonly used herbicides which have potential for remaining in soil under Alaskan conditions. Degredation rates of the herbicides are being determined through periodic soil sampling and extraction of residues. The effect of soil residues on rotational crops in following years is also being investigated. The effects of pH, soil moisture and soil temperature on herbicide persistence are being determined through growth chamber experiments where environmental conditions can be closely controlled.

Application: The results of this study will allow us to determine: 1) whether herbicies in soils will persist for longer periods of time under Alaskan conditions; 2) which rotational crops (if any) would be affected by soil herbicide residues; 3) the effects of soil pH, temperature, moisture and depth of herbicide incorporation on herbicide degredation in soil. With this information in hand, more knowledgeable decisions could be made regarding clearing and management of agricultural land, since the amount of organic matter left on the land and the manner in which it is disposed of (burned in place vs. in berms) has dramatic affects on soil pH and moisture.

Status: Progress to date has been to set up a 2.5-year experiment to determine persistence of five herbicides and associated carry-over problems with rotational crops. Soil samples were obtained at monthly time intervals for residue analysis. A depth of incorporation study was also set up, and residue samples collected. Analysis of residue samples is in the beginning phases.

Dr. Jeff Conn
C.W. Knight
Agricultural Experiment Station
University of Alaska - Fairbanks

Title: A Study of Airborne Pollen and Spores for Medical and Other Purposes
Grant Amount: $73,341.
Completion Date: November 30, 1983

Purpose: 1. To document the seasonality of pollen and spores in the atmosphere through periodic measures of concentration.

2. To produce a preliminary pollen calendar for each pollen and spore taxon showing average seasonal dynamics as well as record conditions.

3. To analyze the data on aeroflora dynamics in conjunction with weather data to determine any relationships and, from this, to develop a pollen and spore predictive capability.

4. To establish a scientific basis in Alaska for a continuing program of routine sampling and information release and for later and more beneficial analyses.

Application: The benefits of this project will, in the first place, be for those who suffer with hay fever, or pollen and spore induced allergic reactions, and for the physicians who have to treat them. For example, the list of plant taxa will help physicians in the Fairbanks area to narrow the range of their testing and make it easier to choose hyposensitization treatments.

The benefits to the hay fever community are only the most immediate from this research. Additional benefits to the state, and to the broader scientific community, will be in two areas: 1) Ecosystem analysis. Seasonal pollen and spore productivity is a critical aspect of ecosystem function; 2) Paleoecology. Fossil assemblages of pollen grains and spores may be extracted from peats and other kinds of sedimentary materials indicating the kinds of plants in the vegetation at the time the sediments were deposited.

Status: The first list of plant taxa for Alaska aeroflora on the University of Alaska Fairbanks campus has been completed. It will be possible to upgrade and expand this list when results from the proper samplers are available. Then, similar lists will be prepared for Juneau, Anchorage, Palmer, and possibly Kenai or Homer.

Pollen calendars for 1978, 1981, and 1982 on the Fairbanks campus, illustrating the dynamics of the aeroflora in these have also been completed. These pollen calendars are the first for Alaska and show that while there is a general similarity in aeroflora dynamics between the years, there are significant differences in times of first appearance, peak abundances, and disappearance from the atmosphere. There also appear to be differences in the number of pollen and spores trapped from year to year. It is these differences that must be analyzed in terms of meteorological or biological factors in an attempt to determine their causes and predictability.

A prototype of what will be called a standard pollen calendar for birch has been developed, a device that may be used to estimate in advance the birch pollen severity on any day during the average flowering season. Similar calendars will be developed for the other major pollen and spore taxa. The present one is only a prototype because three seasons' data are insufficient for statistical analysis. Sampling should continue for at least ten years to facilitate the development of standard pollen calendars. Then, standard deviations or confidence intervals for the averages could be calculated and plotted, thereby increasing the usefulness of the calendars.

J.H. Anderson
Institute of Arctic Biology
University of Alaska - Fairbanks

Title: Investigations of the Geothermal Energy Resources of the Lower Susitna Basin

Grant Amount: $149,664.

Completion Date: June 30, 1983

Purpose: The initial D.O.E. funded study suggests that a substantial warm water resource may be present in the Willow-Big Lake area. However, large gaps exist in the survey data base that have been used to delineate this resource, and the nature of the geothermal system supplying the reservoirs is not yet well understood.

The ACST funded follow-on program of exploration geophysics which will focus on providing a much better definition of the nature of the geothermal system and the lateral and vertical distribution of suspected geothermal reservoirs. Specific work will include completion of helium and gravity surveys and deep resistivity surveys in selected areas of large helium anomalies. Also, an attempt will be made to obtain a few shallow exploratory drill holes in critical areas in cooperation with the water resources division of the Alaska Division of Geological and Geophysical Surveys.

Application: The potentially favorable economics resulting from the shallow predicted reservior depths and the rapidly growing population of this area along the Parks Highway make an exploration program very attractive. This is one of the few areas in Alaska where a sizeable future population could be located in the vicinity of a large geothermal resource that could be economically utilized.

Status: Four dry wildcat wells drilled in the lower Susitna basin have encountered anomalously high temperatures, suggesting that low temperature geothermal resources might be present which could be used for space heating and agriculture. Estimated temperature gradients range from 40 to 123°C/km. One well had an indicated maximum temperature of 76.7°C within 2050' depth. There are not known surface manifestations of a geothermal resource in the area but water wells have encountered warm saline water at a depth of 40 ft. in one locality and reportedly at 200 ft. in two wells at Nancy Lake.

A helium soil gas and water survey corroborates the temperature anomalies in the three hot wells studied and suggest that discontinuous hot water reservoirs totalling 40 square miles may be present in the Willow-Big Lake area. Several areas of state land in the previously proposed state capital site near Willow contain substantial helium anomalies. The helium anomalies extend to within six miles of Wasilla, where the preliminary survey ended. It is possible that this anomaly trend may extend as far east as Wasilla, or even possibly farther to the east.

Two possible models have been proposed - radioactive heating of aquifers by U and Th-rich basement rocks, and fault-controlled

hydrothermal convection to account for the geothermal system in the area studied. Although both models are generally consistent with available field evidence, the very large extent and apparent orientation of discontinuous geothermal reservoirs appear to favor the fault model.

It should be emphasized that the presence of large amounts of hot water has not yet been confirmed in the study atea. Indirect evidence from the helium survey is very encouraging, but the actual confirmation of the suspected geothermal resource will require exploratory drilling and well testing. Drilling should be relatively inexpensive due to the shallow depths to suspected reservoirs inferred from the gravity survey.

Donald L. Turner
Eugene M. Wescott
Geophysical Institute
University of Alaska - Fairbanks

Title: Removal Process of Air Pollution Particles in Ice Fog Conditions
Grant Amount: $118,816.
Completion Date: July 1, 1984

Purpose: This study was started in the winter of 1981 to determine if pollution is removed from the air by nucleation and diffusion. Nucleation is the process of an ice crystal forming around a pollution particle.

Application: Ice fog is produced whenever water vapor is injected into very cold air and it freezes into tiny ice crystals. Water vapor is continuously being emitted into the atmosphere from automobiles and homes, as well as from natural sources such as rivers, lakes, plants, and animals. At low temperatures, generally -30°C (-23°F) and below, ice fog is formed in Fairbanks, for example, and at the same time certain meteorological conditions occur where this dense, cold air hugs the ground and may remain for days at a time. This stagnant air means that there is very slow and inefficient mixing and little removal of materials from the atmosphere. Ice fog and air pollution coexist in this situation, providng a dangerous and unhealthy environment. This study will examine the removal of the air pollution particles.

Ice fog in a polluted atmosphere consists of ice crystals formed from water droplets alone, and pollution particles around which an ice crystal often forms. Nucleation to form crystals and diffusion of air pollution particles in the air have been considered to be the major processes for removal of the pollution in ice fog.

Status: Air samples were taken with a Casella cascade impactor and an electrostatic aerosol sampler when air temperature was below -29°C (-34°F). These samplers collect particles in the air, and size distribution of the particles can be determined.

Residence time of the aerosol particles (the total time particles stay in the air) was calculated from known ice fog crystal precipitation rates, solid water content of the air, and vertical thickness of the ice fog layer. It was calculated that at -30°C the residence time is 5 minutes, at -35°C residence time is 37 minutes, and at -40°C residence time is 5 hours. This shows that at lower temperatures the ice fog stays in the air much longer than at warmer temperatures.

Preliminary results indicate that the major removal process of aerosols in ice fog is diffusion into the air or sedimentation on the ground of aerosol particles not attached to ice fog crystals. Nucleation appears to be a less important process, and scavenging is least important.

Research is continuing on the possibility of artificially enhancing the effect by small ice fog crystals in order to accelerate the removal of harmful particles from the air.

Takeshi Ohtake
Geophysical Institute
University of Alaska

Title: Fate of Fertilizer Nitrogen in Agricultural Soils in Interior Alaska
Grant Amount: $191,257.
Completion Date: December 31, 1983

Purpose: At present, very little is known about the behavior of nitrogen in Alaskan agricultural soils. Since Alaska's climate is much different from most other agricultural areas of the world, information from other regions cannot be transferred here. Thus, a need was seen by agriculturists to determine what happens to nitrogen fertilizer when it is applied to soil in Alaska. The primary objectives of the work are to: 1) measure the rates of the major transformations of nitrogen in Alaskan agricultural soils; 2) determine nitrate leaching losses, and hence, potential pollution of waters from urea and nitrate fertilizers in field soils in Interior Alaska; and 3) measure recovery of fertilizer nitrogen by barley.

Application: Results of this project will be used to make recommendations to farmers and agricultural policy planners in Alaska on methods of management for best use of fertilizer nitrogen. Types of recommendations likely to ensue will be on kind of nitrogen fertilizer to use under certain conditions, and on methods of application of nitrogen fertilizer. This in turn, will hopefully maximize efficiency of utilization of nitrogen fertilizer by crop plants and minimize potential pollution problems from the use of nitrogen fertilizer.

Status: The research is being conducted primarily on the University of Alaska's research farm near the Delta Agricultural Project. A laboratory study is also planned in order to obtain detailed information that cannot be obtained in a field study. In the field aspect of the research, barley is being used as the test crop. Barley is used because it is, and will likely continue to be the most important large scale crop in Alaska. Urea and nitrate fertilizers are being used in the study. Urea is being studied because it is manufactured in Alaska and is likely to become the major form of nitrogen fertilizer used in the state. Nitrate is being tested because of all the forms of nitrogen fertilizer, nitrate is likely to have the greatest leaching potential, since it does not have to undergo transformations in order to be leached.

The field aspect of the study was begun in spring of 1982, and numerous plant, soil, and water samples were collected during the growing season. Many of the soils in the Delta Agricultural Project are underlain at shallow depths by sand or gravel, and thus may be susceptible to leaching. On the other hand, the low amount of rainfall in the area is not likely conducive to leaching of nitrates. Information on the amount of leaching of nitrogen through these soils is needed before any assessment of potential pollution problems can be made.

The cost of nitrogen fertilizer has increased dramatically in recent years and is likely to continue to do so in coming years. Thus, farmers are becoming concerned about the cost of nitrogen and would like to get maximum utilization from the nitrogen fertilizer they use. Research in other areas indicate that in most farming situations, only about half of the applied nitrogen is recovered by the crop.

When nitrogen fertilizer is added to soil, it undegoes a number of chemical transformations. For example, some of it can be converted to nitrate, which is the form most susceptible to leaching. Some can be transformed to gaseous forms of nitrogen which are lost from the soil. Some of it is "tied-up" by the soil organic matter or soil clay particles. All of these processes result in the nitrogen being unavailable for utilization by crop plants, and hence, from the standpoint of the farmer, wasted. Through proper soil and fertilizer management, these losses of nitrogen can sometimes be reduced and hence the efficiency of utilization by crops can be improved. If this can be done, application rates of nitrogen fertilizer can be reduced. This will result not only in lower costs to the farmer but also in reduced potential for pollution from nitrogen fertilizer.

At present samples are being prepared for analysis, no results are available yet. The study will continue for one more year.

Stephen D. Sparrow
Agricultural Experiment Station
University of Alaska - Fairbanks

Title: Catalog of Alaskan Earthquakes
Grant Amount: $128,334.
Completion Date: February 28, 1983

Purpose: This project's main purpose is the compilation of a machine-readable catalog of all Alaskan earthquakes recorded to date.

Application: The project was undertaken in order to pull together the earthquake information gathered by different agencies into a representative Alaskan earthquake catalog. Without such a catalog, much of Alaskan seismological research and evaluation of the seismic safety of critical seismic areas cannot proceed.

Status: 1. The earthquake data gathered by the different state (Alaska), national and international agencies have been assembled into a computer-readable file in which the earthquakes have been arranged in chronological order.

2. The above file has been carefully studied for each year of data, and listings of duplicate earthquakes were identified.

3. Using earthquake location solutions with uncertainty values, whenever available as a guide, duplicate listings of earthquakes have been eliminated.

4. A new Alaska earthquake catalog without any duplication has been created which consists of about 40,000 earthquakes of all magnitudes.

5. Using two well-studied earthquakes -- Rampart earthquake (magnitude = 6.5) of 1968 and St. Elias earthquake (magnitude = 7.1) of 1979 -- a magnitude formula has been established in cooperation with Professor K. Aki of Massachusetts Institute of Technology.

6. The magnitude formula has been tested successfully for 25 local Fairbanks earthquakes.

7. Next, the catalog mentioned in (4) was sorted for all earthquakes of magnitudes equal to or greater than 4.0. Since 1967 to the present time, calibrated seismographic stations in Alaska are in operation and available. This time period has been selected for the recomputation of magnitudes for the sorted events.

8. The sorted eqrthquakes (about 900), have been selected for the magnitude computations. On completion, further magnitude computations are planned. In this way, we intend to compile homogeneous magnitudes for all Alaskan earthquakes that occurred since 1967. The next task will be to recompute the locations of earthquakes for magnitude equal to and greater than 4.0. The output of this project, if supported for FY84, will constitute the fundamental data source for seismic risk studies in the immediate future and for much of future seismological research in Alaska.

N. N. Biswas
Geophysical Institute
University of Alaska - Fairbanks

Title: Alaskan Dulse for Treatment or Prevention of Herpes Infections
Grant Amount: $75,000.
Completion Date: June 30, 1984

Purpose: This proposal was to study the medical implications for treatment of herpes infections, to determine the effectiveness of Alaskan Dulse in Southeast Alaska, to determine availability of Alaskan Dulse (two species of Alaskan red seaweeds).

Application: There are two potential benefits of this research for Alaskans and for the rest of the nation. First, the possible prevention of herpes infection, reduction of length of infections and relief of pain and suffering from the several severe diseases caused by the herpes virus. Second, a new industry in Southeast Alaska of gathering and processing Alaskan Dulse could be developed.

Status: Empirical use of Alaskan Dulse for several years in Alaska has shown the effectiveness of topical application in relieving symptoms of herpes simplex and herpes zoster (shingles) in humans. The purpose of the research is to determine if clinical testing of the effectiveness of Alaskan Dulse against herpes is warranted, and it has two parts: (1) Medical: Objective testing to determine safety and effectiveness using tissue cultures and live animals, and to determine the chemical characteristics of the active fraction, and (2) Resource availability: Field studies of the abundance of Alaskan Dulse to discover if enough is available to justify further expenditures of money for clinical testing.

Preliminary results of work completed in 1982 are promising. The laboratory studies indicate that extracts of Alaskan Dulse are effective against herpes virus both in tissue cultures and in mice (using eye infections). While toxicity studies have not yet been conducted, there has been no evidence of toxicity in either tissue cultures or animals. In the abundance studies, based on only a few days of sampling in 1982, Alaskan Dulse appears to be more generally distributed and abundant than was first apparent.

Robert J. Ellis
Natasha I. Calvin
Marine Botanicals
Sitka

Title: Impact of Community Participation on Rural Alaska Education
Grant Amount: $146,332.
Completion Date: September 30, 1983

Purpose: The purposes of this research project are:

1) To collect information systematically on the incidence of involvement and participation in school activities and operations by community members;

2) To assess the relationship between different degrees and types of participation and educational results; and

3) To make recommendations useful to educators, interest groups, and the state in the evaluation of the effectiveness of community participation.

Application: Presentations and reports designed to be useful to educators will be produced during the next year. A presentation on the findings of the principal's survey was made to the principals' conference in Anchorage, and a report will be distributed to all rural principals within two months. A presentation on the teachers' survey will be made at the National Education Association-Alaska conference in early spring, 1983; a report derived from the findings of this project will be distributed to all rural teachers before the close of the shcool year. Results from the board members' survey will be presented to the Americal Association of School Boards meeting in November, and a report prepared for board members, designed to be useful in board member training, will be drafted for distribution before the end of the calendar year.

The major projects of the research, however, will be comprehensive analyses of findings from surveys and field research and development of policy recommendations. An analytical study will be written which will merge all data sources in an examination of the relationship between community participation and school quality in rural Alaska. Executive summaries of this study will be widely distributed throughout the state. Second, analysis of the types of rural educational participation and their effects in communities will be the basis of recommendations for changes in school board training and for review of regulations and legislation on state education policy.

Status: The activites conducted under this research project include both survey and ethnographic research as well as analysis of files, records, electoral data, and reports.

Survey Research. Data are being collected by means of this method that will describe the incidence of community involvement in educational processes and the participation of communities in areas of educational decision making. Because involvement and participation are quite subjective concepts, information is being collected from

four different groups of school actors: principals or principal teachers, teachers, district superintendents, and school board members.

1. Survey of Rural Alaska School Principals. A survey of school building principals in rural Alaska was conducted from March to May, 1981, as part of the project "Decentralized Education in Rural Alaska," funded by the National Institute of Education (NIE).

2. Survey of Rural Alaska School Teachers. A survey of one, randomly selected teacher in each rural school was conducted from February to May, 1982.

3. Survey of Rural Alaska School Superintendents. A survey of all rural superintendents who had not been interviewed in previous field research is now being conducted.

4. Survey of Rural Alaska School Board Members. The final survey is scheduled for administration from February to May, 1983 and will be sent to all members of district school boards in rural Alaska and to a sample of members of local (advisory) school boards.

5. Field Research. During school year 1981-82, field research for the NIE project was conducted in 30 rural Alaska communities. Field sites were sampled randomly to represent all school-communities in rural areas of the state, and access was gained to each community in the sample. Beginning in January, 1983, field research will be initiated in more than half of the field sites visited during the 1981-82 school year, three types of data-gathering activities will be undertaken. Semi-structured guides; unstructured informant interviews; and observation of school processes will also be used.

6. Data Analysis. Data collected from the principals' and teachers' surveys are not being analyzed. The body of data collected from district office personnel and school board members will be anlalyzed during the summer, 1983, along with analysis of field interviews.

Gerald A. McBeath
Department of Political Science
University of Alaska - Fairbanks

Title: Arctic Alaska Soils Data Base
Grant Amount: $45,548.
Completion Date: December 31, 1983

Purpose: At present there is no single source from which to access detailed soils information on arctic Alaska. It is with this perceived need to assemble and cross-reference existing soils data for arctic Alaska, while it is still in a manageable state, that research with the following objectives was initiated. The goals of the project are:

1) To identify exisiting soils data sources, published and unpublished, in arctic Alaska by author and geographic position;
2) To abstract pertinent morphological data, e.g., horizon, thickness, color, associated vegetation and classification, and all chemical, physical (including geotechnical), and biochemical information in such a way that they are compatible with the program library selected;
3) To compile averages and ranges for variables selected in objective (2) and reduce these to compatible units;
4) To provide cross-reference by soil variable, author and geographic site;
5) To provide a general overview of the soils of arctic Alaska with reference to the existing exploratory soil survey; and
6) To compile these data at the University of Alaska in a format that is easily accessible and updated.

Application: The study will provide a complete integrated soils data base (that is compatible with existing vegetation data) to local, state and federal agencies within Alaska charged with evaluation of environmental impact statements and the issuance of use permits within the arctic.

The study will also provide individuals and groups an information base from which research and/or development plans can be formulated. The data will give industry and state agencies a complete, internally consistent source of soils information from which to develop impact mitigation plans. Finally an up-to-date overview of Alaska's arctic soils resource will be generally available.

Status: Funds became available for this study in August 1982. A brief preliminary survey of the soils holdings in the University of Alaska (Fairbanks) library, the Forestry Research Institute and Public Library was undertaken in September in conjunction with other business. Also, at that time a meeting was held with Dr. Samuel Rieger, a consultant in this study, in which published and unpublished federal materials were identified. These publications have been requested. The following standard data bases have been searched: AGRICOLA, GEOREF, SCISEARCH, SSIE, BIOSIS, NTIS, ENVIROLINE, COLD, MIC, SDC, and Comprehensive Dissertation Abstracts. The products are being evaluated prior to acquiring publications. A letter is being prepared to solicit input of relevant unpublished materials.

A preliminary study is underway to determine the most suitable general formatting procedure.

K. R. Everett
Institute of Polar Studies
The Ohio State University

ACST/ANNUAL REPORT

APPENDIX C

Conferences, Seminars, and Small-Scale Research Funded to Date

Title	Amount	Recipient
Women in Science	$ 3000.00	Anchorage Community College
Fourth International Conference on Permafrost	5000.00	Geophysical Institute
Conference on Old Growth Forest in Relation to Wildlife	2000.00	The Wildlife Society
Conference on Old Growth Forests and Fish	2000.00	American Institute of Fishery Research Biologists
The Alaska Symposium on Social, Economic and Cultural Impacts of Natural Resources Development	3000.00	Dept. of Conferences and Institutes, UAF
Seventh Annual Alaska Health Congress	5000.00	Alaska Public Health Ass.
Learn Alaska Video Conference	3000.00	Parker Associates, Inc.
Exhibit on Distribution of Plants, Trees, and Permafrost	5000.00	University of Alaska Foundation
Hokkaido University School of Fisheries Symposium	5000.00	Institute of Marine Science, UAF
Moss Flora of Arctic North America - Workshop	5000.00	University of Alaska Museum
Permafrost Abstract Volume	5000.00	University of Alaska
33rd Alaska Science Conference	5000.00	Institute of Marine Science, UAF
25th Annual Alaska Science and Engineering Fair	5000.00	Alaska Science and Engineering Fair, Inc.
Special Issue of The Northern Engineer	5000.00	Geophysical Institute, UAF

Title	Amount	Recipient
Development of National Arctic Health Scienc Policy	5000.00	Alaska Public Health Association
Moss Flora of Arctic North America - publication	5000.00	University of Alaska Museum
Pacific Northwest Regional Meeting of American Geophysical Union	3000.00	Organizational Committee of American Geophysical Union
4th Alaska Alternative Energy Conference	5000.00	Alaska Center for the Environment
Glaciation in Alaska - Conference	5000.00	Office of Quaternary Studies Uni y of Alaska - Museum
Printing Smoke Detector Report	4200.00	Arc nvironmental Information & Data Center
Nortech Poster Session	2000.00	Institute of Marine Science
Women in Science Speaker - AAAS Meeting	1000.00	
Index USGS/Military Aerial Photos of Alaska	5000.00	Arctic Environmental Information & Data Center
6th International Symposium on Circumpolar Health	5000.00	American Society for Circumpolar Health
American Fisheries Society Meeting	4000.00	American Fisheries Society
Symposium on Telecommunications	5000.00	Dept. of Continuing Studies, UAF
Smoke Detector Report - Articles	3000.00	Geophysical Institute, UAF
1st International Muskox Symposium	5000.00	Alaska Cooperative Wildlife Research Unit, UAF
TOTAL	$115,200.00	

ACST/ANNUAL REPORT

APPENDIX D

Publications

General Reports
U.S. Arctic Science Policy
Alaska Science Policy
Synopses of Research Activities Funded
Results of Joint Meeting Between Polar Research Board and ACST - Scientific and Technological Research Needs in Alaska
Synopses of Grants - Northern Technology Grants Program
Federal Involvement in Scientific Research and Development in Alaska

Research Needs
Communications and Information Transfer
Transportation
Rural Primary and Secondary Education
Living Resources and Habitat Protection
Seismology
Energy
Agriculture and Animal Husbandry
Minerals
Health and Life
Natural Hazards

Research Results
Smoke Detector Testing in Rural Alaska
Storm Surge Climatology and Forecasting in Alaska

Technical Briefs
Waterproofing Earth-sheltered Home
Window Insulation
Converting Clothes Dryer to Hot Water Heat Source
Solar Kiln to Dry Wood
Greenhouses
Arctic Home Construction and Insulation Techniques
Off-Peak Electric Heating System
Willow Rake - Farm Land Development
Home Built Wind Energy
Solar Heating Domestic Hot Water System
Using Solar Power to Operate Boat Equipment
Conversion of Oil Furnace to Wood Furnace

APPENDIX E

Identification of State Research Organizations in Response to Alaska Council on Science and Technology Letter Survey

	Yes	No
Alaska	X[1]	
Connecticut		X[2]
Delaware		X
Georgia		X
Hawaii	X[3]	
Illinois	X[4]	
Kentucky	X[5]	
Louisiana	X[6]	
Michigan		X[7]
Montana		X
Nebraska		X
New Hampshire		X
New Mexico		X
North Carolina	X[8]	
North Dakota		X
Ohio		X
Oklahoma		X
Tennessee	X[9]	
Texas	X[10]	
Vermont		X
Virginia		X
Washington		X
Wisconsin		X

1. Research proposals accepted in all areas but must address state needs as defined by science council.
2. Product development to provide employment and state royalties.
3. University research institutes fund applied research in alternate energy development and high tech areas. Also state loans to foster innovation and encourage commercial development of new products.
4. Research in environmental, energy and natural resource areas. Also, environmental education, information dissemination and economic review of environmental regulations.
5. Energy research and demonstration, primarily for coal and oil shale. Also, grants and loans for alternative energy.
6. Proposals accepted in priority areas listed yearly by academic advisory body.
7. Product or process development in energy - not research.
8. "Seed" money in waste management research and molecular biology.
9. Private research corporation and private research foundation with state representatives serving ex officio.
10. Alternate energy technologies which show commercial promise.

ACST
THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

SYNOPSES OF GRANTS

For the Alaska Council on Science and Technology

Northern Technology Grants Program

1979 through 1982

April, 1982

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

Northern Technology Grants Program

The Northern Technology Grants Program began when the Alaska state government appropriated funds in July, 1979. These funds were to be awarded by ACST in grants up to $5000 to Alaskans with innovative ideas in northern technology.

The initial program was so successful that in 1980, 1981 and 1982 additional grant funds were awarded to ACST to conduct three more Northern Technology programs.

The program has awarded grants to projects that are low-cost alternatives for Alaskans in such areas as building design, food production, recycling, transportation, energy generation and waste disposal. The immediate benefit of the grant is to the person with the idea but the long-range benefit will be to all Alaskans. Grant recipients are required to provide a progress report to the ACST and in many cases, recipients conduct demonstration workshops on project results for community members or other interested Alaskans. Also, the Alaska Council on Science and Technology publishes "Technical Briefs" on the successful projects. These short "how to" reports are intended to show others in the state how grant recipients completed their projects while also describing pertinent results.

This is a list of all 113 Northern Technology awardees and synopses of the projects. For more information concerning the program contact: Alaska Council on Science and Technology; Pouch CV; Juneau, Alaska 99811 or telephone (907) 465-3510.

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ALPHABETICAL CROSS REFERENCE
1979-1982 GRANTS

REGENERATIVE FREEZER (0011)

Kevin McDougall
P. O. Box 503
Delta, Alaska 99737

Amount Funded: $3,100

Awardee will build a multi-family freezer which will store the winter's cold for summer use. It will maintain freezing temperatures for 3,000 pounds of meat or fish year-round without need of any power source whatsoever. The freezer will be a buried 14' x 14' room housing a 10 foot high, 10 foot diameter brine-filled tank. A fluid-filled convection loop will be installed in the tank and a project above ground. When the outside air is colder than the brine, the convection loop will continuously remove heat from the freezer and dissipate it above ground. The freezer will be insulated well enough to keep heat out during the summer.

JUICE BOTTLING PLANT (0107)

M. Michael Rowcroft
c/o St. Judes Center
3272 Hospital Drive
Juneau, Alaska 99801

Amount Funded: $3,250

Awardee will set up a juice processing, bottling and distributing center in Juneau. Overripe produce purchased from local markets and wholesale distributors will be processed, bottled in recycleable containers and sold to the public at reasonable cost. All processing will be performed according to the State Division of Public Health regulations -- Mr. Rowcroft is the Juneau District Sanitarian.

HYDRAULIC-POWERED AUTO (0146)

Bert Bingham
1650 Beaver Road
Fairbanks, AK 99701
(Ken Kunkel)
(Don Luterbach)
456-2491
452-2718 (message)

Amount Funded: $4,045

This grant will help finance the building of an automobile with a hydraulic propulsion system. A volkswagen chassis and running gear with a sleek fiberglass body will house the low-fuel/high-energy system. The system starts with a 16 h.p. Briggs and Stratton engine. This drives a hydraulic pump. The hydraulic pump supplies charge pressure to two 5000 psi accumulators, and drive pressure to a Sunstrand hydraulic motor. The small gas engine operates at full power until the accumulators are fully charged. At that point the engine drops back to idle and the accumulator takes over. The sequence repeats automatically when the accumulators are drained to a certain level. The propulsion system, which has been previously demonstrated elsewhere, is expected to develop 75 mpg while cruising at 55 mph to 75 mph.

BEE-OVERWINTERING BUILDING (0083)

David Stoops
Mile 2.8 Kalifonsky Loop
S.R. 2, Box 707
Kasilof, Alaska 99610
Phone: 262-4904 or 262-7212
262-4904 or
262-7212

Amount Funded: $3,775

The awardee will construct a building in which he will over-winter bees in a controlled environment. Presently, the state's 250 beekeepers have no alternative but to kill their bees each fall and face the difficulty and expense of shipping in new bees each spring.

WASTE-HEAT-CLAIMING GREENHOUSE (0029)

James Barger
Galena Regional Learning Ctr.
P. O. Box 181
Galena, Alaska 99741

Amount Funded: $2,570

GRLC is a rural extension of the University of Alaska involved in facilitating subsistence gardening programs in 17 villages along the Yukon and Koyukuk Rivers. The group will use grant money to build a 1,500 square foot greenhouse heated by waste heat from the local power plant. The Galena Air Force Site will provide access to the glycol solution in the plant's cooling system. The hot glycol will be piped to a unit heater inside the greenhouse as well as through the soil bed of a garden behind the power plant.

SOLAR HOT WATER HEATER (0089)

Julie Scott
Camp Property Committee
c/o Box 80435
College, Alaska 99708

Amount Funded: $1,200

Camp Bingle-Harding Lake Camp is a non-profit camp operating at Harding Lake, a recreational area 40 miles east of Fairbanks. The camp is used by various children's groups and its program is educational in nature. The staff will build a solar collector into the camp's hot water system to help offset operating expenses and incorporate energy awareness into the camp's educational program.

INSULATED SHUTTERS (0144)

Robert Walton
P. O. Box 1480
Fairbanks, Alaska 99701
Phone: 479-6838
479-6838

Amount Funded: $1,100

The awardee will design and construct insulating shutters that can be used to cover large window areas to reduce heat loss. The shutters will take advantage of garage door technology and photoelectric or temperature sensing switches to achieve ease of operation.

TIDAL/CURRENT HYDRAULIC SUCTION DREDGE (0162)

O. Alexander Hoke
P.O. Box 963
Juneau, AK 99802
Phone: 789-0065
789-0065

Amount Funded: $5,000

Awardee will design and develop a working model of a tidal/current hydraulic suction dredge. A tide or current powered low velocity hydraulic turbine will drive a centrifugal water pump after the high-torque, low-RPM turbine energy has been translated into low-torque, hihg-RPM energy by a water tight gear box. The high-velocity discharge of water will be injected through a reduction nozzle and create a vacuum at the suction head. This vacuum will lift sand and gravel through a flexible hose to a sediment stockpile on the bank. Mr. Hoke will also consider methods of achieving a regular, automatic sweep of a channel by the dredge.

SOLAR GREENHOUSE (0139)

Cyndie & Stephen Tack
S.R. Box 51113
Mile 24 Chena Hot Springs Road
Fairbanks, Alaska 99701
488-9632

Amount Funded: $5,000

The awardees will build a greenhouse which combines several of the better greenhouse construction and energy conservation principles now in use. The structure will be similar to a large cold frame with solar storage in the back wall and in the soil. Some of the features expected to make the greenhouse free of dependence on fuel heat from mid-April to lat September include:

a) Burying to north wall and parts of the other three walls to moderate the effect of very cold and very hot weather;

b) Using solar collectors and an underground array of pipes to heat the soil;

c) Using a massive north wall to store heaat during the day and radiate heat at night;

d) Glazing the greenhouse with a twin-wall stressed material;

e) Making an easily-used blanket to cover the glazed surfaces at night.

OIL FIRED CLOTHES DRYER (0145)

Mike Potter
P. O. Box 80293
Fairbanks, Alaska 99708

Amount Funded: $500

Awardee will convert a standard household dryer from electric to oil-fired hot water heat to take advantage of the oil-fired boiler which heats his house. Hot water will be piped to a radiator core whicch will be mounted on the rear of the dryer; air forced across the radiator will dry the clothes. The energy requirements and cost of drying clothes with an electric dryer will be measured before the conversion; when the oil-fired system is installed, its heat requirements will also be tested.

Mr. Potter says the high cost of electricity and gas, and the fact that a large number of Alaskan homes use hot water heat suggest significant potential savings.

METHYL-FUEL PLANT (0165)

Douglas Grimm
S.E. Applied Electronics
P. O. Box 324
Auke Bay, Alaska 99821
789-2542

Amount Funded: $5,000

The awardee will build a scale model of a system capable of accomodating the electrical and automotive energy needs of a typical urban or rural residence in southeast Alaska. The methyl-fuel plant will produce approximately one gallon of methylfuel for every 20 pounds of waste material. This project will make use of the large quantity of sawmill wood chips available in southeast Alaska. Experimentation will also be done with many other forms of "garbage." The fuel produced will then be applied to a modified 4 H.P. internal combustion engine driving an 1800 watt generator. This scale model should supply about 1/10 of the electrical energy requirement of a typical residence.

HYDROELECTRIC GENERATOR (0155)

Richard Ford
P. O. Box 158
Copper Center, Alaska 99573
344-6988 or 822-5847 (work)

Amount Funded: $2,500

Awardee will build a small-scale hydroelectric system to reduce his family's dependence on a diesel generator. The system will be mounted on a raft in the Copper River and provide enough electricity to the residence for 8 months of the year.

WOOD FURNACE (0136)

Donald Ruef
P. O. Box 1906
Palmer, Alaska 99645

Amount Funded: $2,150

The awardee will build, instrument and test a wood-coal furnace with a fluid-filled jacket. The fluid tube will store heat and be controlled to produce a low-pressure hot fluid and not vapor. Mr. Ruef expects the furnace to deliver 100,000 BTU/H, provide long-term even heat, require no electricity, and be marketable at less than $1,500 each.

ELECTRIC CAR (0098)

Dav Grove
214 Larwood Hall
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $5,000

Awardee will build and test an electric car for operation in cold climates. The plans for the vehicle will be purchased, but modifications will be incorporated, such as the use of light weight aircraft steel, an insulated battery compartment, and solid state devices for startup. Mr. Grove expects to demonstrate that the electric car is uniquely suited to Alaska for three reasons: first, gasoline is

generally priced higher here; second, because pollution, especially ice fog, is a serious problem; and finally, because much of Alaska's road system is disconnected, the auto's 60-mile range per charge will not be a serious limitation.

SOLAR GREENHOUSE (0074)

Jeremy & Linda Weld
P. O. Box 165
Mile 128 Ft. Richardson Highway
Gakona, Alaska 99586

Amount Funded: $5,000

The awardees will build an add-on solar greenhouse which will utilize a thick gravel pad to store heat from the greenhouse for later use in the greenhouse and in the attained cabin. The gravel pad will be insulated from the ground around it and a heat collector at the greenhouse ridge will pump warm air into it. In addition, a rain water collection system will be incorporated into the greenhouse such that the stored water will also bank heat.

AMBULANCE SPLINT (0027)

Steve Carney
Fire Department
University of Alaska
Fairbanks, Alaska 99701
479-7535

Amount Funded: $200

Awardee will build a modification of the long spine board used by ambulances which he expects to be an improvement. His patient stabilization system will utilize vacuum "bean bags" in conjunction with conventional straps. The vacuum bags would rely on the same principal as the vacuum splints, be adjustable, and would attach to the board with velcro.

HYDROELECTRIC GENERATOR (0129)

Ted Neville
313 Lakeview Trailer Court
Fairbanks, Alaska 99701
456-8108

Amount Funded: $350

The awardee will build a small-scale water-powered electric generator to be powered by a river. A paddle wheel's rotation will be translated by a 2:1 ratio gearbox, and then drive an electric motor. The electric motor, when driven, produces current. Mr. Neville hopes to produce enough current to run small power tools.

SOLAR HEATER (0065)

Chris Johansen
P. O. Box 81162
College, Alaska 99708
452-2153 (work) or 479-4563

Amount Funded: $600

Awardee will use grant money to build a simple solar air heater which could be placed in window openings. The heater would consist of a plastic panel which would admit fresh cold air from outside, allow the sun to heat it as it rises toward the window opening, and have a simple thermostatic device at the top to allow air to pass in

only when it is warmer than the ambient room temperature.

WASTE-OIL HEATER (0106)

Donald Pendergrast
S.R. Box 50342
Fairbanks, Alaska 99701
Phone: 456-3516 (home) or 356-1400, ext. 428 (work)

Amount Funded: $250

The awardee will build a stove that burns waste crankcase oil. The stove will provide a more complete use of a scarce resource and an efficient method of waste disposal. The design utilizes a discarded electric water heater, several frying pans, and generally available aand inexpensive hardware.

EXPERIMENTAL GREENHOUSES (0180)

Jim Donally & Norm Stoppenbrink
1014 East 11th, #4
Anchorage, Alaska 99501
Phone: 277-1794 or (message) 277-4050

Amount Funded: $1,000

Awardees will build three greenhouses to test the efficiency of a plastic product, called ACPS, as a greenhouse wall material. ACPS is commercially available in long sheets or on rolls. Its common purpose is as a packing stock for fragile merchandise. It is a clear plastic film with little bubbles in it which, Mr. Donally notes, when squeezed "give a satisfying little pop." But, the bubbles also seem ideally suited to provide insulating dead air space for greenhouse walls. The first greenhouse built will have only a 6-mill visqueen covering. The second greenhouse will have ACPS, and the third, ACPS plus an insulated north wall. Maximum-minimum thermometers will be installed in each greenhouse and daily readings taken to determine the length of frost-free season.

INDUCTION GENERATOR (0506-80D)

Alakanuk City Council
City of Alakanuk
P. O. Box 51
Alakanuk, AK 99554
238-3313

Amount Funded: $4000

The use of an Enertech 1500 wind powered generator will create an energy conservation project for remote villages, and supply power to these remote areas on an uninterrupted schedule.

SOLAR SPACE HEATER (0226-80)

Alaska Alternative Energy Resources Center
1069 W. 6th Avenue
Anchorage, AK 99501
274-3621

Amount Funded: $1500

To construct an easily adaptable solar space heater for retrofitting onto existing homes and to conduct a workshop in conjunction with the construction. The simplicity of the construction of the solar collector should be conducive to assembly by the average Alaskan homeowner. At the workshops, the retrofitting topic will be combined with a weatherization session.

FURNACE CONVERSION (0068-80)

Don Bailey
P. O. Box 70
Anchor Point, AK 99566
235-8485

Amount Funded: $400

A unique conversion - from oil to wood. The conversion of the forced air oil furnace heating system is simple and is a means of beating the high cost of oil. The existing wiring will not be touched so a circulation fan can activate at the correct temperature and continue to blow air.

TREATMENT UNIT (0312-80)

Norman Bair
Box 10043
Dillingham, AK 99576

Amount Funded: $1100

To help establish state regulations for the disposal of greywater. A 30 yard septic tank would be installed outside with a gravel filter installed downline in the basement of a home. The gravel filter would further purify waste material.

BATTERY OR FUEL CELL MADE FROM SCRAP METAL (0508-80D)

Thomas R. Berson
SR 937
Chugiak, AK 99567

Amount Funded: $800

To develop a cheap, long-life, high energy battery or mechanically charged fuel

cell to be made from common materials or scrap metal. This will provide an alternative power/storage supply which could replace or assist fossil fuel generators, in vehicles and in home heating systems.

WINDOW INSULATION (0036-80)

Jim Cunningham
5300 "A" Street
Anchorage, AK 99504
278-2819

Amount Funded: $200

With the use of styrofoam panels. Students at the Specialized Academic Vocational Education Center (S.A.V.E.) will participate and earn credits. Other schools will be invited to view the panels and share the resultant data to be recorded on comparative values of these and other types of window insulation.

DOG, WATER OR WIND POWERED WASHING MACHINE (0358-80 & 0359-80)

Bill Hall
SR 1438
Eagle River, AK 99577
694-2238 (message)

Amount Funded: $400

To be used in remote region of Skwentna. For dog power, an exercise wheel will be used to harness the dog or dogs for operating the washing machine. The method would be demonstrated at local dog mushing club meetings.

GREENHOUSE (0515-80D)

K. Quinn Hart
SR 196 H
Eagle River, AK 99577
862-5292

Amount Funded: $2200

An energy efficient greenhouse using soil thermal mass storage and waste heat recovery on a year-round basis. In the summer months, the excess solar heat collected is transferred and stored in the soil. In the winter, waste heat from the residential coal stove is recovered to maintain soil temperatures. Upon completion of construction, a workshop will be conducted.

WIND GENERATOR (0098-80)

Steve Hicks
Box 147
Glennallen, AK 99588
822-5872

Amount Funded: $1600

To build and demonstrate a 12 volt generator constructed from junk auto parts. The main component will be a shortened rear axle which will serve as the propeller shaft. A demonstration seminar will be conducted in Glennallen upon completion of the project.

WATERPROOFING FOR EARTH SHELTER HOUSE (0165-80)

Marnie & John Isaacs
2418 Forest Park Drive
Anchorage, AK 99503
279-8900

Amount Funded: $3300

To utilize and test existing material"Bituthene" for waterproofing house. Bituthene is used primarily in tunnels and subways. The Isaacs wish to demonstrate that this material will be more effective and less costly than other more commonly used products.

GREENHOUSE (0055-80)

Ed Knoebel
P. O. Box 84
Glennallen, AK 99588

Amount Funded: $4100

Knoebel has excess domestic warm water from his home heating system. He plans to recycle this water to a greenhouse as a heat method. Tests will be run for a one-year period on the practicality of growing vegetables under these greenhouse conditions.

TRAILER STEERING DEVICE (0081-80)

Alex Matheson
1817 W. 13th Avenue
Anchorage, AK 99501
388-4618

Amount Funded: $5000

To develop a remote control rear axle steering device for truck trailers. The problem with multi/trailer rigs is maneuverability. Three trailer rigs would be used more frequently if they were more maneuverable. In addition, a moveable rear axle will eliminate the problems of backing up a multi/trailer rig.

RECYCLING ALUMINUM SCRAP (0085-80)

John Phillips
4211 Cope, #3
Anchorage, AK 99503
272-7992

Amount Funded: $700

This is an alternate method of handling scrap aluminum cans and other aluminum scrap material. A small crucible furnace will transform the scrap into ingots. The ingots could be packed in a small area per unit weight for economy of shipping.

GENERATOR (0332-80)

Radio Communications Inc.
3350 Mountain View Drive
P. O. Box 98190
Anchorage, AK 99508

Amount Funded: $5000

To construct a hybrid solar panel/wind generator system supplemented by lead-acid battery plant, that would have the capacity to power a moderate 25 Watt 12 V.D.C.

load. The proposed system would be suitable for providing power to such equipment as microwave relays, VHF/UHF communications, repeaters, hydrologic telemetering instruments and low power television translators.

SOLAR HEAT HOUSE (0072-80)

Robert Reinhardt
General Delivery
Aniak, AK 99557

Amount Funded: $5000

Will also provide heat for hot water heating system. During winter months, additional heat will come from a modified multi-fuel stove boiler. The heat house could also be used as a fruit drying house, a greenhouse and a clothes drying area.

BOILER SYSTEM (0155-80)

Alfred Doner
SR 5620
Wasilla, AK 99687
376-5540

Amount Funded: $1800

Design and install heat storage tank with solar assist. This will demonstrate the feasibility of year-round wood burning boiler operation. This will also demonstrate the feasibility of adding a wood or coal burning boiler in series with any existing oil or gas-fired boiler.

SOLAR WOOD DRYING KILN (0116-80)

Bruce Forster
P. O. Box 1021
Homer, AK 99603
235-7286

Amount Funded: $3000

This is an air transfer solar kiln. Forster is a cabinet maker and would prefer using local woods which are of higher quality than imported woods. The kiln will hold up to 2000 board feet of lumber (1" thick) and is designed to dry a loan in approximately one month's time. The body is a two-layer sandwich of clear fibre glass supported by four insulated walls.

WIND GENERATOR (0540-80D)

William Hightower
P. O. Box 4 (Mile 24)
Moose Pass, AK 99631

Amount Funded: $2600

Using auto electrical parts for 12 volt wind generator to light outbuildings such as chicken house, etc. A Savenius rotor will be installed on a hill with three or four alternators attached to it. The current will be transmitted to storage batteries in the outbuilding area. When 110 volt current is needed, a power inverter will be employed.

DIGESTER (0045-80)

Edward Johnson
P. O. Box 1347
Soldotna, AK 99669
262-7941

Amount Funded: $5000

Methane gas producing digester which will generate energy as well as dispose of waste. Waste from the digester will be transformed into fertilizer. A reinforced 2000 gallon digester in four compartments will facilitate total digestion and keep the gas supply stable.

IMPROVED WILLOW RAKE (0374-80)

Cecil R. Jones
Star Route A, Box 49A
Homer, AK 99603

Amount Funded: $3000

Designed to speed up farm land development. It will remove willow and alder roots in the area with little disturbance to topsoil. Current methods remove excessive topsoil with removal of growth.

FRUIT AND NUT TREE CULTIVATION (0298-80)

Karen Leis
P. O. Box 923
Homer, AK 99603

Amount Funded: $1000

To grow various fruit and nut bearing trees in remote area. Orchard is planned on a remote plateau at the head of Kachemak Bay, east of Homer. Leis is a knowledgeable grower and believes Pecan trees and other varieties of fruits and nuts will do well on the site under proper controlled growing conditions.

PERMAFROST EXCAVATION (0232-80)

Charles Posciri
SR Box 9360
Palmer, AK 99645
745-3892

Amount Funded: $5000

A pre-facture method for excavating permafrost and rock formations. The method is designed to save on gas and oil and at the same time preserve the environment by eliminating the major portion of environmental damage normally suffered during excavation.

HYBRID ELECTRIC CAR (0281-80)

Ricardo Quiroz
P. O. Box 770
Valdez, AK 99686
835-4614 or 835-4322 Ext. 229 (work)

Amount Funded: $2300

To modify a conventionally powered gasoline engine in a 1970 Volvo station wagon. The Volvo presently gets 16 MPG and Quiroz hopes to bring that figure up to 75 MPG. This hybrid electric propulsion system is selfcontaining and self-generating. Emphasis will be geared to learning if additional modifications will be required

to produce a hybrid electric car compatible with Alaskan weather. A 16 gallon tank should yield about 1200 miles.

PLANT HYDRO FEED SYSTEM (0290-80)

Elizaveta Shadura
P. O. Box 181
Galena, AK 99741

Amount Funded: $5000

Using the nutrient film technique which is a streamlined version of hydroponics. A recirculating system allows a weak concentration of a complete nutrient solution to constantly run by the plant roots. This method supplies a constant flow of nutrients that can be taken up by the roots on a continuous basis.

PASSIVE SOLAR HOME PLANS (0159-80)

Steven B. Smiley
SRA Box 41-C
Homer, AK 99603

Amount Funded: $1700

To design standard superinsulated passive solar home plans that will meet FHA approvals. It is difficult to obtain FHA approval on a "custom" looking home, rather than a conventional design. These plans will combine energy-saving features in an FHA acceptable design.

SHUTTERS FOR GREENHOUSE (0327-80)

Ak. Federation for Community Self-Reliance
P. O. Box 73488
Fairbanks, AK 99707

Amount Funded: $1000

Insulated shutter demonstration project on site of Federations's community garden project. Roll-down quilt/type shutters in super insulated solar heated greenhouse. The system would have the advantages of light weight, low cost and esthetic appeal. Local artists will donate their time to decorate the shutters. The shutters can easily be modified for residential use.

SUBTERRANEAN OUTBUILDINGS (0130-80)

Phillip Albert
General Delivery
Ruby, AK 99768

Amount Funded: $4800

To build subterranean area for chickens, goats, etc. On the earth surface, a greenhous will be constructed on the top of the animal stock outbuilding. Produce for local consumption would be grown in the greenhouse. Eggs and milk would be available from the chickens and goats on a year-round basis.

SOLAR THAWING OF PERMAFROST (0044-80)

Joseph Balch
Mile 34 Salcha
Fairbanks, AK 99701

Amount Funded: $5000

Thermal tube method using heat jacket at base of tube. Could be used for specific

research programs. With the use of a wind pump and solar collector, could possibly supply water year-round in the remote regions.

EFFECTIVE U-VALUE MEASUREMENTS (0139-80)

Axel R. Carlson
SR Box 30183 Scenic Heights
Fairbanks, AK 99702
479-6434

Amount Funded: $5000

To develop a technique with instruments to measure the effect of thermal mass, solar orientation and color of exterior surfaces. Also to determine effective U-values (R-value) of floors, walls and roofs below grade for earth shelter homes. Will also determine the effective U-values of heavy timber and masonry of walls above grade. A computer program will be developed to convert and tabulate the data as U-values.

ARCTIC HOME CONSTRUCTION (0505-80D)

Bobby Cloyd
3750 Geist Road
Fairbanks, AK 99701

Amount Funded: $3400

Various techniques will be implemented by the vocational carpentry class at the Hutchinson Career Center. Results will be monitored and compared for effectiveness with other types of home construction.

SOLAR GREENHOUSE (0328-80)

Michael Crawford
Box 73560
Fairbanks, AK 99707
456-6843

Amount Funded: $4800

An air/hydronic solar collector system. An attached solar greenhouse to be constructed on the south wall of the Two Rivers Grange (Alaska #3). Labor to be donated by members. The greenhouse will be utilized by the community, including the 4H Club and other young people's organizations.

HOME ENERGY SYSTEM (0118-80)

John Dillon
Mary Moorman
P. O. Box 81123
College, AK 99708

Amount Funded: $5000

Plan to design, build and demonstrate hybrid solar, wood and coal energy system as conservation features in a home. There will be a solar-chimney attached greenhouse with energy storage in eutectic salts. Use will be made of locally available resources to avoid rising fuel costs.

METHANE GENERATOR (0362-80)

Chris Lamb
P. O. Box 602
Nome, AK 99762

Amount Funded: $400

Utilizing honeybuckets with a two-stage generator. The two stages allow for continuous gas production. Disposal of human waste is a major problem in northern areas. Fuel costs are high. Lamb hopes to alleviate both problems with the generator.

AUTOMATED THERMAL SHUTTERS (0309-80)

Ed McGrath
P. O. Box 80807
Fairbanks, AK 99708
452-6690

Amount Funded: $2400

Four motor operated retrofit automated shutters when combined with 2 panes of glass have an R value of 18 - substantially higher than most insulated shutters.

TECHNIQUE FOR SHALLOW SUBSURFACE EXPLORATION (0020-80)

Robert McHattie
Richard Jurick
1921 Capitol Avenue
Fairbanks, AK 99701

Amount Funded: $5000

To be developed with an electromagnetic solid conductivity instrument to delineate permafrost and ground ice conditions for building, map subsurface conditions and for small placer and hard rock mining operations.

GENERATING SYSTEM (0538-80D)

Carl Pelz
P. O. Box 93
Petersburg, AK 99833

Amount Funded: $5000

A hillside stream will be the energy source. A dam will be built 200 feet above the generating system. A pipe in the dam will guarantee a steady flow of water. A Pelton wheel will be used to transmit mechanical energy from the water to the generator.

DATA RECORDING INSTRUMENT (0205-80)

James Raymond
P. O. Box 81504
Fairbanks, AK 99708
456-3128

Amount Funded: $1100

Will build a multi-purpose instrument for recording environmental data in remote regions. The data would provide information that could help to improve the design of buildings and other projects for suitability of construction in the wilderness areas.

SOLAR ENERGY HEATING SYSTEM (0064-80)

Richard Seifert
Gary Newman
Box 80147
Fairbanks, AK 99708

Amount Funded: $5000

To purchase two identical thermal and flow monitoring systems, two differential thermostate controllers and temperature sensors and two recording and integrating pyranometers. Seifert and Newman will monitor the systems for the lifetime of the units. Seifert's system will be heating a basement using panel heating (pipes imbedded in a concrete pad) and Newman's system will be used to provide space heating and domestic hot water heating, with additional exchangers to be used for extended gardening ground warming at a later date.

SOLAR WOOD DRYING KILN (0248-80)

Charles Simmons
Box 81724
College, AK 99708

Amount Funded: $2000

To dry wood for use in woodworking and woodcarving. This would enable artist Simmons to utilize local rather than imported wood. The kiln will utilize fiberglass for insulation on a 2 x 4 construction, with control from thermostate operated fans.

WATER HEATING (0177-80)

Leslie A. Viereck
HR 20791
Fairbanks, AK 99701

Amount Funded: $2000

A method for heating domestic water by a combination of wood stove and solar panels. The solar panels will heat the water from March through October and assist in heating during late fall and early spring. The project is designed to demonstrate that domestic water need not be heated by oil or electricity in the interior of Alaska.

FISH DRYING PROCESS (0145-80)

Ole Wik
Savoonga, AK 99769

Amount Funded: $5000

A method of drying fish in a vacuum chamber, powered by existing wind electric system. The Danes use a similar process called pressfisk, where the fish is squeezed into blocks during the process.

STEAM PLANT FOR SMALL BOAT (0262-80)

Ronald Klein
P. O. Box 1587
Juneau, AK 99802
586-9492 or 465-2925/465-2944 (work)

Amount Funded: $5000

To install and modify a commercially made steam boiler and engine for a small launch hull. To demonstrate practical use of steam as a means of locomotion, especially in the southeastern area where wood is plentiful.

1 WATT TRANSLATOR (0166-80)

David Molvik
Narrows Broadcasting Corporation
Box 149
Petersburg, AK 99833
772-3770

Amount Funded: $5000

Translators are low power repeater stations. This would be erected on a mountain top for energy generation via solar voltaic cells for the operation of radio broadcast transmission equipment.

HOME ENERGY CONSERVATION SYSTEM (0234-80)

Jay Moor
9175 Skywood Lane
Juneau, AK 99801
789-9583

Amount Funded: $4800

A dual domestic system comprised of heaters, controls, and environmental stabilizers that can be coordinated by means of small computer, or operated manually when the electrical power supply fails. To demonstrate the system can be packaged in modules for easy adaption to professionally built housing in Alaska.

DEVELOPMENT OF CLAM HARVESTING TECHNIQUE (063-81)

Carl DeBoard
608 Kim Place
Anchorage, AK 99504
337-3191 or 344-9602

Amount Funded: $5000

A clam dredge that is an amphibious vehicle that will travel in 7 feet of water before it floats. It could harvest razor clams 8 months per year, for 8 hours a day. Awardee will experiment with a design modification of a clam digger he has developed. It is anticipated the clam dredge could harvest a swath 4 feet wide and have a forward speed, while harvesting of 5000 feet per hour. A beach area of 20,000 square feet per hour could be harvested.

DEVELOPMENT OF A CAM OPERATED ARCTIC DOOR DESIGN (061-81)

Phillip W. Sanders
P.O. Box 80982
Fairbanks, AK 99708
479-5920

Amount Funded: $1100

To design a door with beveled edges and a cam operated pin hinge to eliminate the problem of air infiltration of exterior doors. Awardee will convert standard metal door. The door would revolve around one central axis. As the door is opened, the cam lift mechanism raises the door and allows it to clear the threshold. As the door closes, the cam drops the door back down on the threshold for a tight seal.

TO GROW FRUIT TREES IN THE YUKON-TANANA UPLANDS (115-81)

Bonnie Friedman
P.O. Box 81110
College, AK 99708

Amount Funded: $1650

To coordinate the experience, research and expertise of those growing fruit trees in Alaska and to utilize those methods of growing fruit trees used in other arctic countries. To date, results are not recorded by individuals in a scientific manner and results are not passed along to other Alaskans. The grant will permit an investigation through experimentation into the response of fruit trees grown through a variety of techniques.

TO CONVERT A VW BUG TO A HYBRID-ELECTRIC VEHICLE (110-81)

W. Charles Newell
P.O. Box 80302
College, AK 99708
456-2800

Amount Funded: $2700

To attempt to demonstrate a viable transportation design which will eliminate wasteful warm-up periods, provide reliable car service and conserve fuel emissions. The prime movers in the system would be eight 12 VDC batteries in series connection and a 2000 watt motor generator set.

TO USE SPILL-OVER ENERGY FROM A HYDRAULIC WINDMILL (117-81)

Clark Corbridge
7420 Tikchik Circle
Anchorage, AK 99504
333-4587 or 279-0641

Amount Funded: $5000

To build a windmill incorporating a controllable-pitch, full-feathering propeller; hydraulic control of propeller pitch, a hydraulic pump, motor and 'lock.' If successful, the project will prove the viability of the theoretical ideas concerning the use of full-feathering, ground controllable propellers and hydraulic methods of power transportation for windmills. Alaskans could benefit from windpower systems, which are quieter and therefore, more environmentally acceptable. Because the hydraulic windmill should provide that all adjustments be made from the ground, it would be substantially safer than a conventional windmill.

EQUIPMENT FOR SENSITIVITY AND COLD TEMPERATURE TESTING OF SMOKE DETECTORS (131-81)

John Benevento
Geophys. Inst., U of A
Fairbanks, AK 99701
479-7560

Amount Funded: $4900

To be used for equipment in basic laboratory tests for smoke detectors to be used in the bush. Tests would be run that would be difficult to document and evaluate under field test conditions.

HEAT PUMP FOR FOUNDATION STABILIZATION (118-81)

R. Dale Guthrie
SR Box 20044-B
Fairbanks, AK 99701
479-6034 or 479-7142 (work)

Amount Funded: $5000

This would be a dual function heat pump; to stabilize a house foundation on permafrost with energy efficient interior heating. Building on permafrost in Alaska is expensive and sometimes unsatisfactory. It is difficult to remove subfoundation heat in an even and controlled manner without producing the undesired side effects of expansion and differential heaving of the slab and foundation. It may be possible to avoid these problems and at the same time, salvage building threatened by permafrost with a modification of a heat pump system already in existence. Instead of pumping heat into the basement from the soil surrounding the house, heat could be evenly extracted from beneath the existing slab.

TO INSTALL A HIGH-PRESSURE JET MODIFICATION TO A CLAM HARVESTER (066-81)

Ed Stultz
7020 E. 11th
Anchorage, AK 99504
333-4348

Amount Funded: $5000

A competent hand digger can harvest 200 to 300 pounds of clams per day. It is proposed that the suggested high-pressure digger could harvest 5000 pounds per hour, by using a water-pressure method.

DEVICE TO TEST SOIL STRENGTH (068-81)

Douglas Beaudoin
50 Valley Drive
Fairbanks, AK 99701
488-9228

Amount Funded: $2050

This would be a tri-dimensional stress-strain controlled field testing apparatus. It would predict settlement rates of foundation materials. It would also determine size, shape and type of foundations and footings for each type of soil condition. The objective would be to perform field tests throughout the Anchorage and Fairbanks areas where foundation failures occur and where cohesive soils exist.

TO DEVELOP A SUBMERSIBLE INVESTIGATING DRONE (069-81)

Randy and Larry Smith
P.O. Box L
Haines, AK 99827
766-2810

Amount Funded: $5000

For underwater research, mapping and salvage. The drone would also have application in pollution investigation, fisheries and halibut studies, harbor maintenance and light underwater salvage. It would be an unmanned, remote-controlled drone capable of being towed and/or maneuvered under its own power at ocean depths up to 35 fathoms. It would fit in a standard hold of any vessel over 50 feet in length and could be lowered into the water with a modes winch.

TO STUDY THE FEASIBILITY OF MIGRATORY BEE/HONEY OPERATION SYMPATHETIC TO DELTA BARLEY PROJECT (070-81)

Paul Carlson
Chilkat Valley Farm
P.O. Box B
Haines, AK 99827
766-2770

Amount Funded: $2350

Bees would be purchased and installed in the Delta area. Bees from Haines would be sent by truck to the Delta area where eight acres of rapeseed will be planted for bee pasture. The bees would then be transported back to Haines following the bloom period. The benefit would be increased honey production, a sounder agricultural program, utilizing honey bee pollination for seed set and fruit yields.

WIND POWERED HEAT PUMP AND LIGHTING SYSTEM (003-81)

Erick Olson
P.O. Box 393
Haines, AK 99827

Amount Funded: $5000

Project will demonstrate the feasibility of heating and lighting a house in southeast Alaska using wind power. The power will be generated by a 10 kilowatt "Elektro" wind generator and fed through battery banks to a six kilowatt modified sine wave inverter. The heat pump will optimize power that is produced by turning energy into heat in an energy conservative manner.

MARICULTURE OF SUBTIDAL RED SEAWEEDS (005-81)

Natasha Calvin
P.O. Box 112
Auke Bay, AK 99821

Amount Funded: $5000

The species of Alaskan seaweeds of the Rhodophyta, or red algae group, when used as natural herbs, applied topically, give significant relief from the symptoms of herpes infections. Awardee would dive in many places of the outer Chichagof area which provide algae species.

TO CONSTRUCT A DUAL-LAYER GREENHOUSE ON ALASKAN PENINSULA (020-81)

Charles & Sara Hornberger
P.O. Box 69
Illiamna, AK 99606

Amount Funded: $3400

To demonstrate that it is possible to grow major portion of food needs on the Alaskan peninsula and enjoy a growing period of 8 months. The greenhouse would be geographically situated and constructed to utilize solar heat to the maximum efficiency.

TO REFINE INDOOR HYDROPONIC SYSTEM (022-81)

Ira Winograd
435 Kennedy St.
Juneau, AK 99801
465-3991 (day) 586-6417 (eve.)

Amount Funded: $1500

To create an indoor hydroponic system for home use producing vegetables at a price which is cost competitive with market produce. Compact in size, 3 feet by 8 feet, awardee plans to market the units in kit form.

TO DEVELOP A METHOD OF PRODUCING ETHANOL ALCOHOL (026-81)

Craig Delbridge
% Northland Maint. Co.
Pump Station #1
P.O. Box 73608
Fairbanks, AK 99707
479-3983

Amount Funded: $5000

Alcohol would be removed from fermentation as it is formed, by tying together the fermentation and distillation functions in a continuous loop. The efficient production of ethanol as a fuel could cut costs in marketing Alaskan grain and Alaskan wood products. Exportation to overseas markets is almost prohibitive at this time, due to high transportation costs.

HIGH TEMPERATURE SURFACE COMBUSTION TECHNIQUES (028-81)

Horace Simmons
Box 2464
Kodiak, AK 99615
486-4890

Amount Funded: $1500

Incomplete combustion in stoves and furnaces increases fuel consumption. Awardee will try to eliminate this problem by constructing two types of surface combustion units. One will be intended for use with natural-draft oil ranges and heaters and

TO CONSTRUCT A CHICKEN HOUSE AND SOLAR PIT GREENHOUSE (031-81)

with wood and coal heaters. Another type will be constructed for use in forced-draft furnaces and boilers.

Joy Orth
P.O. Box 1171
Wrangell, AK 99929

Amount Funded: $4200

To develop a system of food production which would provide a continuous supply of fresh vegetables, eggs and meat suitable to southeast Alaskan conditions.

COMPOSTING TECHNIQUES EXPERIMENTATION (033-81)

Eugene Gerow
P.O. Box 8265 NPS
Kenai, AK 99611
776-8996

Amount Funded: $4900

To develop a process of utilizing heat from decomposing brushwood and trimmings. Branches are chipped and stacked. Water is circulated through the stacks where it is heated by the exothermic reaction of the decomposing brushwood. This hot water is then used to heat buildings. Completion of the decomposition cycle results in a high quality compost that can be tested for use for agricultural purposes.

TO REUSE WASTE HEAT FROM LAUNDROMAT (038-81)

James Wilcox
1914 Churchill Ct.
Juneau, AK 99801
586-2637

Amount Funded: $4400

Rocks would collect heat while the dryers are in use. After dryers have run, tops of rocks should be warm anough to change temperature of water in pipes, which would lower cost of heating water. Rocks would be in a box above the dryer, with vents entering from the dryers. Heat recovery fans on top of the box would draw heat back from rocks and distribute heat to building.

TO CONSTRUCT A SOLAR SEMI-SUBTERRANEAN BARN/ROOT CELLAR (052-81)

Jack Detzel, Jr.
P.O. Box 278
2 Mile Tanana Loop Rd.
Delta Junction, AK 99737
895-4696 (work)

Amount Funded: $4000

To make use of the heat loss from poultry and passive solar collector in the barn and root cellar. The root cellar would provide necessary storage area for vegetables. The barn would provide shelter to laying chickens and turkeys. Vegetables, eggs and poultry could be provided to Delta residents all year around.

CONSTRUCTION OF ELECTRIC HYBRID CAR (057-81)

H. J. Coutts
Mile 348 Nenana Hwy.
Nenana, AK 99760
353-1106 (Mon. - Thurs.) 479-3645 (Fri.)

Amount Funded: $5000

Not only construct but demonstrate its use under cold climate conditions. The car will be assembled from off-the-shelf components. Fuel economy, which may approach 100 miles per gallon including electric power consumption will be measured and reported.

IMPROVED HYDRAULIC RAM FOR USE ON STREAMS IN INTERIOR ALASKA (056-81)

N. Meade Riche
1379 Alaska Hwy.
Delta Junction, AK 99737
895-4842 (message)

Amount Funded: $4900

A lighter, more compact and more efficient ram than used now. It will be fabricated from local materials and will be easy to install. The renewable hydro-power will be used in the nearby stream to pump water to gardens, greenhouses and animal barns, without using electric-powered or gasoline-driven engine pumps currently in use.

WOOD FUELED ELECTRICITY GENERATOR (059-81)

Richard Miller
P.O. Box 4005
Kenai, AK 99611
283-4426

Amount Funded: $5000

To build and demonstrate an efficient, technologically simple producer gas refactory to convert firewood into a flammable gas vapor to fuel a portable piston driven electic generator. This would provide a means for comparatively economical sources of electricity for many Alaskan areas where conventional means have proven too costly.

TO DEVELOP A MICRO HIGH HEAD HYDROELECTRIC SITE FOR REDUCTION OF FOSSIL FUELS (077-81)

Kenneth Cassell
5680 Thane Rd.
Juneau, AK 99801
586-2394 or 586-3911 (work)

Amount Funded: $5000

Along the five mile length of Thane Road in Juneau, there are 27 streams; all having potential to produce electricity. The need for fossil fuel would be less by promoting the use of micro hydro. A community involvement program is planned in all facets of the project.

TO REUSE WASTE COMPUTER PAPER (079-81)

Nancy North
401 8th St., #108
Juneau, AK 99801

Amount Funded: $1000

To find a secondary use for waste computer paper which is thrown away in vast amounts in the State of Alaska offices.

EMERGENCY SOLAR POWER FOR SMALL BOATS (004-81)

George Olanna
Shishmaref, AK 99772
479-7987 or 452-6519 (home)

Amount Funded: $3000

To use the photovoltaic application of battery charging for boats. This could be used not only to start the motor, but operate CB radios. There is almost 24 hours of sun during the spring seal hunt and, as batteries very often go 'dead', this could be a method to possibly save the lives of hunters who are 75 miles out sea.

TO RECYCLE ALUMINUM CANS (013-81)

Daniel Moen
Kodiak Scrap Metals
P.O. Box 3074
Kodiak, AK 99615
486-3881

Amount Funded: $2400

To modify a log-splitter for the purpose of crushing cans. This method of decreasing volume of used cans would be especially beneficial to the bush country, where disposal methods are a problem.

RIVER-POWERED ELECTRICAL GENERATOR (021-81)

Pete Brown
General Delivery
Aniak, AK 99557

Amount Funded: $3000

Using the power of the river in a similar manner as the fish wheel. The 12 VDC generator would be designed to power lights, a freezer and power tools at a fish camp.

INSTALLATION OF SELF-TIMER SILENCERS ON SMOKE DETECTORS (130-81)

Nancy Smoyer
Geophys. Inst., U of A
Fairbanks, AK 99701
479-7125

Amount Funded: $5000

There is a high incidence of false alarms in smoke detectors now being used in Alaskan villages. A simple electronic circuit has been designed which will allow de-activation of smoke detectors for ten minutes, by pushing a remotely connected push button. The awardee will use the grant to construct approximately 100 of these devices for installation in six villages.

TO DIVE TO RECORD ABUNDANCE AND DISTRIBUTION OF SEAWEEDS (006-81)

Robert Ellis
P.O. Box 112
Auke Bay, AK 99821

Amount Funded: $5000

Awardee is an experienced research diver. Collect plants for microscopic inspection for possible use as medicine and food. At present, there is not a systematic, coordinated effort being expended in Alaska in this area.

WOOD UTILIZATION SURVEY IN THE FAIRBANKS NORTH STAR BOROUGH (N-82-01)

Steve Laroe
226 Glacier Avenue
Fairbanks, Alaska 99701
456-6094

Amount Funded: $2500

The Interior Woodcutters Association will conduct a survey to determine if adequate wood supplies are available for domestic and commercial use. Due to an increased demand for fuel wood in the area, there is a notable decrease in available areas for wood cutting. 1,200 questionnaires will be sent to Fairbanks residents to determine the actual demand for use of firewood in the area. The Association's goal is to educate Alaskans concerning the use of timber and to promote the proper use and management of this resource in interior Alaska on a sustained yield basis.

DEVELOPMENT OF AN AUTOMATIC AND MANUAL FUEL-SAVING FLOOR REGISTER (N-82-02)

Dane Wagner
919 Cherry Street
Anchorage, Alaska 99504
338-4555

Amount Funded: $4000

The register will direct the air in a heating system ductwork to the area of a room most in need of heat. Directional louvres will automatically direct initial cool air to the ceiling area. As air becomes warmer, it will be directed to floor area. A two-selector manual system will operate on the same principle. The plastic louvred register will be mounted over the outlet of a conventional forced air heating system.

FROZEN FOOD PROCESSING PLANT (N-82-04)

Max Stark
St. Rt. 10603
Fairbanks, Alaska 99701
479-2891

Amount Funded: $3750

The purpose of this project is to grow broccoli, cabbage and cauliflower and to explore methods of freezing these products on a large scale. Produce will be grown by the awardee, as well as 4-H members and other residents. Plans for a much larger food plant will be undertaken if the smaller plant is successful. Stark is a retired vocational agriculture teacher and is currently supervisor of the Alaska Experimental Farm.

DOCUMENTATION OF OFF-PEAK ELECTRIC HEATING SYSTEMS AND USAGE (N-82-23)

Albert Shaw
631 West 11th Street
Juneau, Alaska 99801
586-1602

Amount Funded: $500

The problem to be addressed is the apparent lack of information on electric off-peak heating systems. The grantee will collect and document the names of suppliers of these systems plus information on what utilities are doing to implement such systems. The information could be used by individuals and utilities to determine if off-peak electric power is adaptable to their particular needs.

DESIGN, DEVELOP AND TEST MANUAL, SEMI-AUTOMATIC AND AUTOMATIC CONTROLS FOR THERMAL SHUTTERS (N-82-26)

John Davies (Ph: 479-7424)
Richard Siegrist (Ph: 479-7131)
SR 20123-K
Fairbanks, Alaska 99701

Amount Funded: $4900

The grantees feel that energy-efficient thermal shutters will not be used by Alaskans to any degree until reliable, automatic controls are available at a reasonable cost. The four control designs will be: a single shutter manually cranked from the interior of the house; single or multiple shutters semi-automatically cranked by a switch-activated motor; multiple shutters automatically cranked in unison by a motor controlled by hard-wired electronics that monitor light, temperature and/or time of day, and multiple shutters automatically and individually cranked at arbitrary times by a motor controlled by software-based microcomputer electronics that monitor a large number of environmental conditions.

DESIGN AND CONSTRUCT WASTE OIL FURNACE (N-82-44)

Frank Abegg III
3762 Erickson Road
Fairbanks, Alaska 99701
479-6045

Amount Funded: $3450

The proper disposal of waste oil is an ongoing problem. The Environmental Protection Agency and the Alaska Department of Environmental Conservation encourage disposal through incineration. Although the cleanest method, it too can create pollution. The design for this prototype waste-oil fired hot air furnace will enable it to generate up to 100,000 BTU/Hour for space heating. The grantee has extensive experience in this area and has marketed many devices such as this. However, although there are many waste oil burners on the market there still is not one designed for Alaska's unique conditions that can burn more than a few gallons per day. The furnace will use a standard high pressure fuel oil burner modified to burn waste oil. The furnace will be capable of operating on a wide range of oils which could be stored underground in a heated tank.

TO DEVELOP A MICROPROCESSOR CONTROLLER TO OPTIMIZE HOT WATER HEATER USAGE (N-82-49)

Richard Jablonowski
Box 638
Juneau, Alaska 99802
586-3833

Amount Funded: $5000

The project will utilize a microcomputer to design the logic for and test the energy savings of an "intelligent" black box controller for domestic hot water heaters. The computer program will be able to direct the controls to turn a hot water heater on and off; sense thermostat "on" and "off" conditions; sense requests for hot water (flow or pressure changes); measure, and record and analyze operating characteristics for financial and energy analyses. The computer's data will be doublechecked by cumulative energy meters. The final outcome will be the development of "micro-chips" as the major component and memory of these proposed devices which will be installed, at a minimal cost, in hot water heaters.

BANDSAW POWER ALTERNATIVE FOR BUSH AREAS (N-82-51)

Matthew Kirchhoff
Box 8800
Port Alexander, Alaska 99801

Amount Funded: $500

The absence of electricity in many rural Alaskan communities prohibits the use of power tools. Using a commercial bandsaw kit, the grantee proposes to build a bandsaw and utilize a treadle in lieu of power. Components for the treadle design are readily available. A 50 pound automobile flywheel, pulleys, shaft, gears and foot sprocket will be used to activate the bandsaw. He estimates that the lowest gear setting will yield a blade speed of 340 feet per minute, and the highest gear setting will yield a blade speed of 4900 feet per minute. His ultimate goal is to produce the kits for use by other Alaskans in remote areas.

CROSS-TRANSMISSION OF COCCIDIOSIS BETWEEN WILD AND DOMESTIC ALASKAN SHEEP (N-82-72)

Carol Nielson
P. O. Box 81751
Fairbanks, Alaska 99708

Amount Funded: $5000

In central and northern Alaska, the further development of commercial sheep herds as a local source of meat through "fat lamb" production would probably involve summer pasture grazing and winter confinement feeding. While on pasture, it is very possible that domestic lambs and ewes could acquire coccidia, harbored by Alaskan Dall sheep. The grantee proposes to investigate the possibilities for cross-transmission of coccidiosis between Dall sheep and domestic sheep by determining if both kinds of sheep harbor similar species of Eimeria and if infective cocysts from wild sheep can cause coccidiosis in susceptible domestic lambs. Alaskans who are considering commercial sheep-raising, even on a small scale, need to know if the use of summer pastures will expose their animals to increased risk of coccidiosis.

STUDIO-SIZED, HYDRAULICALLY POWERED IMPACT MILL (N-82-77)

David Stannard
1009 O'Connor
Fairbanks, Alaska 99701
452-7208

Amount Funded: $4100

To address the high cost of imported clay and the unavailability of local sources, the applicant plans to develop a mill to pulverize local ceramic raw materials. It will not only provide an example of one person's ability to subsist on local materials, but will also provide other potters in the Fairbanks area with practical experience so that they too can extend their ceramic endeavors without being completely dependent on outside suppliers.

SOIL HEATED FOOD PRODUCTION WITH SEEP IRRIGATION (N-82-87)

John Quirk
P. O. Box 29
Galena, Alaska 99741
656-1238

Amount Funded: $3750

Hot water plastic pipe will be placed two feet apart underground, and 18 inches deep to use the waste heat from the Ruby, Alaska powerplant water jacket heat to warm the soil from April through September. Seep irrigation will be used along all the rows and slitted row covers on two rows for early production. This should extend the growing season and increase the production of vegetable crops.

WINTER STORAGE FOR ROOT CROPS (N-82-103)

Stanford Gurtler
General Delivery
Ruby, Alaska 99768

Amount Funded: $4950

To build a 24' X 48' root cellar for winter storage of excess vegetables. This will be a village effort and will eventually be turned over to the local school as a students' project. The awardee is a native rural Alaskan trained in arctic agriculture by the local Learning Center.

DEVELOPMENT OF A LOW-COST, LIGHTWEIGHT, SOLAR SNOW MELTER FOR EXPEDITIONARY AND REMOTE SITE USE (N-82-107)

Matthew Sturm
Dan Solie
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99701
479-7369

Amount Funded: $1300

To maximize the amount of solar energy collected in the snow melting device, maximize the efficiency of the heat transfer process to the snow and minimize the heat losses. An important part of the work will consist of experimenting with a variety of materials in a number of configurations in order to determine the best possible arrangement. Obtaining water is often a problem in cold climates.

Despite the limited availability of sunlight, it is possible to melt snow using only the sun's rays.

TO DEVELOP A HYDRO-POWER GENERATION SYSTEM (N-82-109)

Michael Loeffler
P. O. Box 595
Chugiak, Alaska 99567
694-3920

Amount Funded: $5000

To build a turbine test unit which will incorporate various impeller designs and test in several locations under different water conditions. The system will need little, if any, stream damming and components are off-the-shelf items that are readily available and inexpensive. The ultimate goal of the project is to produce inexpensive kits simple enough for Alaskans in remote areas to build.

MONITORING OF INTERIOR WINDOW INSULATIONS (N-82-80)

William McDonald
James Bershire
1551 East Tudor
Anchorage, Alaska 99507
274-2627

Amount Funded: $4650

Since determining the right type of thermal shutter in Alaska has yet to be undertaken, the awardees propose to gather and disseminate information on the performance of several different types of interior shutters, in actual application in southcentral Alaska. The approach to monitoring will be twofold; microprocessor measurements of heat loss through the windows with and without shutters in place, and visual observation with a log noting condensation problems that may exist. The period of testing will be one complete heating season.

INSTRUMENTATION FOR A SMALL HYDRO-POWER PROJECT (N-82-108)

Louis Butera
University of Alaska, Anchorage
274-9344

Amount Funded: $3750

The project will enable the collection of data to substantiate and make possible the compilation of an Alaskan Small Hydropower Guide. The instrumentation will be installed on a 5 KW hydroelectric project currently under construction on a local stream.

FISH MEAL AND OIL PRODUCING RAFT (N-82-119)

John Stam
Box 21
Galena, Alaska 99741

Amount Funded: $3800

The awardee is a subsistence fisherman who has an alternative for current fish camp methods of cutting and drying fish for use as dog food. He proposes to build a large raft, using oil drums for flotation. The whole fish would be boiled in large containers aboard the raft, the excess water drained off, and the remaining fish sludge laid out under the raft roof to dry. Using this method, fish dries in 2 to 4 days, as opposed to the 1 to 2 week period on racks at the fish camp and there is no waste of fish. When the fish is dried, it will be mixed with dog meal to provide a nutritious feed all winter.

HYDROGEN GAS GENERATION BY AND FOR BOATS (N-82-38)

Joseph Charles Black
Dawn Lee Black
Box 1912
Kodiak, Alaska 99615
486-4666 or 5516

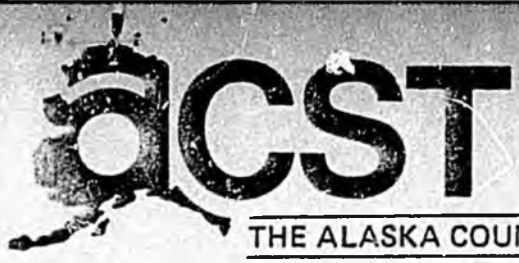
Amount Funded: $5000

Although the testing is being conducted in Kodiak the proposal is based upon research conducted by Paul H. Lee, Research Physicist, University of California - Santa Barbara. Dr. Lee has offered to loan the awardees a 12 ft. buoy to investigate the possibility of producing hydrogen gas as fuel to power a boat. The buoy would be cabled to an electrolysis system in the boat that would produce hydrogen gas. The hydrogen gas would be stored in metal hydride flakes. In turn, heat would release the gas from the flakes.

Dr. Lee's approach is to use inertial coupling to design a generator for buoys. The generator has only one moving part. It is carried by the buoy for the purpose of recharging its batteries. The device is hermetically sealed from the ocean environment. The power it will produce from a 3-ft. wave, having periods ranging between 4 and 8 sec, is substantially that near 12 watts. For a 5-ft. wave, a maximum power of over 40 watts can be produced.

In conjunction with the project, the awardees will produce an educational film depicting step-by-step procedures. The film will be shown on public television statewide.

According to the awardees, the village of Old Harbor on Kodiak Island has been designated for a pilot program by the Alaska State Division of Energy for conversion to hydrogen gas with the use of wind power. The awardees think that the use of tidal/wave power to produce hydrogen gas as outlined in the proposal, will be timely.



THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

RESEARCH ACTIVITIES

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SEPTEMBER 1982

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GEOTHERMAL ENERGY RESOURCES OF THE LOWER SUSITNA BASIN

Principal Investigators: Donald L. Turner
Eugene M. Westcott
Geophysical Institute
University of Alaska
Fairbanks, Alaska

Amount Funded: $149,664

This project proposes the continuation of geothermal exploration in the lower Susitna valley near communities along the Parks Highway. Very large areas in the Willow-Wasilla-Big Lake region show substantial geothermal resources exist, but there are gaps in the data base outlining this resource.

Proposed follow on work will focus on providing a much better definition of the nature and area and vertical distribution of the geothermal system and on providing specific recommendations for exploratory drilling. This is one of the few areas in Alaska where a sizeable future population could be located directly over a large geothermal resource that can be economically utilized.

EFFECTS OF COMMERCIAL TELEVISION ON RURAL AL/SKAN CHILDREN

Prinicpal Investigator: Norma Forbes
Center for Cross Cultural Studies
University of Alaska
Fairbanks, Alaska

Amount Funded: $77,714

The proposed research is the third phase of a study of effects of the introduction of television on rural Alaskan Native children.

Data will be collected in two Tlingit-Haida villages in Southeast Alaska and four Eskimo villages in the Kotzebue Basin. Villages in each area are paired such that one had television and one did not during an earlier phase of the study. All village sites now have television. A wide range of social, psychological, and educational data will be utilized, with most of the measures reflecting television's role as a change agent.

PERSISTENCE OF HERBICIDES IN AGRICULTURAL SOILS

Principal Investigators: C.W. Knight & J.S. Conn
Agricultural Experiment Station
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $132,973

Agricultural acreage in the Alaskan Interior is increasing at a dramatic pace. By 1990, approximately 500,000 acres are expected to be under cultivation. The majority of the acreage will be located in the interior. A complicating factor in this development is that it is occurring in the subarctic, where little research has been undertaken to determine the effect of cold soils, long photoperiod, and short growing season on the various agroecosystems. One such component is agricultural herbicides. Herbicides are used extensively in agriculture throughout the developed world and now in Alaska.

Since persistence of herbicides could result in damage to herbicide-susceptible rotational crops, or in longterm buildup of residues sufficient to damage even less susceptible crops, information on herbicide degradation is urgently needed.

This information would be directly useful to extension personnel and farmers for: selection between alternative herbicides; planning clearing practices that optimize soil pH and organic matter content for minimizing herbicide buildup; and in the planning of crop rotation sequences. The information would also benefit those evaluating the length of environmental impact that would be caused by herbicide contamination of non-agricultural lands.

SNOWPACK STRUCTURE AND REGIONAL AVALANCHE HAZARD FORECASTING

Principal Investigator: Edward R. LaChapelle
Professor of Atmospheric Sciences
and Geophysics
University of Washington
Seattle, Washington

Amount Funded: $28,503

Forecasting avalanches for widely varying mountainous terrain is a growing problem for many areas throughout the world. It is proposed that the role of snowpack structure analysis be formalized and included into regional avalanche forecasting.

A computer program will be applied to a large data base in order to isolate snowpack features that discriminate stable from unstable conditions. This information can then be synthesized with meteorological data into an operational guidance model for avalanche forecasting in Alaska.

FOREST ECOSYSTEM MANAGEMENT MODEL

Principal Investigator: John Fox
Institute of Arctic Biology
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $63,236

There will be increasing utlization of interior Alaska forests in the next several decades for saw logs, house logs and firewood. The effects of all management options cannot be evaluated by field studies alone because of the costs and time lags involved. The alternative, increasingly in use now in the eastern U.S., is development of forest growth and ecosystem computer simulation models. Such models aid in the selection of possible field experiments and in the refinement through field studies of the assumptions rationale of the models and consequently of predictive capabilities.

There is a current need for forest production-decomposition-nutrient exchange models capable of predicting effects of forest management practices and climatic changes for interior Alaska forests. A large data base now exists, suitable for building a first generation of such models fully comparable to, or even exceeding performances of the models currently used for eastern deciduous forests.

Such a modelling program would benefit and complement current management oriented research by the state and federal institutions in Alaska.

VOLCANO-GLACIER INTERACTIONS ON MT. WRANGELL

Principal Investigator: Carl S. Benson
Professor of Geophysics and Geology
Geophysical Institute
University of Alaska
Fairbanks, Alaska

Amount Funded: $154,500

A major goal of this proposed research will be to complete selected parts of research which deals with the behavior of glaciers on the flanks of Mt. Wrangell. (Mt. Wrangell is an explosive volcano similar to Mt. St. Helens. It is the northernmost and one of the largest active volcanoes on the Pacific Rim.)

The research will cover site selection for a deep ice core to be obtained in 1982 for analysis of climatic and volcanic history. The research will also continue detailed monitoring of volcanic activity. Monitoring is important because of the three-fold increase in heat from Mt. Wrangell since the Mt. St. Elias earthquake in 1979 and the increased activity currently reported by long-term residents of the Copper Valley.

ALASKAN EARTHQUAKE CATALOG

Principal Investigator: Niren N. Biswas
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $128,334

It is proposed to establish and test a homogeneous catalog of Alaskan earthquakes with local magnitude greater than or equal to 4.0, for the period January 2, 1966 through December 31, 1980. Prior to the great Alaskan earthquake of 1964, there were only two seismographic stations in Alaska. In 1964, the National Weather Service began establishing a network of seismic and tide gauging stations along the south coast of Alaska. Shortly thereafter, in late 1965 and early 1966, the University of Alaska's new seismic laboratory began establishing a network of stations in central Alaska.

Now there are more than 200 short-period seismic stations in Alaska, divided into at least six major networks, and operated by five different groups for a variety of different purposes. A clear need exists to synthesize all of this data on Alaskan earthquakes into one list.

ENHANCED OIL RECOVERY

Principal Investigator: Christine Ehlig-Economides
Dept. of Petroleum Engineering
School of Mineral Industry
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $120,000

Alaska owes most of its present and much of its future prosperity to revenues from oil and gas production within the state. While exploration continues on the North Slope and offshore, the ongoing production from fully developed reservoirs in Alaska already provide the U.S. with nearly 20 percent of the total domestic production.

As primary production rates begin to decline and the secondary measures such as gas cap injection or water flooding reach the limits of effectiveness, the Alaskan reserves will be greatly extended through design of appropriate enhanced oil recovery processes.

To aid the design effort, the investigators propose a major, two part research project on enhanced oil recovery in Alaska. The first part will deal with the physical properties of the Alaskan crude oil. The second part, which is not a component of this proposal, will deal with the geological description of the formation properties of Alaskan reservoirs.

NEAR-SHORE BOTTOMFISH MANAGEMENT PROGRAM

Investigators: Lewis Haldorson
University of Alaska
Juneau, Alaska

Alaska Coastal Research, Inc.
Box 368
Langely, Washington 98260

Amount Funded: $72,710

With the recent trend to very short halibut openings in southeast Alaska, and reduced salmon troll seasons, increasing numbers of fishermen are turning to, or investigating the possibility of fishing previously underutilized resources. Near-shore bottomfish are the first alternative for most of these fishermen. It appears that these previously unexploited fish populations are beginning to be targeted by small boat fishermen who are seeking alternate resources.

Research underway since 1980 has gathered extensive baseline information on important species caught in these fisheries. However, the state in 1981 almost eliminated the bottomfish study program in Alaska. The data gathered remains of relatively little value to the state unless it can be used as the basis for developing effective management plans. The proposed research is designed to complement this research program by developing a monitoring procedure for the inshore aggregation of fishes.

EFFECT OF HYDROCARBONS ON FISH

Principal Investigator: John P. Harrington
Chemistry Department
University of Alaska
Anchorage, Alaska 99501

Amount Funded: $47,029

This project will help answer any questions on the long term effect that hydrocarbons, especially aromatic and polycyclic aromatic hydrocarbons, have on fish.

The rapid exploration and development of oil potential in Alaska may soon overlap all the richest fishing areas of the state. The investigator plans to obtain dissolved hydrocarbons and raw crude oil from Port Valdez ballast, fractionate it by solvent extraction and test the effects of these fractions on the mutation rate of bacteria and Alaskan fish.

One of the chief values of this project will be to raise the general awareness of interactions between industry and the environment.

STUDY OF WIND CHARACTERISTICS FOR APPLIED WIND POWER

Principal Investigator: Tunis Wentink, Jr.
Professor of Physics
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99701

Amount Funded $149,408

The objective of the proposal is to provide information leading to the early implementation of wind powered systems as energy supplements for use by the people of Alaska. The work involves the analysis of existing wind data, acquisition of new wind data and transference of the information to the users of wind power.

The research will provide an improved service program for dissemination of wind power information, involving coordination with the University and other extension services and agencies. One improvement in particular will be in servicing specific information requests by private enterprise and state and local governments.

INFLUENCE OF CLIMATIC FLUCTUATION ON PERMAFROST

Principal Investigator: T.E. Osterkamp
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $142,733

Permafrost is a common soil condition in Alaska, with about three-fourths of the land area underlain by permanently frozen ground. Long-term needs of understanding the basic permafrost properties and processes and the short-term needs of developing solutions to permafrost detection and engineering problems, require intensive study and a comprehensive approach.

The study will include the monitoring of the thermal regime of the permafrost in Alaska at 15-20 sites. Measurements will be made of the thickness of the active layer and any thawing that may occur at the permafrost table and base, and of the temperature profiles through the permafrost section.

Interpretation and modeling of the temperature profiles will then be carried out to determine the effects of past and present changes in surface temperatures on the permafrost and to predict future changes in the permafrost regime.

SOLAR RADIATION ASSESSMENT

Principal Investigator: Gerd Wendler
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $165,964

Before an alternative energy source can be applied intelligently in Alaska, knowledge of how much energy is available from this specific source is essential. There is very little information concerning solar energy. Although a sophisticated system of solar radiation data acquisition is in use at the Geophysical Institute in Fairbanks, most of the data is only for the Fairbanks vicinity.

In order to obtain radiation data from each of the four major climatic regions in the state, substations were established in Kodiak, Anchorage and Barrow, using a limited number of sensors and antiquated data systems. The resultant data from these three stations are incomplete for proper evaluation of solar energy utilization.

The investigators propose to maintain operation of all four radiation stations in Alaska after the Deptartment of Energy support discontinues. The Fairbanks station will operate as it is at the present, but the other three stations will be upgraded by using additional sensors needed for the assessment of solar energy. All data will be reduced and presented in a form directly usable by individuals or agencies within Alaska. The data will be archived and disseminated by the investigators and the State Climatologist at the State Climate Center.

BIOGEOCHEMISTRY OF ARSENIC MINE DRAINAGE

Principal Investigator: Edward J. Brown
Institute of Water Resources
University of Alaska
Fairbanks, Alaska

Amount Funded: $83,500

The contribution of micro-organisms to the accelerated leaching of arsenic associated with gold mining to groundwater is unclear. The proposed research will study the biogeochemistry of arsenic in both placer and lode gold mining areas in Alaska where arsenic is prevalent.

This research could determine the specific causes for the increased levels of arsenic in streams and groundwater. The results of the study will be used to formulate solutions to water quality problems caused by placer and gold mining (if mining, in fact, is determined to be the cause).

STUDY OF AIRBORNE POLLEN AND SPORES FOR MEDICAL PURPOSES

Principal Investigator: James H. Anderson
Research Associate
Institute of Arctic Biology
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $81,341

Many Alaskans suffer with allergies induced by airborne pollen and spores. Alaska is practically unknown "aeropalynologically", and research is needed to help allergic patients and their physicians toward more effective prevention and treatment.

The objectives of this proposal will be to acquire detailed knowledge of the composition and seasonality of the atmospheric pollen and spore flora and to develop a method of predicting significant pollen inducing events.

This proposal is partly for funding to finish analysis of 1978 samples and to analyze the samples from three Durham samplers in 1981. The major portion of the funding is to upgrade, expand and intensify aeropalynological research more adequately to meet medical and scientific needs and criteria in the state.

FATE OF FERTILIZER NITROGEN IN AGRICULTURAL SOILS

Principal Investigator: Stephen Sparrow
Agricultural Experiment Station
University of Alaska
Fairbanks, Alaska 99701

Amount Funded $191,257

Very little is known about the behavior of nitrogen fertilizer in Alaskan soils. A better understanding of this behavior is needed to enable efficient utilization of applied nitrogen by crops and to minimize potential pollution problems.

The proposed research will study the various transformations and fates of nitrogen fertilizer in Alaskan soils. These include nitrification, immobilization and mineralization, leaching and gaseous loss of nitrogen. The results will be used to make recommendations to farmers and to policy planners on methods of management for best use of nitrogen fertilizer.

The study site will be located on University land at mile 1408, Fairbanks, within the Delta Agricultural Project. A leaching study will also be conducted at the University of Alaska Research Farm, at Fairbanks.

GROWTH RATES IN MUSKOX CALVES

Principal Investigator: Robert G. White
Institute of Arctic Biology
University of Alaska
Fairbanks, Alaska

Amount Funded: $52,059

Muskox herds reintroduced to Alaska are expanding rapidly and show extremely high population growth rates. This phenomena warrants further study as these muskox may compete for food with caribou, reindeer, and moose.

There are no data on the milk requirements and food conversion efficiency in muskox calves, which is needed to interpret the nutritional basis for differences in growth and reproductive performance of circumpolar muskox populations.

IMPACT OF COMMUNITY PARTICIPATION ON RURAL EDUCATION

Principal Investigator: Gerald A. McBeath
Department of Political Science
University of Alaska
Fairbanks, Alaska

Amount Funded: $146,332

Alaska lacks information on the extent and degree of community participation and involvement in its schools, as well as what effect such participation has had on students and parents.

This project will describe the range of variation in community activity in rural areas of the state. Field research is proposed in 20 sites with data collection using several methods. Case studies will be formed and compared, and the project will also provide information necessary for the formulation of strategies for effective community participation.

HUMPBACK WHALE SURVEY IN PRINCE WILLIAM SOUND

Principal Invesitgator: Olga von Ziegesar
North Gulf Oceanic Society
P.O. Box 156
Cordova, Alaska

Amount Funded: $17,987

The purpose of this research is to photo-document individual humpback whales and determine their number, movements, and activities in Prince William Sound, Alaska.

This information will be used to determine any critical habitats or critical time periods in humpback whale utilization of the area. In addition, data collected will provide a baseline against which future changes can be measured.

ARCTIC ALASKA SOILS DATA BASE

Principal Investigator: K.R. Everett
Ohio State University
Research Foundation
Columbus, Ohio

Amount Funded: $45,548

A large data pool exists for the characteristics of soils in arctic Alaska, and these data are being added to at an ever increasing rate. At present there is no single source from which to access the existing soils information.

It is the goal of this project to assemble and cross reference existing soils data for arctic Alaska while it is still in a manageable state.

EFFECTIVE TEACHERS IN RURAL ALASKA

Principal Investigator: Judith Kleinfeld
Professor of Psychology
The Institute of Social and Economic Research
University of Alaska
Fairbanks, Alaska 99701

Co-Principal Investigator: Bill McDiamond
Research Associate
The Center for Cross-Cultural Studies
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $145,718

The extremely high teacher turnover rate in rural Alaska disrupts the continuity of educational programs, contributing to academic deficiencies for many students. Often these problems are caused by the teachers themselves who cannot cope with a cross-cultural, multi-grade classroom in a different cultural situation, and the rigors of a rural Alaskan lifestyle. Despite the significance of the problem, very little research has been done on the characteristics of teachers who are successful in isolated cross-cultural situations, or with Eskimo and Indian students.

This proposal will examine the characteristics of teachers who are effective in rural native communities. The research will identify the criteria which rural communities use in evaluating the effectiveness of rural teachers. It will also identify the criteria which school administrators and other professional educators use in evaluating teachers in rural settings. Finally, it will describe the characteristics and adaptive strategies of rural teachers who have been considered effective by these groups.

The research target school districts will include some with a high teacher turnover rate. In the high rate districts are: Southwest Region, Northwest Arctic and Kuspuk school districts. The low rate districts are: Lower Yukon, Lake and Peninsula and Yukon Flats school districts.

GENETIC ANALYSIS OF BITING ALASKAN BLACK FLIES

Principal Investigator: Gerald F. Shields
Associate Professor of Zoology
Institute of Arctic Biology
University of Alaska
Fairbanks, Alaska 99501

Amount Funded: $39,216

An increase in agricultural and livestock production is expected to continue in Alaska. Species of black flies, after emergence, extract blood from a variety of hosts, including man and cattle. In addition, little is known of the deleterious effects of black flies on subsistence resources such as reindeer and caribou. In areas outside of Alaska, these flies have severely reduced productivity through host harassment, and in extreme cases, death has resulted.

The more noxious biters are known as Gnu arcticum and the study will concentrate on this species. Preliminary analyses of the distribution of arcticum indicate that this species reproduces in abundance in the very areas of Alaska in which livestock increases are planned. This particular insect presents a potential threat to the success of the livestock industry in Alaska.

When the studies are completed, control agencies will be provided with information concerning the location and distribution of cattle biting flies in the areas proposed for livestock production, the relative abundance of these taxa in relation to non-biting types and the emergence time at these locations.

EVALUATION OF EMERGENCY TRAUMA TRAINING IN LOGGING CAMPS IN SOUTHEAST ALASKA

Principal Investigator: Laurel Anderson
Southeast Region EMS Council, Inc.
Sitka, Alaska

Amount Funded: $24,525

Logging is the most hazardous industry in Alaska. In 1978, accidents and injuries in logging camps were four times the rate of all private sector industries. In 1974, an advanced emergency care course was introduced to two logging camps in Southeast Alaska. Since that time, Emergency Trauma Training (ETT) has been conducted in nine other camps. Reports from independent sources indicate that the training reduces the severity of the injury and the incidence of accidents. This study will determine if these reports are related to the ETT. This will be done by examining Workers' Compensation claims of some logging camps from 1973-1979 and comparing camps that received ETT with camps that did not.

NORTHERN PLANTS DOCUMENTATION CENTER

Principal Investigator: David F. Murray
Institute of Arctic Biology
University of Alaska
Fairbanks, Alaska

Amount Funded: $39,541

This proposal is for funds to supplement federal and University of Alaska support of a computerized data bank of information on Alaskan plants. These data provide fundamental information required in environmental assessments, land use planning, vegetation maping, and impact evaluation.

Although the data have been available, their retrieval has not been practical until the development of appropriate computer programs. These project funds will be used to expand the master file.

STUDIES OF ALASKAN DULSE (Marine red algae)

Principal Investigators: John W. Chandler
Robert J. Ellis
Natasha I. Calvin
Marine Botanicals
Auke Bay, Alaska

Amount Funded: $75,000

Preliminary laboratory studies indicate that two species of seaweed found primarily in southeast Alaska are effective against herpes virus. Alaskan Dulse is the name given these two species by their discoverers.

Prior to determination of the abundance of seaweed in Alaska the medical effectiveness must be researched. This project will analyze the properties of the Dulse and explore the medical implications for treatment of herpes infection through topical application of Dulse.

ALASKAN TEPHROCHRONOLOGY PROJECT

Principal Investigator: Robert Thorson
Assistant Professor of Geology
Geology/Geophysics Department
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $121,365

Tephrochronology is the study of volcanic deposits or tephra (volcanic ash) which results from explosive eruptive events. Geologists in this discipline attempt to determine the characteristics, age, source and distribution of volcanic ash, so that volcanic hazards can be properly assessed. Compiling this information is critical for understanding the regional hazards associated with explosive volcanic events.

This proposal will fund the organization and completion of an Alaskan Tephrochronology Project at the University of Alaska Museum. The purpose of the project is to define and facilitate the study of tephra layers throughout the state. The objectives will be to establish a reference collection and data file on Alaskan tephra; to coordinate future tephrochronology research.

The end result of the two-year project will be the first comprehensive view of the entire volcanic ash sequence in Alaska. Such an overview will be vitally important in identifying volcanic hazards and enhancing the safety and well-being of the state's residents.

COASTAL FLOODING BY STORM SURGES & OBJECTIVE FORECASTING PROCEDURES

Principal Investigator: James L. Wise
Arctic Environmental Information
& Data Center
University of Alaska
707 "A" Street
Anchorage, Alaska 99501

Amount Funded: $57,500

Coastal flooding from storm surges is a real hazard to communities along the Bering, Chuckchi, and Beaufort Sea coasts. The project will gather storm surge occurrence data, then work with the National Weather Service and a storm surge modeling expert to:

1) prepare a climatology of storm surges;
2) develop manual objective forecast procedures; and
3) develop an automated objective forecast procedure.

YUKON-KUSKOKWIM COASTAL COMMUNITY HARVEST DISRUPTION STUDY

Principal Investigator: Ann Fienup-Riordan
325 East Manor Street
Anchorage, Alaska 99501

Amount Funded: $79,888.

The study will provide socioeconomic and sociocultural parameters that can be used to evaluate the nature and extent of potential resource conflicts on coastal Alaskan communities, should uplands or offshore oil and gas activities create an environmental disturbance.

Research will include the identification and assessment of the economic, social and cultural ramifications of possible renewable resource harvest disruption on residents of Scammon Bay, adjacent communities, and the region as a whole. Disruptions could include effects of offshore structures, tanker movements, noise, human disturbances, potential oil spills and other occurrences.

SIXTY SECONDS OF SCIENCE

A SERIES OF STATEWIDE MONTHLY RADIO PROGRAMS

Principal Investigator: Nan E. Elliott
Arctic Environmental Information and Data Center
University of Alaska
Anchorage, Alaska 99501

Amount Funded: $62,006

"Sixty Seconds of Science", a statewide monthly radio program, was developed by the Arctic Environmental Information and Data Center in 1980 through a grant from the National Science Foundation.

The goal of the project is to reach the nonscientific audience and inform it of science activity in Alaska. Ten 60-second programs will be produced each month. The programs are aired by 85 percent of the commercial and public radio stations in the state. In 1981, in its first year, "Sixty Seconds of Science" won a first-place award from the Alaska Press Club.

UNDER-ICE NAVIGATION BY SEALS

Principal Investigator: Robert Elsner
Institute of Marine Science
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $35,631

The objective of this study is an experimental examination of the under-ice orientation and navigation capabilities of the Bering Sea spotted seal. It will investigate the possible sensory disturbances arising from ambient noise levels and environmental disturbances which are anticipated to take place in connection with petroleum exploration in Alaskan waters seasonally covered with sea ice.

A series of experiments will be performed with captive spotted seals. The study will take place in a large, flooded industrial gravel pit during the winter to simulate under-ice low visibility conditions while maintaining control over the environment.

REMOVAL PROCESSES OF AIR POLLUTION PARTICLES BY ICE FOG CRYSTALS

Principal Investigator: Takeshi Ohtake
Geophysical Institute
University of Alaska
Fairbanks, Alaska 99701

Amount Funded: $118,816

Air pollution in Fairbanks during the winter months manifests itself primarily as ice fog. Researchers have cautioned that the city might experience dangerously high levels of air pollution with increasing population and industrial development.

However, a high possibility of removal of air pollution particulates by sedimentating ice fog crystals has been demonstrated. Chemical analyses of ice fog precipitation collected in the Fairbanks area suggest that the pollution particulates are scavanged by the ice fog crystals. If removal of air pollution by ice fog is verified, more ice fog might be preferable because the ice fog may be less harmful than air pollution.

This possible cleansing effect of air pollution particles will be studied in Fairbanks. The mechanism of the scavenging effect of ice fog crystals will be examined by use of electron microscope techniques. The research objectives of this study will be: to obtain current size and number distributions of ice fog crystals and aerosols in Fairbanks and its vicinity; to evaluate the degree of the cleansing effect by ice fog crystals in a subarctic polluted urban atmosphere; and to examine the mechanism of artificially enhancing such a possible scavenging effect by small ice fog crystals.

STUDY OF IMPLEMENTING ALASKA'S BILINGUAL EDUCATION POLICY

Principal Investigator: Ramona N. Suetopka-Duerre
University of Alaska
Arctic Environmental Information and Data Center
Anchorage, Alaska

Amount Funded: $23,710

The study will analyze the implementation of Alaska's bilingual education policy in the Lower Kuskokwim School District. The intent of the research will be to pinpoint problems, suggest reasons for the problems and offer suggestions for improvement in the district's bilingual education programs. The research will include examination of documents pertinent to the programs under study, observation, and interviews. It will also examine the reasons for the increased difficulty in determining the impact of education policies from one program to another and why a single policy produces varying results in various program locations.

ARCTIC RESEARCH SHIP DESIGN (Phase III)

Principal Investigator: Robert Eisner
Institute of Marine Science
Fairbanks, Alaska

Amount Funded: $161,933

Earlier design work for an arctic research ship established the requirements for national polar research vessel operations in terms of geographic regions, environmental conditions and scientific capabilities. The design envisages a ship having characteristics of 225' water line length, 2900 tons displacement, twin rudder and diesel propulsion.

This proposal is to continue the design effort to solve technical problems which remain and which require resolution before further development work can begin. These problems concern sea ice resistance and propulsion and include design improvements such as: modification of hull lines; diesel, reduction gear, nozzled, variable pitch propeller propulsion, and reduction of frictional resistance in ice by air-water lubrication.

A model will be constructed suitable for the installation of self-propulsion equipment and testing. Model tests in ice will be performed at various ice thicknesses to determine the resistance of the ship and to observe the flow of ice around the hull. Modification of hull lines and lubrication techniques will be studied for effectiveness in reducing ice compression, resistance, and ice flow under the hull.

Legislature of the State of Alaska

Testimony of
Dr. Edward Wenk, Jr.

It is quite a privilege to testify on new legislation regarding the Alaska Council of Science and Technology. In my view, this proposition may be one of the most crucial to come before this session. By updating an important aid to state decision making, continuity of the ACST would represent a small investment today that should pay off handsomely tomorrow --- providing sharp and objective information on Alaska's opportunities and problems so as to foster development with the least disappointments or unwitting economic and social costs. I hope that these brief remarks may be helpful in your deliberations.

By way of introduction, a word or two about your witness. Over the last 24 years, I have been a participant in or analyst of advisory apparatus related to the making of technology-intensive policy. Although trained as an engineer and engaged as a practitioner for 18 years, I became the first science advisor to the U.S. Congress in 1959, then served on the science policy staffs of Presidents Kennedy, Johnson and Nixon. In 1970, I was appointed to the faculty at the University of Washington, where I have taught, conducted research, and continued in advisory capacities, especially to the Congress.

Over this last decade, I have periodically visited Alaska where I learned firsthand about its people, its economy, its challenges and its dilemmas. I soon understood why Alaska's future is a special case so that whatever steps are taken in science and technology policy must be carefully matched with the unique characteristics of geography, economy, history, hopes and dreams of its citizens.

As legislators, you have a powerful vantage point on Alaska's agenda so much of which depends on science and technology. These issues and corresponding initiatives, to name just a few, would:

- Increase efficiency, economy and productivity in state government by strengthening information resources, communication linkages and use of technological aids;

- Foster development of Alaska's natural resources, by understanding their distribution, richness and accessibility, by enhancing techniques of management in the public interest to assure a competitive position in world markets;

- Evaluate the future supply and demand of energy, state and global, considering indigenous sources of hydroelectricity and natural gas, their transportation and distribution;

- Provide new opportunities for employment through technological innovation, linking university R and D with industrial and state requirements, attracting diversified industry, facilitating capital formation, promoting long term investments and stimulating economic vitality in rural areas;

- Consider new rail networks that would improve interior transport, considering geology, climate and state of the art of hardware;

- Evaluate the impact of new technologies unfolding in the lower 48 to map dependencies and constraints that may influence the future of the state;

- Expand knowledge of high latitude phenomena, for example of electromagnetic effects that may impair pipelines, disrupt electrical power or radio transmissions, and of frozen soil that must be considered in construction or maintenance of highways, large buildings, railroads, and underground utilities;

- Strengthen meteorological reporting and forecasting as it affects agricultural development, stream flow, and hydroelectric capacity, glacial behavior, outdoor recreation, aviation and maritime safety, etc.;

- Extend capabilities for health maintenance and disease prevention so as to prolong and improve quality of life and to contain rising costs of medical care;

- Meet needs of a growing population for highways, water supply, sewerage, fire and police protection;

- Help manage state funding of research and development, which is a greater proportion of the total conducted in Alaska than in any other, to assure its focus on interests of the state, promote high standards in its conduct, and the effective utilization of products.

Although these examples cover a wide range of topics, they reveal significant common features:

- All these key decisions, consistent with Alaska's Constitution, are matters of public policy,

- Options depend critically on research results from natural and social sciences and engineering, and on alert inquiry as to future technological and social developments,

- Substantial public investments are involved,

- Issues are both technically and institutionally complex and require heightened initiative for public understanding and acceptance,

- Consequences of error are likely to be costly, politically difficult to correct, ecologically irreversible, or marked by shortfall in goal achievement,

- Implementation requires balanced partnership between public and private sectors,

- Public responsibilities for implementation, monitoring , or regulation cross agency boundaries so as to require an unusual degree of coordination,

- The past no longer provides a guide for the future, thus requiring new levels of foresight and impact analysis.

Put another way, these technology-laden issues involve high stakes for Alaska. Moreover, their satisfactory resolution depends on a base of sound information and analysis, and on keen public management. Because of Alaska's special situation, research conducted elsewhere may not suffice.

All of which adds up to the need for Alaska to equip itself with technical advisory apparatus that can provide essential facts and objective interpretations, focused on policy questions, prompt, free of advocacy, future oriented, drawing on a wide range of expertise, clearly and concisely presented. For only after the crucial data base is developed can options be examined and rational choices made that reflect economic, social, legal and political considerations that must be blended in democratic process.

In short, we find that both policies and policymaking that depend on science and technology are substantially different from others. So what do we do?

It is here that such steps may be easiest visualized with a nautical metaphor. Science advisory apparatus is like having a

navigator on a ship's bridge. It's function is an adjunct to that of the captain; it does not replace the crew in the engine room tasked with smooth operations. Navigation involves defining a course to reach a distant and future destination, with a careful watch for obstacles and hazards--early warning of storms, other vessels, reefs--utilizing all available charts, radio, radar and electronic location devices. Otherwise, if these functions are carried out by the ship operator, they are in competition for time and attention, may be terribly distracting -like running from wheel to radar scope- or they may be entirely neglected, with increased risk of collision, damage, delay or failure to achieve goals.

To strengthen the policy making capacity of the state, various instruments are available:

- Modify and strengthen the role for ACST,
- Expand roles of other governmental apparatus,
- reinforce functions in existing staff agencies,
- create a small specialized staff,
- appoint ad hoc advisory committes,
- use private consultants,
- develop systematic citizen consultation.

In considering relative merits of alternatives, and in recognizing that effective functioning may involve several in concert and not just one the following criteria should be considered. The unit should:

- facilitate role of governor as Chief Executive,
- demonstrate credibility and freedom from advocacy,
- assure access to diversity of expertise and of data banks,
- display low cost and structural simplicity,
- impart long range perspective and foresight capacity,
- respond with fast reaction time when needed,
- provide balanced representation of various disciplines and professions,
- demonstrate familiarity with policy process,
- foster interagency coordination and articulate with bodies

at other governmental levels,

- communicate effectively in and outside of government,

- be backed by legislative mandate.

As an aside, while the federal experience is not directly applicable, it may be instructive because exactly the same types of policy predicaments had to be met. Beginning in 1957, the incumbent President and his successors created and utilized four interrelated instruments:

- an advisory committee of outsiders,

- an advisory committee of insiders,

- a science advisor directly on the White House Staff,

- and a small specialized staff office.

With different administrations, these units have undergone major changes to strengthen or to divest tasks, depending upon wishes of the Chief Executive; but except for a 1973-76 hiatus, core functions have continued now for 25 years.

Congress, too, has acted. In 1958, it created a post of science advisor in the Legislative Reference Service, Later, they expanded it to a diversified staff of experts; then in 1972 created an entirely separate Office of Technology Assessment by legislation. Also about 1977, it authorized a science policy unit in the GAO.

States have also established analogous advisory apparatus. They are highly varied; they change in structure and style with new administrations; they range widely in mission and effectiveness. Most have a role in economic development, and these are being reexamined and revitalized as most states respond to the seduction of the hi-tech frontier. The National Governors Association has completed three studies in this area, treating prospects and comparative mechanisms.

To return to Alaska, as was said before, whatever is established here should be custom designed for the State's special needs and situation. As a first step, I strongly support new legislation in relation to the Alaska Council on Science and Technology.

Such a measure should focus more on a policy advisory role and less on managing grants; its mission should reflect:

- the need for acquiring and interpreting technical information in SandT policymaking,

- the potential of scientific and technological research in Alaska's future,

- the obligation to spend public research funds prudently and without unnecessary duplication,

- the benefit of effective information transfer,

- the requirement for central integration of research results,

- the capacity to look ahead and build a future orientation into the advisory function.

I also believe it essential to clarify the organizational arrangements by establishing the ACST in the Office of the Governor. This erases existing ambiguity as to structure, and best assures effective utilization and communication of this resource by linkage between advisor and advisee. Additionally, roles and missions of ACST should be spelled out to meet general criteria for functioning that I listed previously. And finally, the bill should contain an action-forcing provision through a requirement for a biannual report, dealing with the state of SandT, issues deserving research, recommendations for additional research and a summary of significant accomplishments.

In summary, this proposal is derived from what I perceive as needs of the state; it meets a test of soundness, using the criteria for such advisory apparatus. Finally, it would be built on an existing body that, while having a different scope and direction, has a track record of accomplishment that should reduce uncertainties as to performance if it were an entirely new entity. For the ACST has earned recognition and praise in a national scientific journal, almost unprecedented in activities of this kind.

What is important to your deliberations is that this proposal has a high prospect of success. It does mean that the members of the ACST will have a very demanding challenge ahead. But in my discussions with them, they appeared to share objectives and possible changes in legislative mandate that I have repeated here. This step might also correct what seemed to be substantial underutilization by the preceeding administration.

I do not believe that this is the last word on what the state may ultimately decide is necessary to fulfill its opportunities involving science and technology. But in my judgment, it is the best possible first step.

March 22, 1983

Testimony of Mr. David Hickok, Chairman, Alaska Council on Science and Technology before the joint Senate and House State Affairs Committee-Alaska State Legislature

Mr. Chairman, my name is David Hickok, the current chairman of ACST. With me is Chris Noah, Executive Director to the Council and Dr. Edward Wenk.

For four years we have been involved with an experiment unique to Alaska government experience. An experiment which has involved an extremely high level of volunteer participation and committment from individuals within the Alaskan engineering and science community. This volunteer effort has been made primarily to make available Alaskan expertise in the sciences and engineering to the legislature and the executive branch as they considered policies and programs requiring such advisory input. Additionally, the Council has prepared research needs reports on subjects applicable to state interests, disseminated science and engineering information on a variety of subjects and in a variety of media and administered grant funds for the support of technology and research grant programs established by the legislature and given to the Council for administration.

Like many experiments our experience has been only partly successful. But we have learned something of both the strengths and weaknesses of a science organization in and for Alaska. I, and the members of the Council welcome this hearing and a candid discussion of the Council's record together with an evaluation of its responsibilities and duties. Since inception we have been engaged in our own self analysis but particularly over the past 1-1/2 years have sought better approaches or ways to alleviate the deficiencies in the ACST structure which we have observed. We brought three distinguished men of science in Alaskan and ocean affairs--Drs. George Rogers, Joseph Fitzgerald and Edward Wenk in to assist us in this evaluation. Dr. Wenk is here today to offer some observations from his lengthy experience in federal science and other state organizations.

With that introduction aside I'd like to briefly summarize some salient points of our own self-analyses. Where we are weak, where we are strong and why.

1. The Councils' authorizing legislation provided for an organizational relationship to both the governor and the legislature. This dichotomy of responsibility to both branches is perhaps the reason why neither has used the broad expertise available through the Council - extant in hundreds of Alaskan scientists and engineers available to assist government in appropriate ways -- to the extent possible.

   Even so the legislature and the governor have called upon the Council for advice on numerous and various matters. The legislature has used the Council much more than the past executive branch with particular contacts involving several legislative committees: agriculture, telecommunications, natural resources and state affairs. As you will recall it was the Council who first furnished the legislature through this committee information on the impacts of federal budgetary cutbacks.

   The authorizing legislation for the Council called for its placement within the Office of the Governor. However, we were never really welcomed there in the past administration and were transferred first to DEC and later to Administration by executive order.

2. Patterned after the federal experience in science organizations the 1979 draft legislation originally called for three separate entities: an advisory body to the executive branch on policy matters involving science and technology; the chartering of an independent private sector organization - e.g. Alaska Academy of Engineering and Sciences;

and, a third organization to grant funds for the support of scientific and technological research applicable to solving state needs and problems.

During the legislative process all three of these above functions were combined in the ACST. Experience has shown that this was a mistake. A small (seven person) volunteer Council simply cannot perform in both the policy advisory function and the granting of support funds for science and technology.

3. Experience has shown that the membership (7) is too small to effectively represent the expertise necessary to consider the range of scientific and engineering issues brought before the Council. Even though we have a rapid response system at hand to involve hundreds of diverse experts we are hindered in the deliberative and voting process. At least two more members from the private sector would make for a more effective operation.

4. Particularly difficult and time consuming for the Council has been the granting of funds for Northern Technology and Applied Research. In part the criteria for these grants have been vague in the legislation, but more importantly it is extremely difficult for a deliberative body, representing different scientific or engineering disciplines and interests to vote on the propriety of a broad spectrum of research proposals -- even though well screened by reviewing experts prior to Council vote. Incidentally, this review process itself has been most effective scientifically and financially and has been applauded nationally in SCIENCE magazine.

5. Despite some of these difficuties we have produced, in our view, with only volunteer help--a rather impressive record of research needs reports, support of meetings and conferences, and dissemination of information in a variety of media: publications, radio and T.V.

6. On the subject of research needs reports and their prioritization we have only made priorities within each subject or function. We have not felt it appropriate to prioritize between research needs in health vs agriculture or natural resources vs transportation, etc. Instead we have held that this prioritization between functions was a matter for elected representatives. Even so if asked our opinion we would have responded.

7. Similarly we have been criticized for not coordinating all science in Alaska. In response to this we have pointed out that the legislative history for the ACST specifically said not to do so, and in any event it would be a mistake to put the Council in a "big brother" role for all Alaska science. Instead, we have pursued the goal of improved coordination in research through indirect means of workshops, conferences and information exchange. In this way--ie communications and involvement--coordination of state interests on many subjects has been achieved.

8. Finally, I would like to point out that we believe it has been in the policy area that the Council has been particularly effective and in an important sense. We have sought the development of research partnerships between the federal government, the state government, universities and private industry. To this end we wrote the report

U.S. Arctic Science Policy, assisted Senator Murkowski in the drafting of his legislation, the Arctic Research and Policy Act, formulated the state's position on this legislation and influenced the national scientific community to support its enactment in the U.S. Congress.

At this point in time the future of this legislation is our greatest concern and highest priority. We feel most strongly that if state and national goals in resource development, human health, environmental protection and national defense are to be achieved in the U.S. Arctic--Alaska and adjacent waters, then the combined forces of science and engineering expertise from government, from academia and private industry must work cooperatively in the greatest partnership possible.

What you decide to be the fate of the ACST or a similar science body in Alaska will have a direct effect on this effort. Unless Alaska continues an interest in science policy and research planning the United States Congress is unlikely to do so.

Thank you for this opportunity to appear before you I'd be pleased to answer any questions.

A NEWSLETTER PUBLISHED BY THE ASSOCIATION OF CANADIAN UNIVERSITIES FOR NORTHERN STUDIES

see p. 4

NORTHLINE

VOLUME 3, NUMBER 1, FEBRUARY 1983

The Changing Face of the N.W.T.

The changing face of political life in the Northwest Territories is reflected to some extent in the re-orientation of the Territories' Ottawa office. Once the bureaucratic source of administrative decisions emanating from Ottawa, the office has undergone a major transformation over the last 20 years similar to that which has taken the N.W.T. itself essentially from protectorate status to responsible government.

Gone is the bureaucratic office first operated quietly under the wing of first the Department of the Interior, then the Department of Northern Affairs and Natural Resources, and finally the Department of Indian Affairs and Northern Development. In its place is an independent, politically oriented office — an advance observation post for the elected officials of the N.W.T. government in Yellowknife.

The Territories' current champion in Ottawa is Claire Barnabe, who brings an astute knowledge to the job of both the major political issues affecting the North and the leading personalities of the Ottawa political scene. She has the insider's grasp of the political manoeuvring now going on between Ottawa and the N.W.T. over such important questions as the settlement of native land claims and the control of the potentially valuable resource base.

Claire Barnabe knows her territory. Born in Vanier, Ontario in 1940, she has lived in the North since 1965, working as a teacher, a hotel manager, a settlement manager and a policy analyst for the Drury Commission from 1978 to 1980. As Senior Advisor in Ottawa to the Government of the N.W.T., she is responsible in part for establishing contact with federal ministers and their parliamentary and political staffs, and recommending lobbying strategies and plans to the elected Executive Committee of the N.W.T. She reports to the Minister responsible for Intergovernmental Affairs, George Braden, who has been the leader of the Executive Committee since 1979. Braden previously worked as a policy analyst with Claire Barnabe on the Drury Commission.

According to Claire Barnabe, George Braden was the chief architect of the changes

Claire Barnabe

that have taken place in the Ottawa office. "After being elected in the fall of 1979," she says, "George Braden decided that the role of the Ottawa office had to change. He wanted more of a political liaison office. We looked at what the provinces were doing, especially Alberta and B.C." There was a feeling at the time, she adds, that the office should not only be independent of the federal government in fact, but should also be seen to be independent.

This desire led to a decision by the Executive Committee in the spring of 1982 to close the bureaucratic office that still operated within the Department of Indian Affairs and Northern Development. "We wanted to get out of DIAND because of the confusion it was causing," she says, "and to get out of government buildings so we could be independent of the federal government." The bureaucratic office was finally closed in September 1982, leaving only the independent Intergovernmental Affairs office, modelled on provincial offices in Ottawa.

If the move towards responsible government and the right to be represented in negotiations affecting one's future has been accomplished without much opposition, indeed, in many cases, with the encouragement of the federal government, such has not been the case with other goals. The goal of provincial status, for example, embraced by many northerners, is no closer than it has ever been. The people of the eastern Arctic, Claire Barnabe says, who voted strongly in favour of division of the Territories in the recent plebiscite, "seem to believe that within 15 years they will have provincial status and control of resources."

"I don't think the Northwest Territories is ever going to have provincial status," she declares bluntly. The uncertainty in the field of energy and the absence of an adequate industrial base, she explains, make it impractical

Page 4, Changing

New SSHRC President

On October 28, 1982, the Prime Minister announced the appointment of William E. Taylor, Jr. as President of the Social Sciences and Humanities Research Council of Canada (SSHRC). Dr. Taylor succeeds André Isorier, who has retired from the Public Service.

One of Canada's specialists in Arctic archaeology, and the architect of the National Museum of Man's extensive national research and outreach programs, Dr. Taylor is well known for his many research publications and addresses in the fields of archaeology, museology and Inuit art and culture. Dr. Taylor has been the recipient of numerous awards including the Queen's Jubilee Medal, the Bicentennial Medal of the Society of Antiquaries of Scotland, and the Royal Society of Canada Centenary Medal.

Dr. Taylor has been the Director of the National Museum of Man (including the Canadian War Museum) since 1967. He assumed his new position with the SSHRC on a full time basis on February 15, 1983. □

Trust Announces First Awards

In association with the sponsoring body, the Association of Canadian Universities for Northern Studies, the Canadian Northern Studies Trust has begun a program to give northern Canada a stronger and more national place in education and training by announcing the first winners of Northern Studentships and Special Awards to be held at Canadian universities.

The Trust, which was recently established by the Council of the Association of Canadian Universities for Northern Studies, has this year offered Northern Studentships valued at $10,000 each to three outstanding young Canadians in support of their studies leading to careers involving Canada's North. An additional studentship is also being considered at the present time.

In making the announcement Dr. J. G. Nelson, President of ACUNS, and Dr. J. K. Stager, chairman of the Trust Management Committee, said: "We are very pleased to make the first awards to support students clearly committed to northern studies. There is little doubt that northern Canada faces change with the interest in resource potential, the concern for environmental quality and the human condition, and political evolution at several levels of government. We are convinced that it is important to begin now with scholarships to prepare, through education and training at our universities, some of the young people who will be needed to shape a northern future. What was very heartening to the Committee was the excellent response from really quite outstanding students. We had nearly seventy applications of superior quality in most respects, and to select three Studentship winners and three for Special Awards was very difficult. It has demonstrated to us that we need to expand our program with contributions to the Trust fund."

The Special Award winners are from the North. Carol Geddes, a member of the Teslin Band, will work towards a Master's degree in Communications at McGill. Robin Johnson leaves nursing in northern Alberta to gain a Master's degree in Nursing at the University of Calgary before returning north. Jonleah Hopkins from Whitehorse will study the development of northern health care delivery systems for a Master's program at the University of Waterloo. One of the Northern Studentships will go to Margaret Johnston studying at Trent University, who will prepare her Bachelor's thesis on the relationship of highways, tourism and wilderness, using the case of the Dempster Highway. Alain Bissonnette won his award to support a Ph.D. program in anthropology, investigating the territorial rights of an indigenous northern people. He will do fieldwork among the Montagnais and present his thesis to the Université de Montréal. Nancy Weeks will begin study for a Master of Environmental Studies degree at York University, focusing on the theoretical and practical basis for cooperation on multifaceted interests in research on renewable resources. All of the successful candidates have previous northern experience and have demonstrated a commitment to the North which will extend beyond the study period.

The awards from the Canadian Northern Studies Trust are possible because of a grant from the Donner Canadian Foundation. The Trust is seeking funds to match the Donner grant and establish a basis for a five-year program of scholarships and other support for northern study.□

ACUNS Board Meeting

The first meeting this year of the Association's Board was held in Toronto on Thursday, January 27, 1983: "back to back" with the Management Committee of the Canadian Northern Studies Trust which took place the day after on the 28th.

These two events in tandem enabled us to hold a reception during the evening of the 27th so that members of both the Association and Trust could meet each other and discuss plans and ideas with local Council members. We also invited representatives from the corporate funding sector.

Five elements of the Board's agenda are worth reviewing here for general information:

1. The Association is updating the List of Northern Specialists. By the time this edition goes to press the questionnaires will have been sent out across the country.

2. The Association is going to draw up and probably publish a compendium of all federal assistance which is available for northern research and northern training.

3. The work of three Association Committees is now underway. The Education Committee, chaired by Jim Carefoot, is doing a survey of literature of distance education. Dr. John Theberge's Land Use Committee is writing a paper on progress on educational and research land use in the North with special reference to the IBP areas. Finally, Dr. Garry Clarke's Committee on Research and Field Facilities is undertaking a preliminary analysis of the licensing and permit requirements now needed for research in the North.

4. One session of the Annual Conference in Regina in April will be given over to a plenary discussion on the whole range of funding and support available for northern scholarship, including the Northern Scientific Training Grants Program of Indian and Northern Affairs.

5. The Association is considering the advisability of holding a symposium during 1984. Are there any suggestions or ideas on subject matter, time and place?□

ACUNS Annual Conference

A preliminary agenda has been prepared for the ACUNS 1983 Annual Conference, which will be held April 21-23, 1983 at the University of Regina. On the 21st there will be a day-long discussion of the topic "Communicating Northern Values", which will feature papers by Mrs. Minnie Freeman (Edmonton), Professor Joan Townsend (University of Manitoba), Professor Pierrette Désy (Université du Québec à Montreal), Ms. Julie Cruikshank (Yukon Territory), and Ms. Ruth McCleary (Winnipeg). In addition, there will be a review of funding for northern training and research, and a discussion of northern scholarly research being carried out at the University of Regina. The ACUNS Annual General Meeting will be held on the 23rd.

A number of social events have also been arranged including a reception and banquet on the 22nd at Government House — home of the former Lieutenant Governor of the North West Territories.□

NORTHLINE

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for Northern Studies
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(613) 238-3525

Dr. Gordon Nelson, *President*
David A.W. Judd, *Executive Director*
Eileen van Heyst, *Administrative Officer*

Northern Scientific Training Grants: Program Update

The Northern Scientific Training Grants Program, which was started in 1961, is managed by the Department of Indian Affairs and Northern Development. Its primary purpose is to support Canadian universities in providing training that gives advanced students professional experience in the North and encourages them to develop a commitment to northern work. The program objective is to increase the number of graduate and other advanced students in Canadian universities who have specialized in some aspect of northern studies and who have northern research experience.

The Program budget for 1983/84 is $725,000, with annual increases of $100,000 approved until 1985/86, to a total of $925,000. With the establishment of Committees for Northern Studies at Simon Fraser University, Ryerson Polytechnical Institute, and the University of New Brunswick, there are now 26 universities participating in this Program.

The evaluation study of the Grants Program undertaken by Kubiski & Associates, has just been completed. Copies will be distributed to universities participating in the Grants Program, for their information and comment, as well as to the Association of Canadian Universities for Northern Studies. Several of the recommendations have already been adopted by the Program, in particular those relating to the guidelines and applications.

It should be noted that throughout the evaluation process, there has been direct input from representatives of other federal departments, ACUNS, and the academic community. Follow-up on the evaluation and program issues will also be achieved through visits to universities by Program managers, and discussions at the specific session on the Northern Scientific Training Grants at the ACUNS Annual Meeting. This process facilitates annual Program refinements in response to changing needs and circumstances.□

The Canadian-Scandinavian Foundation

The post World War II euphoria of international co-operation saw the creation, in 1951, of the Canadian-Scandinavian Foundation (CSF) in Montreal. Although similarities between the two countries as geopolitical entities may be somewhat tenuous, the tenacity of the CSF in the field of scholarships and grants is impressive. Over thirty years (and some 200 scholarships and grants) have gone by since the Federation was founded, and it is still very much alive and active.

The CSF operates with two basic advantages. The first is that the outstanding achievements of Scandinavia in countries in various fields, including industry, high technology, architecture, planning and public policies constitute a strong appeal to high-quality Canadian grant applicants. The second is that Canadian students have shown themselves to be interested in the possibilities of learning something new from the Scandinavian experience, and of applying Scandinavian solutions in the Canadian milieu. Although the relationship between the foundation's small budget and the large results it achieves is disproportionate, this is, perhaps, an indicator of efficiency in itself.

The present grant program can be divided into three distinct types of grant. The first group of grants is funded by the CSF itself, through annual membership payments and donations. These grants usually amount to approximately $500 per grant, and are intended to be used as travel support to assist a student in his or her study visit to Scandinavia. These CSF-funded grants are not tied to any specific destination in Scandinavia, and thus allow the recipient as much freedom to move around as the total finance will permit.

A second type of grant is funded by national organizations in Scandinavia, with the review and selection of applicants left up to the CSF. For example, two scholarships of this type are awarded by the Swedish Institute and (indirectly) the Swedish-America Foundation. Both are full-year academic grants, which can be sought by academic and non-academic applicants alike. However, the recipient of one of these grants must conduct his study and research in Sweden.

The final type of grant is exemplified by the Brucebo Fine Arts Scholarship, named for the Hamilton-born artist, William Blair Bruce, and the Sylvia Weldon Scholarship, set up in 1982 to commemorate the late Mrs. Weldon, a Canadian-Norwegian who lived in Montreal. The Brucebo Fine Arts Scholarship, which is funded by the artist's estate, takes the recipient to the historically interesting island of Gotland, where William Blair Bruce once had a summer residence. The Sylvia Weldon Scholarship, the result of a generous bequest to the CSF, is to be used to pursue research and studies, preferably in Norway. The 1982-83 winner was Dr. A. Trak, a geologist at the University of Ottawa.

In spite of generous individual and corporate donations from both Canada and Scandinavia, the CSF, as does any voluntary organization, has its financial problems. Over the years, interest in the grant program has grown at a much faster rate than the foundation's resources.

The Management of the CSF consists of a member-elected board of directors, a president, and a secretary-treasurer. Currently, Dr. George Jacobsen, president of Tower Arctic Inc., Montreal, is serving as the foundation's president.

The CSF would like to extend an invitation to new members who are interested in supporting the work of the organization. For further information regarding memberships, write: Dr. J. Lundgren, CSF Secretary, Dept. of Geography, McGill University, 805 Sherbrooke St. W., Montreal, Quebec, H3A 2K6.

Northern Science and Research

As a result of a recent re-organization of the Northern Affairs Program (NAP) of the Department of Indian and Northern Affairs, the Northern Policy and Coordination Branch has been realigned to provide greater direction to matters relating to northern science and research. As part of this re-organization, the Northern Social Research Division has become the Office of the Northern Research and Science Advisor reporting directly to the Director General of the Branch. The mandate of this new office is to advise the NAP, government departments, industry and universities on northern scientific matters; ensure a coordinated approach within the NAP to funding and implementation of NAP scientific activities in the North; promote northern science development; and manage research and analysis between Canada and other circumpolar countries.

Mr. Donat Savoie acts as the Northern Research and Science Advisor; Walter Slipchenko is responsible for Circumpolar Affairs with specific responsibilities for USSR, Alaska, Greenland and Scandinavian countries; while Mr. Harold Finkler is in charge of social research and university affairs which include the administration of the Northern Scientific Training Grants Program. In order to support the Advisor's broadened mandate, Mr. Raymond Bergeron of the James Bay Development Corporation has joined the Research and Science Advisor's Office on Executive Interchange as coordinator of Northern Science.□

Development of Science in the N.W.T.

by J. M. Harrison

Few people now resident in the Northwest Territories have been trained in science. In an age dominated by science and engineering, this is a serious shortcoming, and as one step in improving the situation the Science Advisory Board (SAB) was established by the Legislative Assembly of the N.W.T. The SAB was charged with encouraging scientific activities that will benefit Northerners and with helping to develop the capacity of Northerners to undertake scientific activities themselves.

Although its budget is only about $200,000 per year, SAB has made a modest beginning to achieving its objectives in its six years of existence. It has, for example, sponsored studies on the animal resources of the N.W.T. to provide a base to help calculate the rate at which they may be harvested; a study on population trends; renewable sources of energy; small-scale hydro; and has supported promising students to work with field parties in the North. However, if there are to be indigenous scientists, there must first be a northern scientific presence — an "institute" to investigate problems of concern to northerners who must also take part in its management.

Several years ago a group of people from university, industry and government was convened by the Minister of Indian and Northern Affairs to consider a proposal that the science labs operated by the department should form the basis for a "Northern Research Institute". All agreed, but so far no action has been taken by DINA, except for an inventory of its three facilities at Frobisher, Igloolik and Inuvik and of other facilities that might be included, or added later, and which were under non-departmental management.

It should be emphasized that the term "Institute" is used to describe a concept rather than a physical establishment. The three centres, with others that may be added, would need to have their programs coordinated to the best advantage of the North. In the beginning the "Institute" would probably be made up of a program director and secretary in Yellowknife, responsible to a Board of Governors. To a considerable degree it would be a stimulant rather than an operation, although we expect that it would be responsible for contracting scientific work to appropriate individuals or institutes.

The Institute should be established under authority of the N.W.T. The Board of Governors should draw at least half its members from the North, and should be responsible for determining the major directions of research, and should report to the Legislative Assembly of the N.W.T. It is essential that the Institute represent the N.W.T. and not a department of the federal government, which it would be seen to do if it reports to any federal agency.

The SAB estimates that the yearly cost of up-grading the existing centres, and maintaining and staffing them, would be in the order of $1 million per year. A reasonable scientific program would cost, say, one and a half to two million dollars per year. The SAB believes that a good part of this sum could be obtained from outside sources, but if DINA is serious about northern research, it should provide at least $2 million per year as long as it claims any responsibility for the research.

For the first several years of its existence, the Institute would have few people who would be full-time residents of the North, simply because there are so few scientists who live in the region. However, with laboratories reasonably well-equipped for research, it is expected that researchers from the south would be prepared to spend a couple of years based in the North before returning to their home institutions for final prepatation of results and discussions with their colleagues. If the three centres of DINA form the nucleus of the labs, it might be possible to add other stations, such as that of the University of Saskatchewan at Rankin Inlet, or the McGill station on Axel Heiberg Island. Thus, there would be centres through the North where there would be a continuous presence of scientists.

Technician training could be provided for young people interested in the work that goes on, and eventually young Northerners would obtain university degrees in science and in engineering. The Polar Continental Shelf Program is considering the establishment of a year-round centre in the North and such a center would greatly help in making scientific activities visible throughout the year, rather than being regarded as "tourist" efforts. The Arctic Research Establishment at Pond Inlet, which is based on private funding, clearly has a strong effect on the local people. In its ten years of operation the local community has become much more aware of science in relation to its world.

Assuming the Government is serious about the devolution of responsibilities to the Legislative Assembly of the N.W.T. (and to that of the Yukon) the Science Advisory Board is convinced that one important step is the creation of a Northern Research Institute. It would be relatively inexpensive — DINA already spends nearly as much on its science service centres as it should make available to such an Institute — and its long-term effect would build on the short term studies it could undertake or sponsor. These could include such projects as the effects of hydro-electric sites, more detailed studies of marine and land animals to determine the natural fluctuations in populations, effects on the health of native people who eat the meat of sea mammals that are relatively high in mercury, and other such topics as may be identified by the governing board. Such an institute could be the first step in developing a "University of the North", which may also develop first as a concept.

In any case, the concept of a Northern Research Institute is supported by the interagency group convened by the Minister of DINA some years ago, by the interdepartmental committee on Arctic Science and Technology, by the Legislative Assembly of the N.W.T. and by the Science Advisory Board. There is no evident reason for further delay in implementing the concept.□

J. M. Harrison is the Chairman of the Science Advisory Board.

Changing, from page 1

for the Territories to assume provincial responsibilities. Even if resource prices were stabilized, she claims, it is unrealistic to believe that the Territories would be given sufficient control of the resource base. "If Manitoba, Saskatchewan and Alberta were entering Confederation today," she says, "they would never be given the control they have over resources."

Nevertheless, she admits that there is a strong movement in the N.W.T. for greater governing control. In this, however, the Territories face a dilemma. While the federal government seems ready to devolve certain responsibilities, she explains, they have not come forward with any substantial changes in the financial arrangements between the two levels of government. "There are certain responsibilities the Northwest Territories doesn't want," she says, "unless there is guaranteed funding. For example, John Munro wanted to devolve forest fire control to the Territories, but he expected it to pay the $12 or $14 million that it would cost, so the Northwest Territories refused.

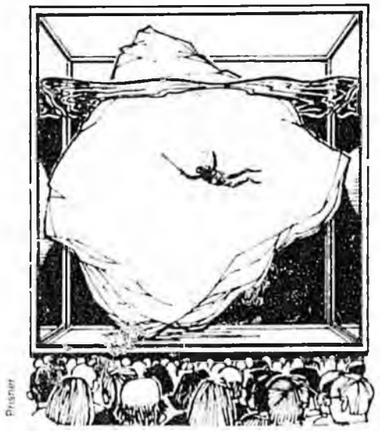
"Right now we're looking at a new system called 'formula financing'. In a nutshell, formula financing would allow for a direct transfer of money from the federal government to the Territories." Support for the system in the N.W.T. is based in part on the belief that it would allow the territorial government to formulate plans that are based on a predictable expenditure ceiling. The federal government has, in fact, promised to move quickly to introduce formula financing in the N.W.T.

The territorial government, however, is interested in a financial arrangement that would be more politically accountable, she explains. "Our government is very strong on resource revenue sharing. The Northwest Territories is still getting money through DIAND. We are not a branch of DIAND, so why should we be treated as a branch of DIAND?" □

Iceberg Management Seminar

A three-day *Seminar on Iceberg Management in Offshore Exploration, Production and Transportation* was held in November 1982 at Memorial University in St. John's, Newfoundland. The seminar, which was co-sponsored by the university's Continuing Engineering Education service, petroleum industry sponsors and various professional groups, provided an opportunity for an in-depth study of the iceberg hazard to offshore operations.

Some of the topics discussed included: a review of the iceberg climatology; measurement and estimation of iceberg size; detection and surveillance; drift forecasting; collision avoidance; iceberg scours; and concepts for protecting production systems. The seminars resource team was composed of representatives of the industry, consulting companies, government organizations and research and academic institutions.



Proceedings of the *Seminar on Iceberg Management* will be available later in 1985, at a cost of $65. For information, write: Dr. Hira Ahuja, Continuing Engineering Education Centre, Memorial University, St. John's, Newfoundland, A1C 5S7.

Arctic Videotapes

The year-old Inuit Broadcasting Corporation has recently concluded a cross-country tour to introduce to southern Canada a video-tape series produced in the Arctic. The Kaminuriak caribou series is concerned with a major herd of caribou in the Keewatin Region of the Arctic and the recent crisis which developed around it, between Inuit hunters and leaders on the one hand, and government biologists and game managers on the other. The 33-tape series also describes (and actually is) a process involving communications techniques and technologies used to bring about greater understanding and co-operation among groups which have been bitterly opposed over the matter of the caribou herd.

Reception of the tapes in the various centres in which the series was shown was most enthusiastic. Although the tapes were initially made for intensive community screenings in the Keewatin District, it is now apparent that they present broader opportunities for use in broadcasting, public meetings, education, special interest groups, and so on. The tapes are designed so that they may be used individually, in various groupings, or in their entirety. All tapes are in English and in Inuktitut, and besides depicting the present, are a source of rich cultural and archival material.

For descriptive material pertaining to the Kaminuriak caribou series and price lists for leasing or purchasing, write: IBC, Suite 300-294 Albert Street, Ottawa, K1P 6E6 (613) 235-1892. □

Caribou Symposium Comes to Canada

The Fourth International Reindeer/Caribou Symposium will be held August 22-25, 1985 in Whitehorse, Yukon. It is expected that 150 delegates from across Canada, the United States and Europe will attend the conference. Following the pattern established at the last symposium, held in Saariselka, Finland, in 1982, the 1985 symposium has been scheduled to follow the Fourth International Theriological Congress, which will be held the week previous, August 13-20, 1985 in Edmonton.

At the present time, planning is still in the preliminary stage. Further details may be obtained, however, by contacting: Dr. A. W. F. Banfield, Chairman, Canadian Committee for the Fourth International Reindeer/Caribou Symposium, Institute of Urban and Environmental Studies, Brock University, St. Catharines, Ontario L2S 3A1, (416) 688-5550. □

Project ASTIC

A two-year project to research and compile a "Bibliography of Algonquian Syllabic Texts Held in Canadian Repositories" is being carried out by John Murdoch of Rupert House, James Bay, Quebec, with funding from the Social Sciences and Humanities Research Council of Canada. The project, known as Project ASTIC (Algonquian Syllabic Texts in Canada), is an extension of Mr. Murdoch's recent work on the use of syllabics in native education.

The system of syllabics was devised by James Evans, a nineteenth century Wesleyan Methodist missionary who, in the winter of 1841-1842, introduced it to the Crees who traded at Norway House, where he was stationed. The use of a syllabary evidently suited the language needs of the Cree, as well as other Algonquian speakers, for within a decade thousands of people from the Rocky Mountains to the Atlantic with no literate tradition were able to read. One of the chief advantages of the system was that it could be readily learned in a matter of a few days and passed on to friends and members of the family.

The extensive collection of syllabic texts located in archives, libraries and resource centres throughout Canada provides the modern researcher with a rich store of information on Indian culture and history. Unfortunately, few archivists or custodians can read these texts, so much of this information remains unorganized or incorrectly identified.

Project ASTIC covers the period from 1841-1981. It is expected that the bibliography will be complete by the end of the first year (now underway) of the two-year project. During the second year, identification keys, transliteration charts and indexes will be developed. In addition, Inuit and Dene texts will be added to the original bibliography.

Information or enquiries on any aspect of Project ASTIC should be directed to: John Murdoch, Rupert House, James Bay, Quebec, J0M 1R0. □

Away From It All

The government of the Northwest Territories has proposed turning Grise Fiord, N.W.T., into a tourist resort. The residents of the small village, located at the southern end of Ellesmere Island, pursue the traditional Inuit activities of hunting, fishing and trapping. It is felt that the village and its way of life may be of interest to Canadians living in southern Canada. □

CALENDAR

April 12-15, 1983 • *Banff Conference on Natural Resources Law* on the theme of "Public Disposition of Natural Resources"; sponsored by the Canadian Institute of Resources Law; Banff, Alberta. Enquiries:
Conference Co-ordinator
Canadian Institute of Resources Law
Room 430, Bio Sciences Bldg.
Faculty of Law
University of Calgary
Calgary, Alberta
T2N 1N4

April 21-23, 1983 • *ACUNS Annual Conference*; University of Regina; Regina, Saskatchewan. Enquiries:
ACUNS
130 Albert Street
Suite 1915
Ottawa, Ontario
K1P 5G4
(613) 238-3525

May 18-20, 1983 • *Cold Regions Environmental Engineering Conference*; sponsored jointly by the University of Alaska and the University of Alberta; Fairbanks, Alaska. Enquiries:
Dr. D. W. Smith
Department of Civil Engineering
University of Alberta
Edmonton, Alberta
T6G 2G7
(402)

June 21-25, 1983 • *36th Annual Conference of the Canadian Water Resources Association* on the theme "Industrial Development and Water Resources"; Saskatoon, Saskatchewan. Enquiries:
Jon A. Gillies
C.W.R.A. Conference Chairman
P.F.R.A.
Box 908
Saskatoon, Saskatchewan
S7K 3M4

July 18-22, 1983 • *Fourth International Conference on Permafrost*; University of Alaska; Fairbanks, Alaska. Enquiries:
Louis DeGoes
Executive Secretary
Polar Research Board
National Academy of Sciences
2101 Constitution Avenue N.W.
Washington, D.C.
20148

July 23-30, 1983 • *Northern Yukon and Mackenzie Delta Field Excursion*; organized jointly by the International Geographical Union Commission on the Significance of Periglacial Phenomena, and the Fourth International Conference on Permafrost (see previous entry). Enquiries:
Dr. Hugh French
IGU Chairman
Department of Geography
University of Ottawa
Ottawa
K1N 6N5
(613) 231-6829

September 28-October 1, 1983 • *34th Alaska Science Conference*; sponsored by the Arctic Division of the American Association for the Advancement of Science. Theme of the conference is "Alaska/Canada North: Neighbours in Science." Whitehorse, Yukon. Enquiries:
Art Pearson
Conference Chairman
Box 4580
Whitehorse, Yukon
Y1A 2R8
(403) 667-4288

ACUNS University Representatives

For general information we are publishing in this issue university representatives for 1982-83.

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Director of Applied Studies

University of British Columbia
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Associate Dean Faculty of Arts

University of Calgary
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Arctic Institute of North America

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Concordia University
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Memorial University
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Department of Geography

University of Windsor
Dr. J. D. Jacobs
Department of Geography

York University
Dr. M. C. Lewis
Department of Biology

Vic's copy

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3-1-83

TO: Sen. Victor Fischer
FROM: Brian Rogers
RE: Alaska Council on Science and Technology draft

Enclosed is a draft proposal on ACST for your consideration. The main features of this draft are:

(1) continues council through 1987;

(2) moves council to Office of the Governor [OMB is implicit, but was not made explicit due to legislative/executive disputes over OMB];

(3) removes power of grant-making from council;

(4) eliminates laundry-list of purposes, powers and duties of council [streamlining functions];

(5) repeals northern technology small grants program;

(6) gives council a role in development and implementation of federal Arctic Science Policy;

(7) increases membership to 9 members; removes designated seats on council;

(8) requires all agencies to submit notification of commencement of reserch activities and copy of final research reports to Office of Governor and council;

(9) establishes post of Alaska Science Advisor.

OMB

I believe this draft meets most of the needs of the Alaska scientific community, the legislature, the governor's office, and the council. It should assist Senator Murkowski in promoting the Arctic Research and Policy Act; it repeals the grants process now in disfavor among House Republicans; it meets the governor's need for scientific advice within OMB. A possibly controversial section is the creation of the Alaska Science Advisor. One item I considered, but did not put in, is enforcement of existing statutes requiring agency researchers (and consultants) to provide copies of research results to the state library and other sources so the research is not lost. You might wish to consider making it a class C misdemeanor not to file the reports required by law to spur compliance. [Such a section would certainly bring attention to the bill; you could argue that a person who deprives the public of the results of state-funded research is guilty of theft.]

OMB

I will call you this afternoon to discuss this bill.

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IN THE SENATE OF THE STATE OF ALASKA

THIRTEENTH LEGISLATURE - FIRST SESSION

A BILL

For an Act entitled: "An Act relating to the Alaska Council on Science and Technology, and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*Section 1. LEGISLATIVE FINDINGS. The legislature finds that

(1) there exist in this state scientific and technological research capabilities which have the potential to contribute significantly to the processes of state government, to industry, and to the public welfare;

(2) the scientific and technological capabilities and knowledge of the state should be available to assist in issue analysis and fact-finding necessary for governmental policy-making activities;

(3) policies for expenditures by the state on science and technology research and development need to be designed or redesigned to achieve the highest and best use of research dollars;

(4) state agencies need to improve ~~initiatives~~ to ascertain the extent of existing knowledge on subjects, problems, or issues of concern prior to the initiation of new research;

(5) existing organizations concerned with production, transfer, and dissemination of scientific and technological knowledge in Alaska need to be more effective in the execution of their missions; and

(6) state agencies and consultants need to comply with

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existing law to produce, and properly file, research and other investigative and analytical reports on the completion of research, investigative, or analytical projects.

*Sec. 2. AS 44.19 is amended by adding a new section to read:

ARTICLE 3B. ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Sec. 44.19.241. COUNCIL ESTABLISHED. (a) There is established in the Office of the Governor the Alaska Council on Science and Technology. The council consists of one member representing the Office of the Governor and eight members who are appointed by the governor upon the recomendations of the state's scientific, engineering, and related communities and organizations. Members have overlapping three-year terms. The council shall elect one of its members as chair. A chair may be reelected chair for successive terms as chairman ~~and~~ serves until a successor is designated. Five members constitute a quorum.

(b) There is established in the office of the governor the position of Alaska science advisor. The science advisor is in the exempt service and serves at the pleasure of the governor. The governor shall appoint the science advisor after consultation with the council. The science advisor shall act as executive secretary to the council. Administrative costs for the council shall be borne by the office of the governor.

(c) Council members receive no compensation but are entitled to the travel and per diem provided by law for members of boards or commissions.

Sec. 44.19.242. PURPOSES. The council shall consider problems and developments involving the fields of science, engin-

eering, and technology and related activities affecting more than one state agency and shall recommend policies and other measures designed to:

(1) provide access to existing scientific and technological information and expertise necessary to the ascertainment and articulation of public policies or programs for the advancement of state needs or objectives;

(2) identify research or investigative needs, including areas requiring additional emphasis, in order to provide adequate bases of knowledge relevant to the development of public policies or programs for state economic or societal strategies;

(3) achieve more effective utilization of the scientific, engineering, and technological resources and facilities of state agencies, including the University of Alaska;

(4) further cooperation in science, engineering, and technology through policy, program and facility agreements between the State of Alaska and local governments, the academic community, the private industrial and business sector, the agencies of the federal government, and the governments of Canada;

(5) foster development and implementation of a national Arctic science and research policy; and

(6) perform such other duties as the governor or the legislature may assign.

Sec. 44.19.243. POWERS AND DUTIES. (a) The council may

(1) convene committees, task forces, conferences, public hearings, and other meetings necessary to carry out the public's purposes;

(2) request and receive from any agency of the state

government the assistance and data needed to carry out the requirements of this section; and

(3) assist, ~~the~~ Arctic Science Policy Council ~~and the~~ Arctic Research Commission, in identifying policy and program needs in national Arctic science and research policy.

national bodies, such as the National Academy of Sciences, and

(b) The council shall

(1) biannually submit to the governor and the legislature the findings of the council, including a listing, description, ranking, and justification of research needs, and a commentary on significant research activities of the preceding two years funded by the state and including the relationship of that research to the state's needs and priorities;

(2) promote and enhance high standards for research activities conducted by the state;

(3) at the request of either the governor or the legislature, advise in a timely fashion on inquiries concerning scientific investigation or comment;

(4) recommend one or more persons to the governor for appointment as the Alaska Science Advisor; and

(5) assist the governor in making nominations for presidential appointments to the Arctic Science Policy Council.

Sec. 44.19.244. REPORTS. (a) Biannually, within 10 days of the convening of each legislature, the council shall sumbit to the governor and the legislature a comprehensive report on the state of science and technology in Alaska, the issues surrounding scientific and technological research in Alaska, recommendations on additional research needs of the state, and a summary of

5 of 6

significant state research activities conducted during the preceding two years.

(b) Each state agency which conducts significant research activities shall, upon commencement of each research project, notify the [office of the governor] [and] [the council] of the project description, cost and source of funding. Upon completion of each research project, each state agency shall notify the council and shall forward the results of the project.

Sec. 44.19.245. DEFINITIONS. In AS 44.19.241-44.19.246, "council" means the Alaska Council on Science and Technology established in AS 44.19.241.

Sec. 44.19.246. SHORT TITLE. AS 44.19.241-44.19.255 may be cited as the Science and Technology Act.

*Section 3. AS 44.66.010(a)(6) is amended to read:

(6) Alaska Council on Science and Technology (AS 44.19.241) -- June 30, 1987 [1983].

*Section 4. AS 44.21.241-44.21.255 (Alaska Council on Science and Technology) are repealed.

*Section 5. AS 44.46.080 (d) (Northern Technology Grants) is repealed.

*Section 6. The unexpired terms of members of the Alaska Council on Science and Technology on the effective date of this Act ~~shall~~ continue until their original termination. New appointments made by the governor to fulfill vacancies on the council ~~shall be~~ are made for terms which will result in three members terms expiring in 1984, three in 1985, and three in 1986.

*Section 7. This Act takes effect July 1, 1983.

6 of 6

April 6, 1983

The Honorable Mitchell E. Abood, Jr.
House of Representatives
State Capitol
Pouch V
Juneau, Alaska 99811

Dear Representative Abood:

As you requested at the Alaska Council on Science and Technology "Sunset Review" hearing on March 22, enclosed is a status of Northern Technology Grants projects.

Before looking over the status I would recommend you take into account the following:

1. The Council has had no staff or administrative funds to monitor this program for almost a year. Therefore, many of the projects which are listed as underway could be completed;

2. Many of the projects that are indeed underway are completed. However, the grantees were reluctant to call their projects complete without a period of testing and monitoring to see that they actually work well enough to recommend use by others;

3. The fact that a project was listed as unsuccessful does not necessarily mean it was a "failure" or a 'bad" project. For example, in two cases the grantees considered their projects unsuccessful because of institutional barriers rather than monetary or technological setbacks.

   Also, as I have stated many times, knowing a project cannot or will not work is just as important as knowing it does. Testing technologies on a small scale can eliminate large mistakes when the same technology is used on a larger scale.

After you have had time to look over the enclosed status report I would be pleased to answer any questions you may have.

Sincerely,

Christopher Noah
Executive Director

Enclosure
cc: Senator Vic Fischer

April 1, 1983

STATUS OF NORTHERN TECHNOLOGY GRANT PROJECTS

1979 - 1982

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
11-79 Regenerative Freezer		X			
27-79 Ambulance Splint				X	
29-79 Waste-Heat Claiming Greenhouse	X				
65-79 Solar Heater		X			
74-79 Solar Greenhouse			X		
83-79 Bee-Overwintering Building	X				
89-79 Solar Hot Water Heater			X		
98-79 Electric Car			X		
106-79 Waste Oil Heater			X		
107-79 Juice Bottling Plant		X			
129-79 Hydroelectric Generator	X				

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
136-79 Wood Furnace				X	
139-79 Solar Greenhouse			X		
144-79 Insulated Shutters	X				
145-79 Oil Fired Clothes Dryer	X				
146-79 Hydraulic Powered Auto		X			
155-79 Hydroelectric Generator			X		
162-79 Tidal/Current Hydraulic Suction Dredge			X		
165-79 Methyl Fuel Plant			X		
180-79 Experimental Greenhouse	X				

April 1, 1983

STATUS OF NORTHERN TECHNOLOGY GRANT PROJECTS

1978 - 1982

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
20-80 Technique for Shallow Subsurface Exploration	X				
36-80 Window Insulation	X				
44-80 Solar Thawing of Permafrost			X		
45-80 Digester	X				
55-80 Greenhouse	X				
64-80 Solar Energy Heating System	X				
68-80 Furnace Conversion	X				
72-80 Solar Heat House	X				
81-80 Trailer Steering Device					Default Judgement Obtained. Grant Funds being re-paid.

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
85-80 Recycling Aluminum Scrap	X				
98-80 Wind Generator	X				
116-80 Solar Wood Drying Kiln	X				
118-80 Home Energy System			X		
130-80 Subterranean Outbuildings	X				
139-80 Effective U-Valve Measurements			X		
145-80 Fish Drying Process		X			
155-80 Boiler System			X		
159-80 Passive Solar Home Plans			X		
165-80 Waterproofing For Earth Shelter Home	X				
166-80 1 Watt Translator				X	
177-80 Water Heating	X				
205-80 Data Recording Instrument	X				

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
226-80 Solar Space Heater	X				
232-80 Permafrost Excavation	X				
234-80 Home Energy Conservation System				X	
248-80 Solar Wood Drying Kiln			X		
262-80 Steam Plant for Small Boat			X		
281-80 Hybrid Electric Car			X		
290-80 Plant Hydro Feed System	X				
298-80 Tree Cultivation			X		
309-80 Automated Thermal Shutters			X		
312-80 Treatment Unit	X				
327-80 Shutters for Greenhouse			X		
328-80 Solar Greenhouse			X		

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
332-80 Generator					Project cancelled prior to transmitting funds.
358-80 Alternative Powered Washing Machine			X		
362-80 Methane Generator		X			
374-80 Improved Willow Rake	X				
505-80D Arctic Home Construction	X				
506-80D Induction Generator			X		
508-80D Fuel Cell Made From Scrap Metal				X	
515-80D Greenhouse			X		
538-80D Generating System		X			
540-80D Wind Generator				X	

STATUS OF NORTHERN TECHNOLOGY GRANT PROJECTS

1979 - 1982

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
3-81 Wind Powered Heat Pump and Lighting System			X		
4-81 Using Solar Power to Operate Boat Equipment	X				
5-81 Mariculture of Subtidal Red Seaweeds	X				
6-81 Record Abundance and Distribution of Seaweeds	X				
13-81 To Recycle Aluminum Cans		X			
20-81 Construct a Dual Layer Greenhouse	X				
21-81 River Powered Electrical Generator			X		
22-81 To Refine Indoor Hydroponic System			X		
26-81 To Develop a Method of Producing Ethanol Alcohol			X		

PROJECT	COMPLETED SUCCESSFUL	UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
28-81 High Temperature Surface Combustion Techniques			X		
31-81 To Construct a Chicken House and Solar Pit Greenhouse			X		
33-81 Composting Techniques Experimentation	X				
38-81 To Reuse Waste Heat from Laundromat	X				
52-81 To Construct a Solar Semi Subterranean Root Cellar	X				
56-81 Improved Hydraulic Ram for Use on Streams in Interior Alaska			X		
57-81 Construction of Electric Hybrid Car			X		
59-81 Wood Fueled Electric Generator	X				
61-81 Development of a Cam Operated Arctic Door Design			X		
63-81 Development of Clam Harvesting Technique	X				

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
66-81 To Install a High Pressure Jet Modification to A Clam Harvester	X				
68-81 Device to Test Soil Strength	X				
69-81 To Develop A Submersible Investigating Drone			X		
70-81 To Study the Feasibility of Migratory Bee Honey Operation Sympathetic to Delta Barley Project		X			
77-81 To Develop a Micro High Head Hydroelectric Site			X		
79-81 To Reuse Waste Computer Paper	X				
110-81 To convert a VW Car to a Hybrid Electric Vehicle			X		
115-81 To Grow Fruit Trees in the Yukon-Tanana Uplands			X		
117-81 To Use Spill-Over Energy from A Hydraulic Windmill			X		

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
118-81 Heat Pump For Foundation Stabilization			X		
130-81 Installation of Self Timer Silencers on Smoke Detectors	X				
131-8 Equipment For Sensitivity and Cold Temperature Testing of Smoke Detectors	X				

STATUS OF NORTHERN TECHNOLOGY GRANT PROJECTS

1979 - 1982

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
1-82 Wood Utilization Survey in The Fairbanks North Star Borough			X		
2-82 Development of An Automatic and Manual Floor Register			X		
14-82 Frozen Food Processing Plant			X		
23-82 Documentation of Off-Peak Heating System and Usage	X				
26-82 Design, Development and Test Manual and Automatic Controls for Thermal Shutters			X		
38-82 Hydrogen Gas Generation By and For Boats			X		
44-82 Design and Construct Waste Oil Furnace	X				
49-82 To Develop A Microprocessor Controller to Optimize Hot Water Heater Usage			X		

PROJECT	COMPLETED SUCCESSFUL	COMPLETED UNSUCCESSFUL	UNDERWAY	FUNDS RETURNED	OTHER
51-82 Bandsaw Power Alternative For Bush Areas			X		
72-82 Cross Transmission of Coccidiosis Between Wild and Domestic Sheep	X				
77-82 Studio Sized Hydraulically Powered Impact Mill			X		
80-82 Monitoring of Interior Window Insulations			X		
87-82 Soil Heated Food Production with Seep Irrigation			X		
103-82 Winter Storage For Root Crops	X				
107-82 Development of a Low Cost Solar Snow Melter For Remote Site Use					
108-82 Instrumentation For A Small Hydro Power Project			X		
109-82 To Develop A Hydro Power Generation System			X		
119-82 Fish Meal and Oil Producing Raft			X		

ACST
THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

April 22, 1983

APR 25 1983

Senator Vic Fischer
Alaska State Senate
State Capitol
Pouch V
Juneau, Alaska 99811

Dear Senator Fischer:

Enclosed for your information is a recently published special report entitled "Trends in Alaska Research". Sponsored by the Alaska Council on Science and Technology this paper provides a brief overview of who pays for research in Alaska; who conducts research in Alaska; where research is conducted (by region) and what is being studied.

If you or your staff have any questions regarding this report I would be happy to answer them.

Sincerely,

Christopher Noah
Executive Director

Enclosure

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

Report

SPECIAL REPORT:

TRENDS IN ALASKA RESEARCH

March, 1983

Christopher Noah, Executive Director, Alaska Council on Science and Technology,
Pouch CV, Juneau, Alaska 99811

TRENDS IN ALASKA RESEARCH

Introduction

This report analyzes the Current Research Profile for Alaska (CRP) maintained by the University of Alaska Arctic Environmental Information and Data Center in order to identify recent gaps, trends, and changes occurring in how research is supported and conducted in Alaska.

Research and development (R&D) is big business in Alaska. The latest year of record (1981) indicates a direct economic investment of $235 million in nearly 2,000 research projects.

The growth of science in Alaska has not been entirely orderly and smooth. There has been no federal, state, or other overall policy to guide research in Alaska. Thus, the selection of research topics has often been governed more by the interests of individual scientists, institutional biases, or the relief of national crises rather than by any long-range plan related to societal or economic needs.

In the last few years, four factors may have long-term but contradictory impacts on Alaska research. The Reagan administration has reduced the amount of money available for research nation-wide. This trend has been intensified by an overall increase in the decline of the U.S. economy, affecting scientific research in both the governmental and private sectors by further reducing the amount of money available for research investment. On the other hand, the responsibilities of federal land managing agencies in Alaska have increased significantly, increasing their need for additional information analysis and research. Finally, the State of Alaska, experiencing an expanding economy,

has expended increased funds for technological development assessment and related applied science investigations.

Research Topics

Figure 1 shows the number of projects conducted in each of the major scientific disciplines, "Physical," "Biological," and "Social." Growth, in terms of the number of projects, has changed in each of these disciplines in recent years. The number of projects increased by 11 percent in the Physical Sciences in 1980, but decreased by 5 percent in 1981. In the Biological Sciences the number of projects has increased by 4 percent in each of these years. Growth has been most pronounced in the Social Sciences, increasing by 28% in 1980 and 12% in 1981.

Among the categories of Physical Science, Geology had the largest number of projects in 1981 (137 projects), followed by Minerals and Fossil Fuels projects (87) and Atmosphere and Space (81 projects). Fisheries studies dominated in the Biological Sciences with 225 projects, followed by Terrestrial Mammals (112 projects) and Vegetation studies (92) projects). Only minor changes in the rankings of these categories have occurred in recent years (since 1979). Similar comparison of categories in the Social Studies is not possible due to the years of accumulated record and presentation format.

Figure 2 compares the number of projects conducted in Alaska during each of the last several years. In general, the trend has been gradually upward, with the exception of 1979. The slight decrease noted that year was seen equally in each of the three major disciplines. Similarly the increases noted in other years have been shared among the major disciplines, with the

FIG. 1: WHAT IS BEING STUDIED IN ALASKA?

NUMBER OF PROJECTS STUDIED-1981

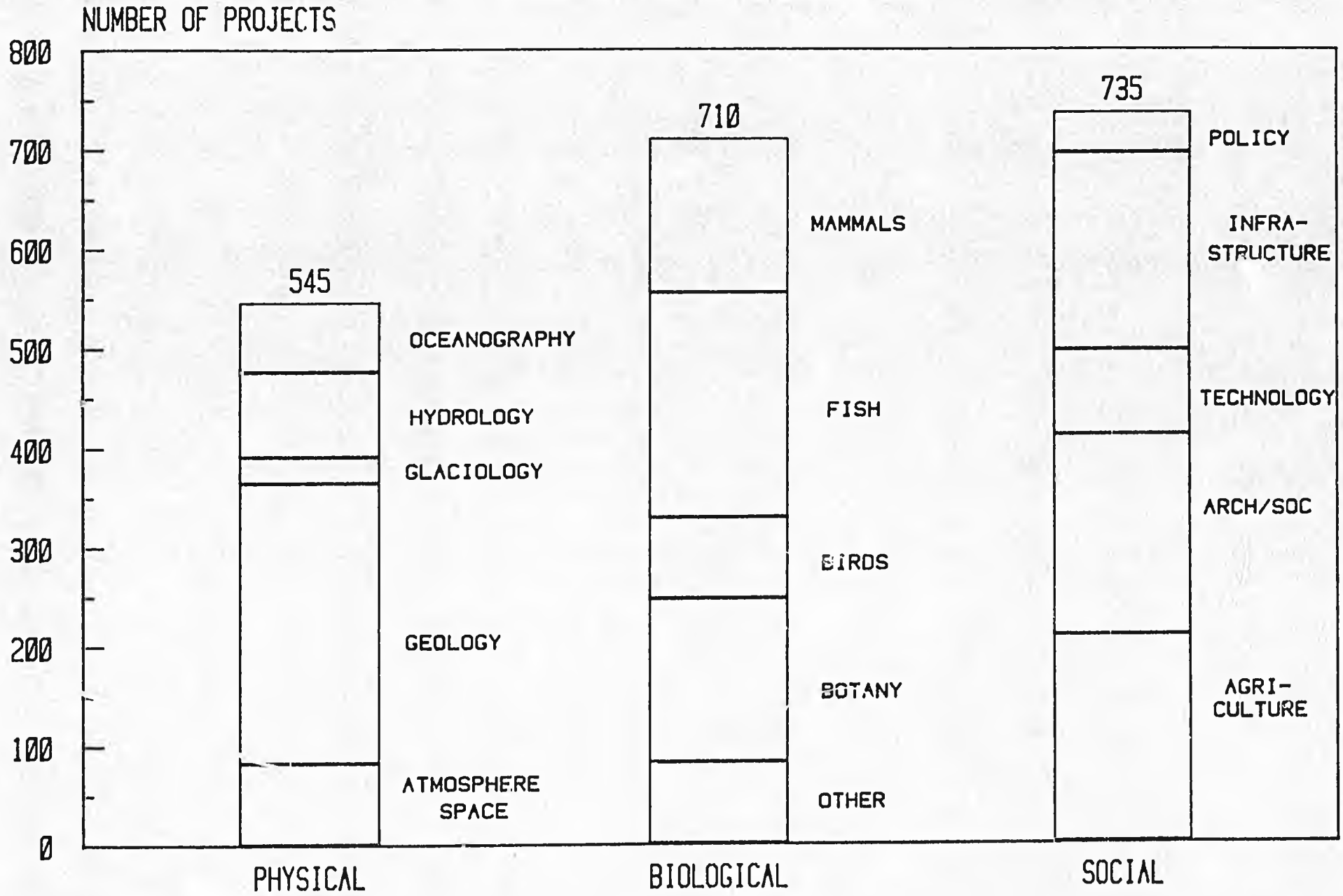
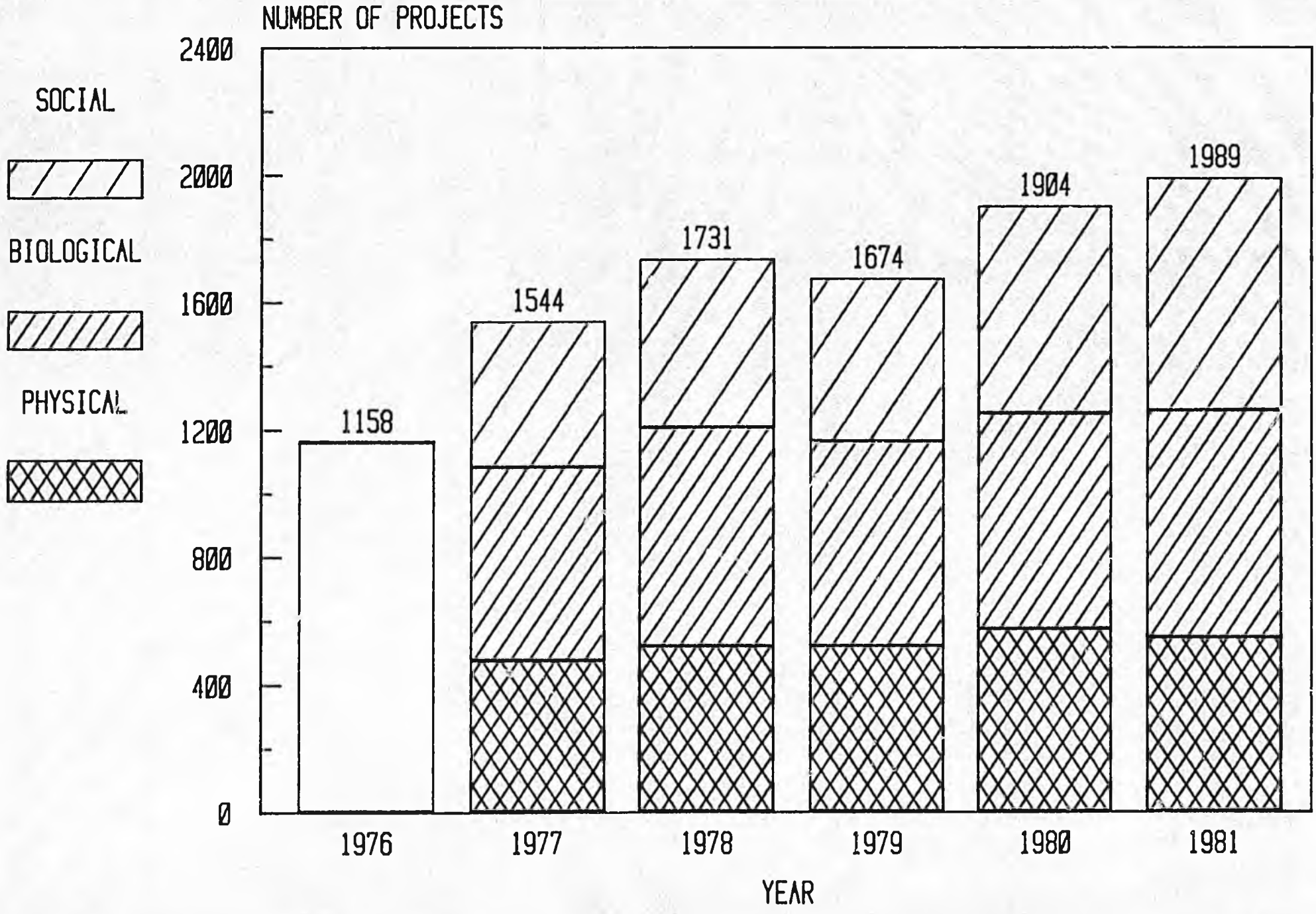


FIG. 2: HOW HAS ALASKA RESEARCH CHANGED?

NUMBER OF PROJECTS CONDUCTED PER YEAR



exception of 1981 when the number of projects conducted increased for Biological and Social Sciences but decreased for the Physical Sciences. The rate of increase was less in 1981 compared to other recent years, except for 1979.

Location of Research

Figure 3 compares the number of projects conducted in each of the six major regions of the state for 1979, 1980, and 1981. Projects conducted in more than three of the state's regions were listed in the statewide category. In all three years 20 percent of all projects fell into this category. More projects were conducted in the Southcentral than in other regions, followed by Interior and Southeast. Fewest projects were conducted in the Northwest region. The number of projects conducted has increased in all regions since 1979, although only a very small increase is noted in the Northwest regions in 1981. The rate of increase has been less each year in the Arctic since 1979, so that in 1981 more projects are conducted in Southeastern than in the Arctic. This trend maybe reflected by the recent closure of the Naval Arctic Research Laboratory at Pt. Barrow.

Agencies Conducting Research in Alaska

Figure 4 compares the agencies conducting research in Alaska. Combining elements in the Figure indicates some possibly significant generalizations. Less than one-third of the projects were conducted by various universities. Thus over 2/3 of research in Alaska is conducted outside of academia. By combining University of Alaska with Alaska government scientific activities, the record indicates that state employees are directly involved with nearly half of all projects conducted in the state. Just over half of all projects

FIG. 3: WHERE IS SCIENCE DONE IN ALASKA?

NUMBER OF PROJECTS PER REGION

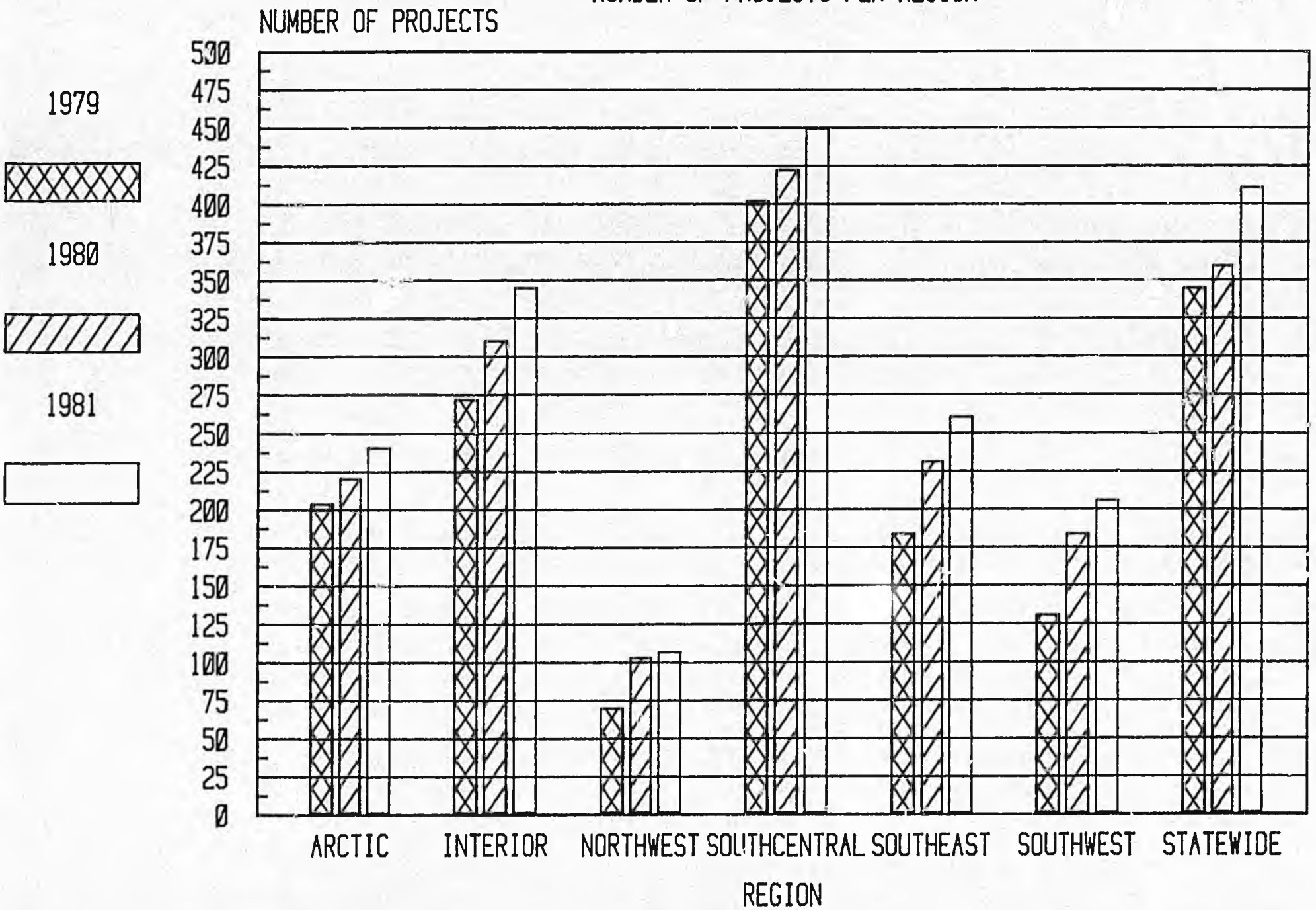
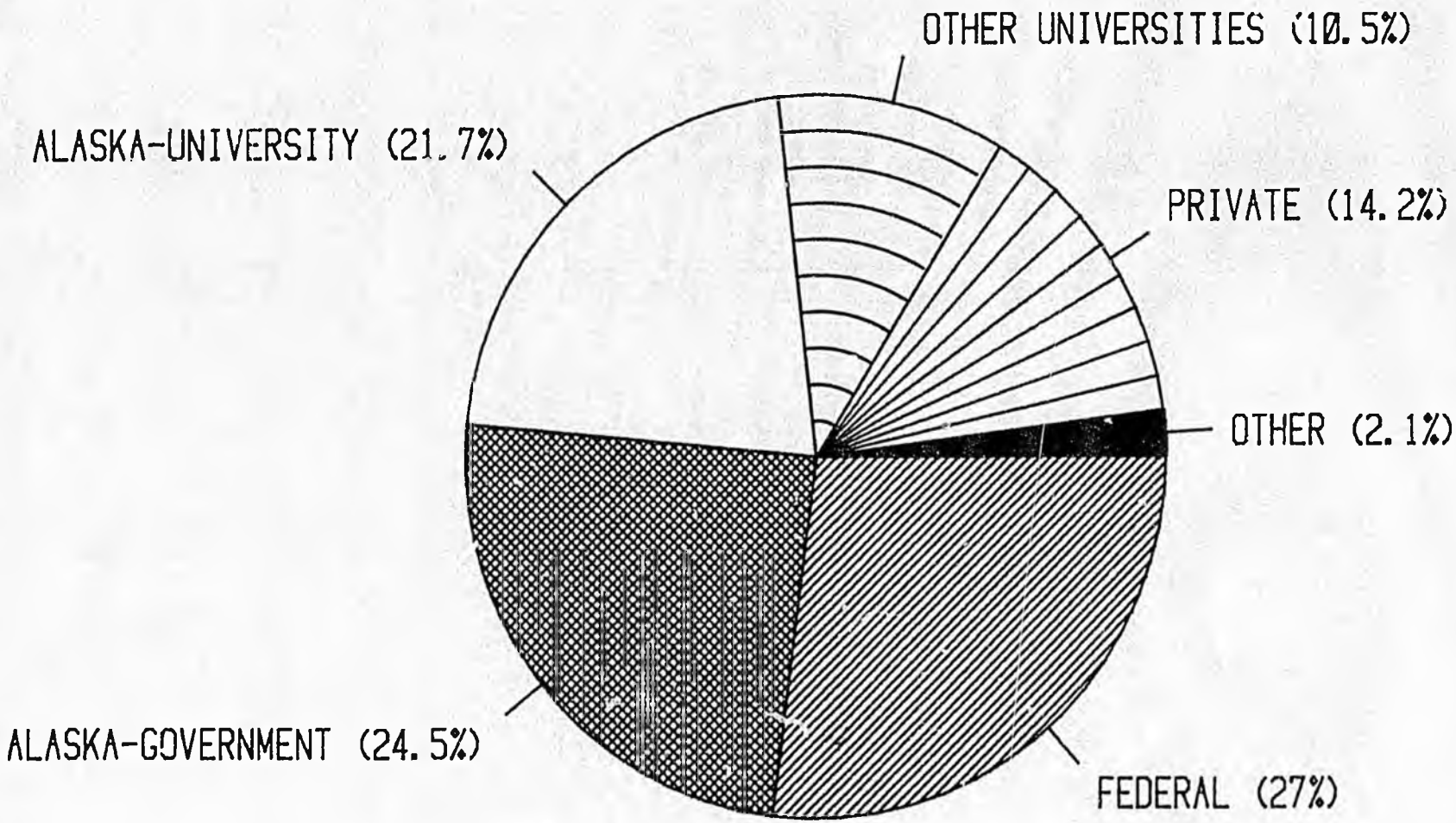


FIG. 4: WHAT AGENCIES CONDUCT RESEARCH?

IN ALASKA-1981



were conducted by some agency of the federal or state government.

The University of Alaska conducted more projects than any other single agency. Most research at the University was conducted by its various research institutes. The Geophysical Institute conducted more projects than the others, followed by the Agricultural Experimental Station, the Institute of Marine Science, the Institute of Arctic Biology, the Arctic Environmental Information and Data Center, the Institute of Water Resources and the Institute of Social and Economic Research, in that order. Overall the University experienced an 8% increase in the number of projects conducted in 1981 compared to 1979, but increases were noted only in the Geophysical Institute, and the Agricultural Experimental Station. The other four leading institutes experienced modest to significant decreases in the number of projects conducted.

The Alaska Department of Fish and Game (ADF&G) was involved with nearly half of the projects conducted by agencies of the state government, followed by the Department of Natural Resources and the Department of Environmental Conservation, and several miscellaneous agencies. Overall the state executed a 67 percent increase in the number of projects conducted in 1981 compared to 1979, most occurring in ADF&G and miscellaneous agencies.

The federal government conducted only 8 percent more projects in 1981 compared to 1979. The U.S. Geological Survey led all others, followed by the U.S. Forest Service, the U.S. Fish & Wildlife Service, the U.S. Army, the National Marine Fisheries Service and the National Park Service (NPS). The NPS and the U.S. Army conducted fewer projects in 1981 than in 1979, while all of the other agencies listed, particularly the U.S. Geological Survey and the U.S. Forest Service, experience modest to significant increases.

Sponsorship of Research

Sponsorship of research is viewed both in terms of the number of projects supported and the amount of money provided. Figure 5 indicates that nearly 60 percent of the projects conducted in the state in 1981 were sponsored by federal agencies. The federal government supported nearly equal numbers of Physical and Biological projects (390 physical science projects and 360 biological science projects), followed by a much smaller number of Social Studies projects (231). Various state agencies supported the next largest number of projects. Interestingly, the state sponsored relatively few Physical Science projects (67), a much higher number of Biological Projects (215), and still more Social Studies projects (329) In fact, 45 percent of all Social Studies were state sponsored, more than were federally funded

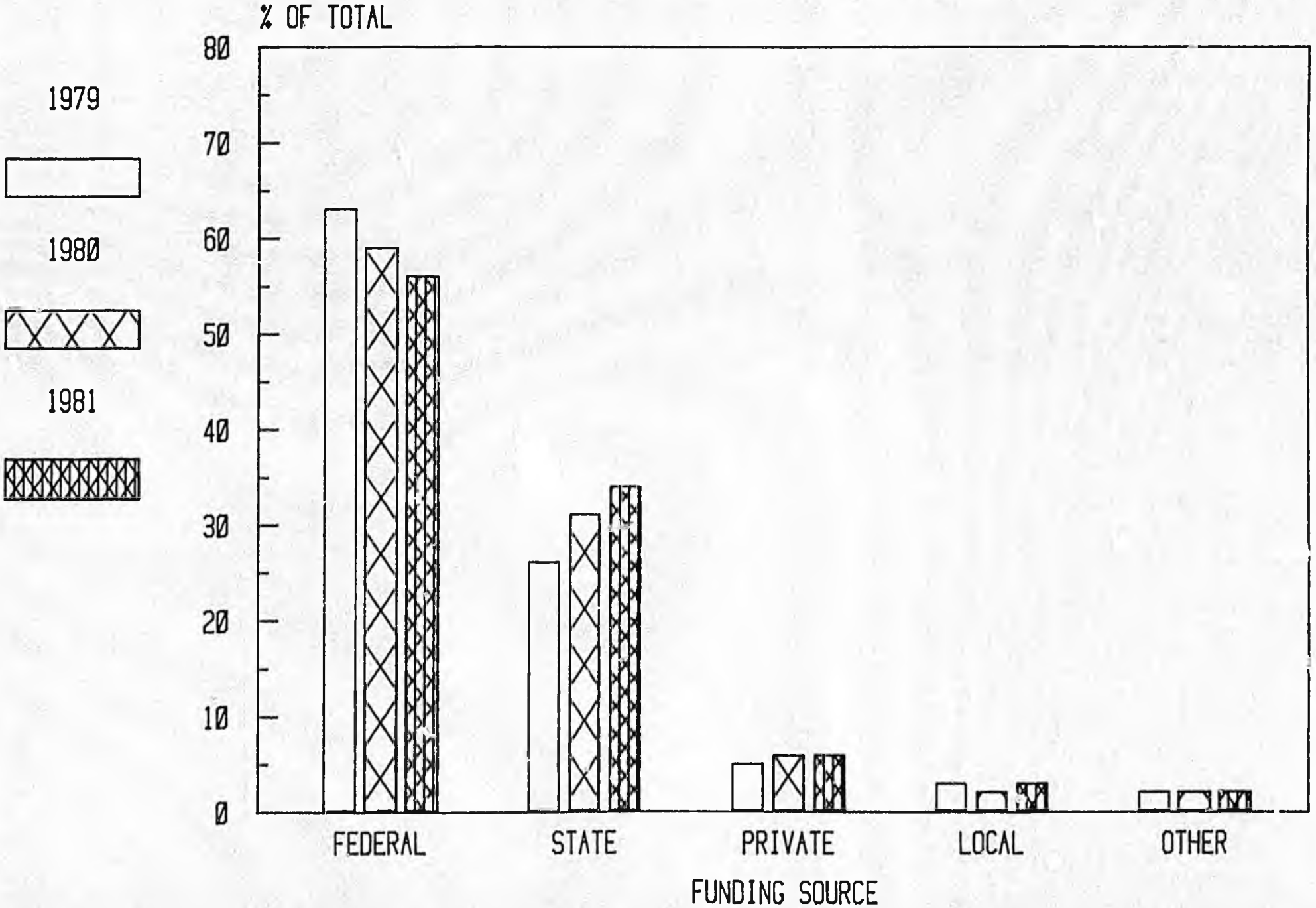
Although the number of projects sponsored by federal and state agencies has increased since 1979, changes have occurred in the proportions of projects supported by these two groups of governmental agencies. Since 1979 the proportion of federally funded projects has decreased 7 percent, matched by a similar increase in state funded projects.

An estimate of the total amount of money spent on scientific research in Alaska during 1981 was calculated from CRP data. Approximately 40 percent of the projects reported their funding. Some of those had to be adjusted to indicate only monies expended during 1981 rather than over the life of a multi-year project. From those data an average expenditure per project was calculated and aggregated by discipline for all those reporting their funding.

Nearly $235 million was spent on research in Alaska in 1981. (Miscellaneous projects not included in the CRP would probably raise the total to about $250

FIG. 5: WHO SUPPORTS SCIENCE IN ALASKA

% OF PROJECTS BY FUNDING SOURCE



million.) Nearly $63.5 million was spent for Physical Science Projects, $74.5 million for Biological Science Projects, and $97 million for Social Science Projects. The federal government provided nearly $142.5 million for scientific research in Alaska, while the state provided nearly another $82 million. Roughly $10 million came from other sources. The average amount of money spent per project was approximately $118,000.

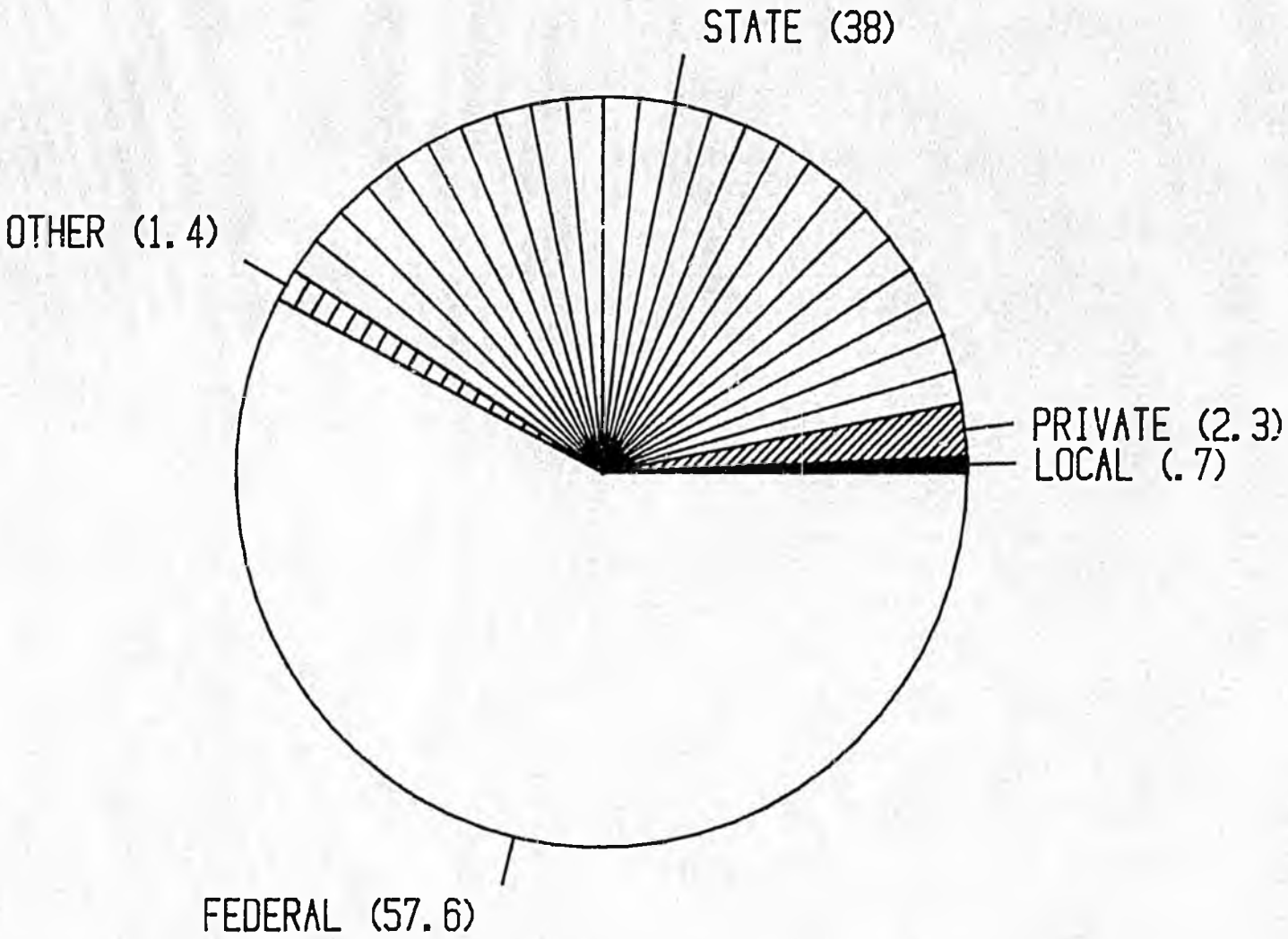
The amount of money provided by the federal government decreased nearly $4 million between 1979 and 1981, while state dollars increased from $30 million to over $80 million. Figure 6 shows the proportion of projects supported by various sources for 1981. The federal government provided less than 60 percent of Alaska's research dollars in 1981--down from over 80 percent in 1979. The proportion of state dollars increased during the same time period from 16 percent to nearly 40 percent. Most of the state dollars paid for Fisheries research and Social Science Projects

Summary

The record indicates that research in Alaska has continued to grow in recent years, from just under 1,700 projects in 1979 to nearly 2,000 in 1981; from approximately $200 million in 1979 to approximately $250 million in 1981. However, there have been significant changes in the sponsorship of Alaska research support and which disciplinary emphasis. Generally, cutbacks in federal support have been compensated for by increases in state sponsorship. Increases have occurred mainly in geology, fisheries, and several of the social science categories. Other categories, especially in the physical sciences, have experienced either very modest increases or significant

FIG. 6: WHO FUNDS SCIENCE IN ALASKA?

PERCENT OF TOTAL-1981



decreases, both in the number of projects supported and amount of funds provided.

The trend towards a decrease in Physical Science support is particularly alarming in view of the dependency of technological and resource development upon basic knowledge in this field.

THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

RURAL PRIMARY AND SECONDARY EDUCATION IN ALASKA

Research Priorities and Recommendations

A Summary Report

Based Upon the Results of the

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

EDUCATION WORKSHOPS

Conducted by the University of Alaska

and the Alaska Native Education Association

Spring, 1980 in Fairbanks and Anchorage, Alaska

January 1981

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

EDUCATION IN ALASKA: Research Priorities and Recommendations

* *

CONTENTS

* *

EXECUTIVE SUMMARY:

Alaska devotes 39% of its state budget ($591 million) to the support of education. Yet, little state money is allocated to educational research to identify strategies for improving this important enterprise and making it more cost-effective. Alaska has a set of critical educational problems which are not common to other areas of the United States. The central issue is how to deliver effective and relevant education to culturally different population groups. Most groups are scattered in small, remote communities while others comprise large subgroups in Anchorage and other urban areas. Since these problems differ from national educational issues, research funds are not available from non-state sources.

This report proposes four research projects which could substantially improve the quality of Alaskan education and thereby the competencies of a future generation of Alaskan adults.

1. Defining and Assessing "effective Schooling" in Alaska's Cross-Cultural Context — Estimated Cost $50,000

2. Effects of Community Participation in Educational Affairs on School Functioning — Estimated Cost $100,000

3. Providing Educators with Skills Necessary to Work Effectively in Alaska's Cross-Cultural Situation — Estimated Cost $75,000

4. Developing Educational Approaches for Village High Schools — Estimated Cost $110,000

BACKGROUND AND STATUS OF ACTIVITIES IN EDUCATION RESEARCH

Alaska devotes approximately 27% of its state budget to the support of education at the school district level and another 12% to education at the university level. Yet, little research has been carried out on the complicated educational problems presented by Alaska's culturally and linguistically diverse populations and by the scattering of these groups in small, isolated communities.

At the state level, the Department of Education includes a "Planning and Research" section in the Office of the Commissioner. This section performs analyses of current educational issues, conducts a statewide testing program for fourth and eighth graders, and houses special educational efforts, such as the telecommunications project. The Planning and Research section with the assistance of the Northwest Regional Educational Laboratory also carries out some applied research relevant to the development of new educational systems. Those regional resource centers still in existence in Alaska conduct some development activities as well. Primarily, these centers provide training, curriculum, and other forms of practical assistance to school districts in their regions.

At the university level, the School of Education of the University of Alaska's Fairbanks campus contains a Center for Cross-Cultural Studies. The Center is the major agency for cross-cultural education research in Alaska. However, little money is available to support research projects concerned with Alaskan issues.

The major source of research funds in education is the National Institute of Education (NIE). However, NIE's primary interest is in supporting educational research that will apply to national educational problems. These problems center around Black and Hispanic children, not Indian and Eskimo children, and around congested urban ghettos, not small remote villages.

The National Institute of Education is currently supporting several educational studies in Alaska. These include:

1. The Social Basis of Mathematics Learning and Teaching

   Dates: 7/01/80-6/30/81 Institution: UA Funding: $14,505

   Purpose: To examine the nature of mathematics teaching and learning across cultures and identify educational and social processes best suited to increasing the integration of math thinking into the social and cultural circumstances of the learner.

2. The Social Organization of Participation in Four Alaska Cross-Cultural Classrooms

   Dates: 9/1/80-8/31/81 Institution: UA Funding: $14,865

   Purpose: To examine teaching style and effectiveness in cross-cultural classrooms involving Native teachers.

3. The Organizational Control of Communicative Differences in a Public University

Dates: 9/30/80-12/31/81 Institution: UA Funding: $20,315

Purpose: To conduct an ethnographic study of the University of Alaska's Fairbanks campus which centers on the experience of Native university students.

4. Decentralized Education in Rural Alaska

Dates: 8/1/80-12/31/82 Institution: UA Funding: $198,142

Purpose: To examine the concept of decentralization and its application in rural Alaska where a diverse student population - Indian, Eskimo, Caucasian - is educated.

5. Youth Organizations as a Third Educational Environment, Particularly for Culturally Different Youth

Dates: 10/1/79-9/30/81 Institution: UA Funding: $120,000

Purpose: To examine the type of learning that occurs in non-formal situations, such as Boy Scouts, Girl Scouts, and 4-H, in order to identify potential educational benefits of such activities in rural Alaska.

While the projects listed above may appear to apply directly to Alaskan issues, in many cases the research is actually directed toward national issues which the Alaskan experience is expected to illuminate. As a national institute, NIE is not interested in supporting research on the serious educational problems specific to Alaska. Thus, Alaskan educators have virtually no source of funding to examine research issues which are uniquely important in Alaska.

MAJOR ISSUES:

Given the high costs of conducting educational research in Alaska and the smaller number of Alaskan researchers, it makes more sense to review and use research conducted elsewhere than to launch a special research program on educational issues relevant to majority white communities. Alaska's unique educational problems concern first how to deliver educational programs to small, remote communities in ways which respond to cultural differences. The issue is not only "how" to accomplish this goal but exactly "what" constitutes quality education in these settings and "whether" the goal can be accomplished with reasonable levels of cost. Second, Anchorage and other urban areas have large populations of Native and other minority students who typically have low rates of achievement, high levels of drop-out, and related problems.

Issue 1: Are there cultural differences in what constitutes "effective schooling"?

Recent educational research suggests that it is possible to identify and measure characteristics of schools that lead to greater educational effectiveness, such as higher student achievement and lower student dropout. These include such characteristics as time devoted to instruction, principal's leadership, and and school ethos. It is not clear, however, whether these findings apply to Alaska's cross-cultural situation. "Effectiveness" in this context may be strongly linked as well to such variables as the type of interpersonal relationships which develop in schools between teachers and students from different cultural backgrounds. In view of the emphasis begin placed on "effective schooling" in the Governor's Office, it is important to determine the applicability of national findings to Alaska's cross-cultural settings and to identify factors important to effective schooling.

Issue 2: Should opportunities for community participation in educational affairs and decision-making be increased and if so, how?

One of the key premises in educational discussion is that increasing community participation will lead to greater satisfaction with schooling and decrease such problems as absenteeism and vandalism. This assumption needs to be tested. It also may be that certain types of community participation are educationally helpful while other types create conflict with improving education. Research on this issue can be applied in such areas as school board training and the design of educational programs and facilities which promote certain types of community involvement.

Issue 3: How can teachers and administrators be better prepared to work in the Alaskan environment?

Teachers and administrators require special knowledge and abilities to operate in a culturally and geographically unfamiliar and isolated area. Identifying these teacher skills is important to improving both campus-based teacher training programs and alternative field-based delivery programs. Such information will also be useful in developing evaluation and certification programs which enable educational systems to retain teachers and administrators who remain competent and effective.

Issue 4: How does the size of a school and school system affect the delivery of eduational services?

In the 1970's, Alaska established a system of small village high schools so that rural students would not have to leave home to obtain a secondary school education. Serious controversy is occuring about the academic and social effects of these schools.

According to one viewpoint, village high schools have been highly successful in developing students with strong cultural identities and this goal has been accomplished without declines in achievement. According to the opposite view, village high schools offer a limited curriculum and staff and thereby result in low student achievement. Research needs to be done which examines the effects of school size and location on such factors as achievement, attendance, drop-out, social-emotional problems, and cultural identity. This study can help identify the resources necessary to support educational success in small schools and to capitalize on the advantages of these institutions. It can also suggest educational strategies, curriculum models, and media technology which can provide students in small schools with equal educational opportunity.

Issue 5: Are educational benefits equally distributed across all segments of Alaska's population?

Certain groups of Alaskans may not be receiving equitable educational services. These include school age youth who are not attending formal educational institutions, residents of remote villages, and young children and older adults, who are not traditional clients of educational institutions. Identifying these groups, assessing their educational needs, and developing service strategies are important educational problems.

ANALYSIS AND DISCUSSION:

The issues discussed in this report are central to providing high quality, cost-effective education in Alaska. Yet, these issues are not eligible for funding from conventional sources precisely because they are narrowly relevant to Alaska. Without special funding from the legislature, these key issues will not be addressed in a systematic, careful way. These issues are fundamentally state, not federal, responsibilites.

PRIORITIES AND RECOMMENDATIONS:

Of these issues, the first priority is examining cultural differences in what constitutes "effective schooling". The Department of Education and the Governor's Office are establishing a Task Force of Effective Schooling in 1981. This Task Force is to identify the responsibilities of the school as opposed to other agencies, identify educational practices effective in Alaska, and send recommendations to the Governor concerning teacher training and school reporting systems. This important project is being based on national findings regarding effective schooling which may or may not apply to culturally different regions of Alaska. The Legislature needs to support a research project which examines effective schooling in Alaska before firm conclusions are drawn and statewide standards are developed. Determining what dimensions of schooling relate to educational effectiveness for Eskimo and Indian children

will have important applications in many areas, such as program planning, curriculum development, and teacher training.

Our second priority is examining the the effects of community participation in educational affairs on school quality. Vast amounts of time, effort, and funds are expended to develop channels for citizen participation in education; for example, community school committees, regional school boards, the hiring of Native and or local school staff, and the formation of special committees. Indeed community participation is widely regarded as a "panacea" for educational problems. Yet, we have no information on the effects of these participation strategies and the most appropriate channels for community/school cooperation.

Our third priority is developing information on the skills needed to work effectively in Alaska's cross-cultural situation. This project is related to the "effective schooling" issue but it focuses on improving the skills of educators rather than improving the characteristics of school programs. Systematic information needs to be developed on the problems of teaching in rural Alaska and productive ways of working with children, staff, and communities in remote villages. Only anecdotal material is currently available on these critical matters.

Our fourth priority is developing educational approaches suited for new village high schools. Some initial work in this area has already been carried out by the Center for Cross-Cultural Studies at the University of Alaska. A study of issues in village secondary school education has been completed and some curriculum packages have been produced. This effort, however, is proceeding slowly because of the lack of reliable, sustained funding.

In sum, we recommend that the Legislature provide funding to conduct the following educational research projects:

1. Defining and Assessing "Effective Schooling" in Alaska's Cross-Cultural Context — Estimated Cost: $50,000

   The purpose of this study is to analyze the issue of effective education in Alaskan cross-cultural settings. This project would a) examine the applicability of research on effective schooling outside of Alaska to Alaska's cross-cultural context, b) identify the diverse roles of the school in rural and urban settings and potential changes in these roles, and c) develop a research plan for creating a body of knowledge on the educational dimensions related to effective schooling in Alaska. This initial project is fundamentally a small-scale analytic effort which can be followed by a large data-gathering effort. It addresses a critical issue with important political and practical ramifications.

2. Effects of Community Participation in Educational Affairs on School Functioning — Estimated Cost: $100,000

   A key premise which underlies educational discussion and program planning in Alaska is that a high level of community involvement in

educational activities increases educational quality and relevance and community and student satisfaction with schooling. This assumption, however, has not been tested. Nor is it clear what ways (local school communities, teachers drawn from the community, school staff working informally with local leaders) community involvement may be related to educational success. This project would a) survey school districts and examine levels of and alternative channels for community involvement, b) examine the relationship between various types of community involvement and indicators of educational success, and c) suggest ways in which community involvement most effectively occurs.

3. Providing Educators with Skills Necessary to work Effectively in Alaska's Cross-Cultural Situation Estimated Cost: $75,000

Teachers and administrators require special knowledge and skills and supportive networks to work effectively in what are for many culturally unfamiliar, isolated communities. This research would a) identify and describe the knowledge and skills needed by Alaskan educators, b) compare the cost and adequacy of alternative methods (such as pre-service training, summer workshops, inservice support groups) of providing this training, and c) propose institutional arrangements for carrying out training activities.

4. Developing Educational Approaches for Village High Schools Estimated Cost: $110,000

The formation of small village high schools in rural Alaska has alleviated one set of educational problems, the dislocation experienced by village students away from home, but has created another set of problems, how to provide high quality education in small schools. The purpose of this project is to examine the effects of village high schools in such areas as drop-out, attendance, achievement, college success, and preparation for economic and leadership roles in the village and elsewhere. This information will be used to develop innovative educational stragegies, alternative curriculum models, and media technology which build upon the strengths of the village high school and mitigate weaknesses.

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THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

ALASKAN TRANSPORTATION

Research Priorities and Recommendations

A Special Report

Based upon the Results

of the

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Alaskan Transportation Committee Workshop

Held February, 1980 in Anchorage, Alaska

and the

Subcommittee Meeting on Transportation Research

Held October 3, 1980 in Anchorage, Alaska

January, 1981

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ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

ALASKAN TRANSPORTATION: Research Priorities and Recommendations

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EXECUTIVE SUMMARY

This report incorporates knowledge of past research and development into its recommendations on how to improve and restructure traditional areas of transportation research. It deals with new and neglected areas of research needed to solve Alaska's transportation problems. As a result, recommendations include all transportation modes, as well as the economic and social implications of transportation in Alaska. Both urban and rural transportation problems are considered. Since the role of transportation is to link the two, the report views the system holistically as it serves the diverse needs of a single, small population of 415,000, with annual recruitments of itinerant workers and tourists numbering about 300,000.

It was recognized that the state must find long-term energy sources and alternatives for its transportation systems. The committee did not develop research priorities in this area, but believes that the magnitude of the problem and the complex related technological questions stipulate a major state research and development effort in the near future.

Because of the scope and complexity of this issue, the report has been divided into three components: 1) Aircraft, Automobiles and Freight Vessels; 2) Foundations and Soils; and 3) Technological Scale and Market Structure.

BACKGROUND AND STATUS OF CURRENT ACTIVITIES IN ALASKAN TRANSPORTATION RESEARCH

In addition to the ACST Transportation Committee, two other groups exist for coordinating transportation efforts in the state - the Federal/State Transportation Planning organization and the Transportation Advisory Council of the Alaska Department of Transportation and Public Facilities.

Aircraft, Automobiles and Freight Vessels

Aviation development in Alaska has traditionally been linked to federal funding patterns which tend to concentrate on airport surface improvements, field lighting, natigational aids and air traffic control. Little has been done on total system evaluation. Response to an increased aviation need has been to lengthen the runway. If this cannot be accomplished, service is usually continued with obsolescent aircraft that can fit the field size.

Advanced aircraft applications have been left to the military and to private industry. Most of the short takeoff and landing aircraft available today are offshoots of military programs. However, aircraft that fit a specific regional need are not forthcoming from the present development stimuli.

The civil aviation system in Alaska has developed around the Boeing 737 and 727. These were the only commercial aircraft available to the larger Alaskan carriers in the late sixties and early seventies. This equipment is not ideally suited to Alaskan conditions. Thus, adapting this aircraft to the larger, passenger-supported markets and to the rural, freight-passenger market has created high fleet utilization costs and capacity problems.

No technological breakthroughs in airfoil design or power plants are in sight that would improve cost or performance of aircraft suitable for Alaska's bush routes. The present financial configuration of the industry in Alaska does not permit maximum application of existing aircraft technology. The main problem is cost rather than inadequate technology.

As with aircraft, motor vehicles that fit a specific regional need in Alaska are not forthcoming. Even automobiles with specific adaptations for operation in severe cold are not a feasible possibility within the market structure of the U.S. automobile industry. However, studies show that small attachments and changes to help alleviate the problem appear to have reasonable research promise.

Deterioration of air quality through carbon monoxide produced mainly from cold starting of light-duty vehicles is one manifestation of the expanding motor vehicle transportation network in Alaska. Present research falls far behind what is needed to develop the knowledge necessary to incorporate carbon monoxide control strategies into the planning and designing of new highway and street systems.

Another major vehicle-related problem in Alaska is ice fog. This is not a public health problem but rather one involving safety and economic factors. Past efforts on ice fog research have suffered from spotty interest by federal funding sources.

Increased demand for freight service, other than air, in western Alaska, requires a study of the relationship of the barge system serving that area to the container-ship service presently serving major ports. Very little research has been conducted on new types of vessels and vehicles that have proven their worth in other parts of the world - amphibious air cushion vehicles, hydrofoils, shallow-draft ACV's and surface-effect vehicles, to name a few.

Foundations and Soils

High transportation costs in Alaska have historically been due to the cost of system maintenance, whether the system component is a highway, airport, dock, or other facility. Construction of the trans-Alaska pipeline created a great surge in applied technology in several of these areas, which is still being absorbed into general applications throughout the state. Much of this new technology was possible because of basic research programs that had been ongoing since World War II at the University of Alaska and in federal and state agencies.

Because of the importance of oil and gas development in the future of Alaska, special attention has been given to pipelines. There is ongoing research on metal stresses in cold temperatures, particularly for high pressure gaslines and hose pipelines subject to extraordinary stresses due to foundation movements such as frost heaving, solifluction and the problems presented by permafrost.

Permafrost and frost heave conditions have also had a major effect on roadway and railway construction and maintenance costs in Alaska. Current studies indicate expected performance from selected design features under certain climatic and soil conditions.

For the past ten years the Department of Transportation and Public Facilities has conducted a small-scale research focusing on roadway design and construction techniques to control permafrost and frost heaving and detection of permafrost and ground ice through surface remote sensing methods. Research shows promise of future benefits but major research efforts are needed in the area of design, prediction techniques and permafrost detection.

Technological Scale and Market Structure

Alaska's transport market is such that there is a relatively large number of small economic activity centers separated by considerable distance and rugged topography. This has caused transport system development to follow regional and subregional patterns rather than integrating at the state level. This condition has been aggravated by the high number of carriers, even in remote areas, who compete for the limited markets.

Traditionally, the technologies used to serve this market have been those which have been adapted from systems developed for large national or international markets and those in which Alaska has acted as a laboratory for initial development. Currently, it is almost impossible to find transport systems specially designed for the conditions prevalent in the state.

The concept of the shipping container is the classic example of the "pilot program". The system saw its initial, commercial development and implementation in Alaska during the fifties. It quickly matured into an operational system which achieved its maximum return when applied to larger markets outside Alaska. As a result, the rate of technology development far outpaces increases in Alaska's market size, the state's carriers have found it increasingly difficult to justify the high capital costs of replacing their equipment with modern units for use in small-scale local markets. The pioneer marine carrier in this field dropped from the market in the midsixties. Current operators are finding utilization of current high technology only marginally economical in the Alaskan situation.

MAJOR ISSUES IN ALASKAN TRANSPORTATION

Aircraft, Automobiles and Freight Vessels

- Aircraft tailored to meet Alaska's needs can be produced by private industries. However, production will be primarily tailored to the national needs of the producing country unless some effort is made to influence design to meet Alaskan needs. Operators such as Wien and Alaska Airlines are large enough to have some effect, but they have concentrated their efforts on large jet aircraft. The operators that need specialized aircraft are not large enough to generate orders of any size by themselves.

- The present financial configuration of the aircraft industry in Alaska does not permit maximum application of existing aircraft technology or taking advantage of marginal upgrading that could occur through fleet replacements. The main problem is cost (capital and operating) rather than inadequate technology.

- Motor vehicles that fit Alaskan needs are not forthcoming. However, current studies indicate that increased research pertaining to the development of adaption changes and attachments could help alleviate some of the problems.

- Present research in deterioration of air quality through carbon monoxide falls far behind what is needed to develop the knowledge necessary to incorporate carbon monoxide control strategies into the planning and designing of new highway and street systems.

- Ice fog in Alaska is a problem involving safety and economic factors. Research has bogged down due to spotty interest by federal funding sources. Alleviating or diminishing the ice fog problem can only be accomplished by finding avenues for continuous, uninterrupted research in this area.

- In western Alaska, the demand for freight service, rather than air, will continue to increase. This requires a study of the relationship of the barge system and container-ship services. Additionally, extensive research is needed on the suitability of new types of vessels and vehicles that have proven their worth in the area of freight service outside Alaska.

Foundations and Soils

- Present practice in structural earth embankments requires that they be constructed of free-draining, coarse-grained material (sand and gravel) which is extremely expensive where it is not readily aviable. Lower cost substitute methods and materials should be found that could still provide structural reliability.

- Alaska's road and railway systems directly affects more people than any other transportation system in the state. There are major annual roadway and railbed maintenance expenditures. Permafrost, frost heave, snow and ice add tremendously to construction costs. Major efforts in research are needed for methods of predicting the long-term performance

of roadways and railways. Some factors to be considered include: design features, cost information, frost heave prediction techniques and the development of remote sensing methods to detect permafrost and ground ice, snow avalanche prediction and ice removal.

- The future of Alaska depends, in great part, on oil and gas development. Cost efficiencies in pipeline construction will pay special dividends because of their magnitude. There are special research needs that require ongoing examination such as continued research on metal stresses in cold temperatures and continous research on the problems of burying hot or cold pipelines in frozen and thawed soils.

Technological Scale and Market Structure

- It is unusual to find transport systems in use in Alaska that are specifically designed for the prevalent conditions. Civil aviation is an example of the existing problems. This situation represents only one of the more obvious problems relating to Alaska's transport requirements and the scale of economic activity. There is a definite need for research directed toward the types of conflicts engendered by Alaska's current transport systems.

- Relatively little is known about the intricacies of market structure in Alaska. It is closely related to the concept of scale effects on technological efficiency. This involves the identification of the casual elements transport demand and the manner in which the transport market can have a profound influence on the scale and applicability of technology types. A good deal of research is called for. Much of this work is in disciplines which emphasize economics or management, rather than science or engineering.

ANALYSIS AND DISCUSSION

Because of Alaska's low rural population and greater distances from national transportation systems, the overall economic relationships and associated research needs of the system must be examined in light of operational scale and market structure.

As Alaska's population continues to grow, an increase in service and efficiency in mandated. Because the federal government, through it various agencies, has had a strong research presence in Alaska and because that presence is fast disappearing, close cooperation between the state and federal government is essential to efforts of improving Alaska's transportation system.

The transportation system incorporates modal splits within its functional areas. Vehicles include aircraft, automobiles, ships, boats and surface-effect vehicles. Foundations include highways, airports, coastal structures and offshore facilities.

Aircraft, Automobiles and Freight Vessels

Aviation will continue to be the dominant transport mode for more than 70 percent of the state's communities during the next 25 years. The percentage

of aviation use will probably increase due to greater energy efficiencies for long-distance travel.

Little has been done on a total system evaluation of aviation in Alaska. Production of larger aircraft is primarily tailored to the national needs of the producing country. Efforts must be made to influence design to meet Alaskan needs.

There are no inherent technical constraints in meeting design criteria for small aircraft suitable for Alaska's low-density routes. The aircraft design and selection issue is essentially one of trading off purchase and operating costs against weight and capacity of limits.

Alaska's expanding population means an increase in the number of motor vehicles on the road. As a result, carbon monoxide is fast becoming a major problem in Anchorage and Fairbanks. Needed are carbon monoxide control strategies that would stress cold-start emission. There is need for research, development and maintenance of a relevant air dispersion computer model for the major centers of Alaska.

A comprehensive ice fog research effort is also needed. It should include open-water control, vehicular-produced control, study of aviation-related ice fog, study of large stationary sources such as power plants and basic research directed toward a better understanding of the formation and nucleation of ice fog.

Increased demand for freight service in western Alaska requires an examination of the relationship of the barge system serving that area to the containership service presently serving major ports. Access into western Alaska systems can be either by the Alaska Railroad or highway to the river port of Nenana, through a potential new river port at Yukon Crossing, or to Circle. New type vehicles/vessels should be systematically analyzed for use under the economic and climatic constraints of Alaska operation.

Foundations and Soils

There are popular misconceptions as to the amount of basic research being conducted in permafrost and frozen ground problems as they affect Alaska. The enormous industrial research effort that went into the oil pipeline is privately held. Federal funding of permafrost research is at a low level and funding by the Federal Highway Administration that financed research on the pipeline and haul road has not been renewed. In essence, the present state and federal research programs are funded at low levels and fragmented.

Permafrost and frozen ground have been problems that have beset Alaska for many years. Permafrost and frost heave conditions have a major effect on roadway and railway construction and maintenance costs in Alaska. Extensive research efforts are needed in methods of predicting the long-term performance of roadways and railways based upon known soil and climatic factors; benefits of difference design features for performance on permafrost; benefit and cost information on winter versus summer construction scheduling; frost heave prediction techniques and effects of frost action on pavement system layers and the development of reliable methods of detecting permafrost and ground ice by remote sensing methods.

One of the most pressing needs in ice-related transportation is for short-range prediction of ice distribution and motion to predict areas of open water and thin ice on a real-time basis for periods of several days. Development of this system would make possible better prediction of the trajectory of oil spills, siting of marine structures, prediction and possible routes of marine mammals and other applications.

Another severe problem in Alaska, especially to the fishing fleet, has been the icing of ship superstructures. Already identified by the Marine Board of the National Research Council, it is of special interest to plans for the northward expansion of the fishing fleet.

Technological Scale and Market Structure

Market demand and potential demand dictate the level of technology which can be utilized by the transportation system. For example, the limited demand of communities on the Bering Sea coast has made it unattractive to construct even minimal deep-sea port facilities in the region. Likewise, the channelization of railbelt demand through the Port of Anchorage has managed to meet the minimum throughout requirements for employment of midlevel container technology.

Imaginative use of the demand generated over broad geographic and economic sectors may allow more efficient utilization of transport technologies. Perhaps the most interesting examples of this type of concept has been White Pass and Yukon Railroad's use of a variety of container types for haulage of all commodities, including bulk items. This permits a single technology type to serve a wide variety of demands much more efficiently than would normally be the case for so small a market. Similarly, the backhaul of seafoods between Kodiak and Seattle fills, to some extent, the otherwise empty tonnage moving south from the railbelt.

Changes in the structure of markets can profoundly alter the technology required to service a market. The outstanding example of this phenomena is in the petroleum distribution system used in the state. The location of Tesoro's refinery in Nikiski provided a sufficient concentration of product movement to justify the construction of a pipeline from that point to Anchorage. This reduced the demand for tanker and barge transport as well as converting an overcrowded petroleum terminal at the Port of Anchorage into one which sees a tanker only briefly once a month. It also caused a reorientation of the Alaska coastal distribution system away from West Coast tanker traffic to one based on local barges.

Transport market structure is an area over which the public sector, through a variety of investment and regulatory mechanisms, can exert considerable influences. Thus, public bodies have the power to grant carriers or classes of equipment (e.g., subsidized construction shipping, aircraft sizings, truck weight limits) entry to a market or forced exit from that market. Public policy may also provide a variety of subsidizations which influence technological viability in a market. Likewise, public investment in facilities can cause or dissipate economics of market concentration.

These situations represent the more obvious problems relating to Alaska's transport requirements and the scale of economic activity. They do, however, illustrate the need for research directed toward the types of conflict engen-

dered by these difficulties. Specifically, the following areas would appear to be appropriate targets for research.

1. Identify the cost structures of available technologies as they relate to market size and composition.

2. Determine minimum volumes of various traffic classes necessary to support the operation of technology types.

3. Identify and develop arctic variations of traditional technologies and determine their efficient cost levels and intermodal compatibility with existing systems.

4. Develop low-capital, efficient alternatives to present transport systems.

5. Develop methodologies for exploring capital-labor tradeoffs in technology design.

6. Investigate questions of benefit and equity in expenditure of public funds to support various service levels to remote, high-cost rural areas.

7. Investigate the effects of both intermodal and intramodal competition on small market rate structures and the effects of regulartory policy on these areas.

8. Identify, catalog, and adapt work done in other polar nations (particularly Canada) which addresses these issues.

PRIORITIES AND RECOMMENDATIONS

1. To implement a long-term examination of the market structure problems of the Alaska transportation system: This area has been almost totally ignored, yet it would make possible immediate returns in efficiency, cost, and safety, if addressed by competent researchers. The aim of the examination would be to establish a relationship between the capital programs funded by the state, the currently available technology that is not in use due to inadequate financing being available and the market structure of Alaska.

   Specific Recommendation: The committee recommends that the Alaska Council on Science and Technology provide $25,000 to develop a proposal for submission to the legislature for funding this examination.

2.* Establishment of a program to investigate the problems of permafrost and frost action in soils: There is no strong state presence at this time in this area. Present funding is inadequate to deal with the wide range of permafrost and soil freezing problems encountered in highway, airport, building, port and dock facilities, and oil and gas pipeline construction.

Specific Recommendation: A program is recommended for FY 1982 funding in the amount of $200,000 to investigate the problem of heat and mass transport in freezing and frozen ground and especially the frost heave problem. This program would be especially timely in view of the present gas pipeline planning and pre-construction efforts.

3. Establishment of a program to further efforts on instrumenting roadbeds and other structures to obtain long-term performance data on permafrost and frozen soils: Permafrost, frost heave, snow and ice add tremendously to maintenance and construction costs of roadbeds, railbeds and other structures.

Specific Recommendation: A program of permafrost research funded at $250,000 annually over five years for applied research on permafrost properties and processes and on permafrost and ground ice detection is recommended. It is further recommended to create a continuing position for permafrost research, preferably at the Geophysical Institute, to organize and conduct a long-term permafrost research program. These problems are complex and will require continuing, long-term funding to develop solutions. Total costs over the next five years would be approximately $2,000,000.

4. A major conference on transportation research and technological development be held in Alaska in August 1981: There is a crucial need at this time to bring together experts in arctic transportation to help coordinate research efforts and facilitate communication within the scientific community.

Specific Recommendation: That the council request funding in the amount of $150,000 to sponsor a three to five day conference, bring together experts in arctic transportation with experts in movement of massive resource flows, small scale passenger and freight movements, operations in difficult terrain and a host of other factors.

* The committee further recommends that the only state agency which has a broad range of experience and expertise in dealing with problems of permafrost and frost action is the research section of the Alaska Department of Transportation and Public Facilities. This organization has worked since statehood, in design and construction problems involving permafrost and frost action in soils: therefore, this state agency should be designated the lead agency for allocation of these funds.

5. State of Alaska loan programs for aircraft operators: Design requirements should be developed suitable for Alaska's low-density routes with would include: relatively low initial prices, low operating and maintenance expenses, ease of maintenance, repair and crew training, reliability and durability, independence from ground support equipment and facilities, short field takeoff and land capacity and load configuration versatility.

   Specific Recommendation: The State of Alaska should examine its loan programs to insure that they are meeting the needs of aircraft operators to replace their fleets as needed. The state should work with Alaskan operators to replace their fleets as needed and to specifically define which aircraft characterists are most needed in Alaska. The state should communicate such information to the aircraft manufacturers as a vital component of an overall air transportation plan.

6. Coordination of transportation efforts in the state of Alaska: In addition to the Transportation Committee sponsored by the Alaska Council on Science and Technology, two other groups exist for coordinating transportation efforts in the state - the Federal/State Transportation Planning Organization and the Transportation Advisory Council of the Alaska Department of Transportation and Public Facilities. More coordination of information and communication is needed.

   Specific Recommendation: A forum is needed to bring together private transportation interests with public planners, in addition to the continuation of the above organizations. The above groups could possibly fill this role either through subcommittees or expansion of the parent body.

7. Develop carbon monoxide control strategies: The deterioration of air quality is one manifestation of an expanding motor vehicle transportation network in the urban areas of Alaska. Carbon monoxide, produced mainly from cold-starting of light-duty motor vehicles in now becoming a major problem.

   Specific Recommendation: The state should establish a research program to incorporate carbon monoxide control strategies into the planning and design of new highway and street systems.

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THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

AGRICULTURE AND ANIMAL HUSBANDRY

Research Priorities and Recommendations

A Special Report

Based Upon the Results of the

Alaska Council on Science and Technology

Agriculture and Animal Husbandry Committee Workshop

Held February 1980 in Anchorage, Alaska

March 1980

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

AGRICULTURE AND ANIMAL HUSBANDRY: Research Priorities and Recommendations

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EXECUTIVE SUMMARY:

This report cites certain background and priority needs for activities in agriculture and animal husbandry research in Alaska. The working committee was selected to represent a broad background and diversity relative to Alaska agriculture. The committee identified more than 30 critical concerns in agriculture and animal husbandry. Each concern was evaluated and the top 10 selected and set in order of their priority for this report.

The Council itself, in consultation with the committee's chairman, has added recommended fiscal actions for consideration this year.

BACKGROUND AND STATUS OF CURRENT ACTIVITIES IN AGRICULTURE AND ANIMAL HUSBANDRY:

Over the past six years the State of Alaska has launched a dynamic agricultural development program. Agricultural rights to land are already being sold, approximately 75,000 acres since 1977. An estimated 30,000 to 40,000 acres were already in private holdings, bringing the present potential agricultural base in private ownership to more than 100,000 acres. Present proposed legislation could add another 75,000 acres by 1983. The State has identified a goal of 500,000 acres for agricultural development by 1990. The people of Alaska, as identified in "Alaska Destination Tomorrow" released by the Office of the Governor, placed high priority on development. Through several planning efforts, both commercial and subsistence, agriculture has been consistently emphasized by the Alaskan citizen. (Subsistence in this case refers to farms, usually small, that produce food and fiber for family use and income to generally supplement other income sources.)

Alaska can produce many agricultural products consumed by the in-state population, especially on a subsistence level. Further, as transportation and other costs of imported food continue to rise, this potential becomes more significant. At present, most food needs for Alaska are met through the Seattle marketing structure. If this supply were cut, food shortages would start immediately, and critical shortages would develop within a matter of weeks. This has become an expressed concern and is an important factor behind present agricultural development interest.

The red meat industry is developing rapidly, especially the reindeer industry. Alaska produces less than 2 percent (estimate) of its annual red meat consumption. This can be increased, especially in view of Alaska's rapidly developing grain base. Small grains produced in Alaska could be first made available to meet local needs such as feed requirements for dairy, swine, and cattle feeding. Most of the small grain produced in Alaska over the next five years could be utilized within the state if the proper infrastructure were developed, but the lack of such a system is very evident and a source of concern. It should also be noted that Alaska's developing hydrocarbon industry manufactures urea (nitrogen) fertilizer in Alaska, providing a low-cost source of this most important fertilizer element. (The Kenai plant is presently the largest in the world.)

ANALYSIS AND DISCUSSION:

The present trend favoring agricultural development has been motivated by individual Alaskans. The Soil Conservation Service, through a public participation effort with local subdistricts, noted a strong public concern about the loss of present crop land and potential acreages. Citizens throughout the railbelt area expressed a concern that agricultural lands were being diverted to other uses (especially urban) or were being tied up by special interests.

The Delta Land Management Planning Study, conducted by the Division of Lands, also emerged with strong local public participation. Agriculture development and preservation have become the first identified objectives of this plan, resulting in the Delta Agricultural Development Project.

Several considerations relating to agricultural development and preservation have been developed by local citizens over the past four years.

1. Project Approach

   There is a need to clearly define each development boundary, and how the proposed project will proceed. All resources must be considered in each project. Where it is possible and practical, conflicts must be resolved or minimized.

2. Conservation Ethics

   Precautions must be taken to allow for minimum impacts on the environment during and after development. Erosion control practices, water-quality concerns, and potential pesticide hazards must be

identified. An attitude of prevention of the environmental hazards before they occur rather than correction after they have developed prevails among the public.

3. State Leadership

The need for strong state leadership has been expressed by local people. This includes: a) the necessary legislative authorities to support and maintain the agricultural industry, b) the financial resources necessary to participate, c) identification of the marketing structure, and d) technical support in both research and development.

As an overview of the above, it has been noted by soils experts that Alaska has the soils and climate to produce a variety of adapted, quality crops for both in-state consumption and export purposes.

MAJOR ISSUES

The following are the 10 most urgent concerns for agriculture and animal husbandry. These were selected from approximately 30 areas identified as major research deficiencies in Alaska. The list is presented and explained in order of priority as determined by the committee.

1. Plant and Animal Improvement Research

Top priority was given to this basic area of research. Broad as it is, it is fundamental to establishing a stable agricultural base. The committee includes in this priority the recognition of the need for research in small amimal, subsistence farming, village and urban gardening, and large-scale commercial farming. Research emphasis should be placed on:

a. The introduction of new crop species and new animal species for evaluation under Alakan conditions.

b. Improvement of plants and animals through breeding programs designed to utilize both domestic and introduced genetic material.

c. The management of plants and animals to best utilize the natural resources unique to Alaska, i.e., long summer days, and to increase the efficiency of production.

d. The nutritional requirements of plants (fertilizer) and animals (feed) and especially how the former affects the latter.

As this is a broad display of research, it is recommended that this committee further define the specific research needs on a priority basis when funding is considered for plan and animal improvement research. This report of the committee will be forwarded by the Council to the University for their guidance.

2. Climatological Data

The second priority was giver to the collection, analysis, and application of weather data. No natural phenomenon has more impact on agriculture than daily, seasonal, and annual weather conditions. Agriculture is now being practiced in areas with insufficient weather data to make daily forecasts or long-range planning decisions. In addition, agriculture is expanding into new areas where little or no weather data have ever been collected. These data are urgently needed to assure that proper decisions are made on crop species and variety selections, seeding and harvesting dates, wind and water erosion control measures, storage, transport, marketing considerations, and the myriad of other daily choices that must be weighed in light of the weather in all agricultural endeavors. Wind and water erosion control are the prime considerations, however.

Environmental hazards (such as floods, severe storms, and site-specific hazards) need identification in each potential agricultural area. Even short-term research (3-4 years) is of prime importance for the establishment of conservation practices. This activity has been developed and installations have been made for both the Delta Junction and Nenana areas. It is important that these efforts be continued there and expanded elsewhere when agriculture potentials are investigated.

3. Agricultural and Legal Relationships

The third priority specifies two research needs of agriculture which are bound by legal restraints. The first of these involves testing and clearance for use in Alaska of chemical pesticides and drugs by the Environmental Protection Agency (EPA) or the Food and Drug Administration. (Many chemicals and drugs cleared for use on specific crops and animals in the Lower 48 or other countries are not cleared for use in Alaska.) Chemicals cleared for use in Alaska on crops we do grow are not always effective at approved rates of application because of climate and/or soil conditions that differ from those where effective rates were determined and maximum limits set. EPA clearance of these chemicals on the crops that we grow and at rates of application that are effective under our conditions requires extensive support data and assurance that neither human beings nor the environment would be adversely affected. For example, one drug of primary importance to Alaska is Worbex. This drug is extremely effective in controlling warble fly infestations of reindeer and currently is used in both Scandinavia and the USSR. This drug has not been approved for use on Alaska reindeer.

The second research need now bound by legal restraints is the development of phosphate fertilizer deposits. These valuable deposits are presently within the boundaries of federal land withdrawls or in areas of State or Native land with land access. Phosphate is one of the major limiting minerals in agricultural soils in Alaska. Application of high rates of phosphorus are needed to produce economical crop yields. Methods or procedures are needed to provide access to and utilization of these deposits.

4. Marketing and Processing Beyond the Farm

The fourth research priority is concerned with the complex disposal system of farm products after they leave the farm. Research is needed in all areas of slaughtering, processing, packaging, storage, and shipment of animals as well as the processing, storage, shipment, and utilization of crops. This research should be directed toward developing technologies appropriate to Alaska's conditions and needs, village and remote area consumption, and urban utilization. The unique marketing system found in rural areas needs to be addressed as well as the development of foreign market feasibility. (Some of these kinds of research are related to priority number 10, below.)

5. Animal and Plant Disease and Insect Control

The fifth priority addresses the serious need for research into the control of animal and plant diseases and insects. These pests annually cause large losses of animals, poor growth rates and feeding effiencies, and reduced quality of finished meat products. Plant diseases and insects likewise reduce plant population, yields, and quality. There is presently neither a plant or animal pathologist or entomologist on the University of Alaska faculty. Both are desperately needed.

6. Erosion Control Practices

The sixth priority of erosion control research is essentially mandated by the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-50, Sec. 208) and the Clean Water Act of 1977 (P.L. 95-217). These two acts combined require the development of what are called Best Management Practices (BMP's), and the application of these BMP's to agricultural lands to reduce nonpoint source pollution of lakes and streams. Many BMP's are already developed and practiced, and more are being developed to fit special or changing situations. Their suitability under Alaska conditions and development of BMP's specially for our conditions, need to be researched. The urgency of preventing erosion and water pollution before it occurs is recognized by Alaskans. This is the only state which still has this opportunity. Research of this nature is needed now, not later.

7. Extension - The Transfer of Resources

The seventh priority emphasizes the transfer of research results into appropriate technology that is understandable and usable by large and small commercial farmers, subsistence farmers, and rural and urban gardeners or small animal raisers. The traditional role of the Cooperative Extension Service in this effort is recognized. An intensification of research under other priorities listed here will require a concomitant expansion of extension activities to communicate the results to the people. Increased research without communication is futile.

Additionally, the committee recognizes the accumulation of large amounts of research data over seventy-odd years which now rests, unavailable to

the majority of the public, in archives, private libraries, forgotten files, attics, and closets. These data must be gathered together and placed in a repository with public access. Computer storage of these data, similar to that of the Arctic Environmental Information and Data Center of the University of Alaska, would provide ready access to a large amount of research already conducted and would avoid duplication with new research.

8. Interrelationship of Agriculture and Natural Systems

The eighth priority responds to a controversy which commands the collective attention of agriculturists and nonagriculturists alike--are agriculture and natural ecosystems compatible, complementary or antagonistic, and if so, to what degree? Just as important is the question--can agriculture be adjusted or manipulated to be compatible with natural systems without jeopardizing man? Sound information on these interrelationships is lacking and often misunderstood. Of special importance to Alaska is the relationship of natural systems during the development of artificial systems. The integration of agriculture with natural systems needs to be studied to enable orderly development to proceed without compromising nature.

9. Range Site Identification and Carrying Capacity

The ninth priority concerns the vast range lands of Alaska, estimated to exceed 100,000,000 acres. The true value of these range lands in terms of human food production, wildlife production, and vegetative resources is unknown. Demand for the utilization of Alaska's range lands is growing. The resource is known to be fragile. Identification and classification of different kinds of range lands, their carrying capacities of domestic stock and wild animals, the necessary management for sustained use, and preservation of their aesthetic values, need to be determined.

10. Feasibility of Regional Agricultural Base

The tenth priority addresses a problem peculiar to Alaska and other northern countries--distance and isolation of populated regions. These regions, including Anchorage and the Cook Inlet area, depend upon outside sources for more than 90 percent of their agricultural products. The unsoundness of this dependency is evident wherever the transportation system is disrupted. Even with the transportation system to Seward, Anchorage, and Southeast intact, redistribution to outlying regions depends on the variables of weather, sea ice, space on available carriers, internal transportation strife, etc. The ability of individual isolated population regions to maintain an integrated and self-sustaiing agricultural base would relieve them of total dependency on the outside and avoid crisis situations during transportation or other disruptions. Soils with agricultural potential have already been identified in most of Alaska, and they are well dispersed throughout the state south of the Brooks Range. Information is available on a number of crops adapted to these areas. Research on the feasibility of the concept of regional agricultural bases is now appropriate.

PRIORITIES AND RECOMMENDATIONS:

1. New plant and animal improvement research should be funded with an initial line item appropriation to the University of Alaska Agriculture Experiment Station in the amount of $200,000. The University of Alaska should be directed to use these funds cooperatively with both federal and state agriculture agencies and to be guided by further recommendations of the Council's committee.

2. New climatological data for agricultural growth through collection, analysis, and dissemination should be funded with an initial first-year line item appropriation to the University of Alaska Arctic Environmental Information and Data Center in the amount of $40,000.

3. Legal restraints on agriculture should be examined by the University of Alaska, Institute of Agriculture for that purpose. In pursuing this effort, the Institute should work closely with other state agencies and federal agricultural experts.

4. Problems of marketing and processing beyond the farm should be analyzed through an appropriation to the Department of Commerce and Economic Development in the amount of $80,000. This unique and difficult problem must be examined in light of Alaska's food consumption in relation to its production ability and the marketing structure and legislation needed to tie these together.

5. Two new research positions in the fields of animal and plant disease should be established within the Institute of Agriculture of the University of Alaska by the initial appropriation of $120,000 for salary and support.

6. The Office of the Governor should appoint a lead agency for the coordination of research related to agriculture-related erosion and direct this accomplishment in agencies through the use of existing funds. The U.S. Soil Conservation Service needs to be closely consulted in this activity.

7. The University of Alaska Arctic Environmental Information and Data Center and Agricultural Extension Service should be directed to cooperatively develop a plan for the compilation and dissemination of appropriate bibliographies, data files, and materials for the transfer of knowledge to the agricultural community through the utilization of existing funds. The University should be directed to keep the agricultural committees of the legislature informed of the progress of this effort.

8. The problem of relationships between agriculture and natural systems should be addressed by a pilot project, perhaps in the Mat-Su Valley, examining these agriculture, natural habitat, and wildlife relationships. This report might be requested by an appropriate legislative committee or funds made available to the Council on Science and Technology for the solicitation of research proposals throughout the Alaska community of interest.

9. The Department of Natural Resources, in cooperation with the U. S. Soil Conservation Service, Bureau of Land Management, Forest Service, and others as needed, should be requested to provide a plan for range site identification and carrying capacity research.

10. The Office of the Governor should be requested to develop a framework research plan and proposal for the feasibility analysis of regional agricultural bases.

In summary, appropriations as follows are suggested relative to specific recommendations:

1.	University of Alaska Agriculture Experiment Station	200,000
2.	Arctic Environmental Information and Data Center, University of Alaska	40,000
3.	University of Alaska, Institute of Agriculture	N/C
4.	Department of Commerce and Economic Development	80,000
5.	University of Alaska Institute of Agriculture	120,000
6.	Office of the Governor and U. S. Soil Conservation Service	N/C
7.	University of Alaska Cooperative Extension Service and Arctic Environmental Information and Data Center	N/C
8.	Legislature (appropriate committee)	open
9.	Department of Natural Resources	N/C
10.	Office of the Governor	N/C
		440,000 +

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ABOUT THE COUNCIL:

The Alaska Council on Science and Technology reports annually to the Governor and the Legislature on research activities funded by the state and recommends research and funding priorities. Though the Council itself does not perform research, it is charged with helping to coordinate research activities and to enhance standards of research. Nonpartisan advisory services to assist planning at both state and local levels are provided by the Council; for this and other purposes the Council convenes committees, task forces and conferences as needs arise. Utilizing earmarked funds appropriated to the Council's Scientific and Technological Account, the Council conducts the Northern Technology Grants Program to foster Alaskan innovation. From the Account, the Council can award research grants and contracts for purposes specified when monies are appropriated or otherwise assigned to the Account.

September, 1982

ABOUT THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Organization

The Alaska Council on Science and Technology (ACST) was established by statute and began operations in 1978.

The Council consists of seven members who are appointed by the Governor upon the recommendations of the State's scientific, engineering and related organizations.

- two members are selected from different executive departments of state government having significant research activities;
- two members are selected from the Alaska academic community;
- two members are selected from the general public who have direct activities or interests in research;
- one member is selected from the staff of the legislature.

Purpose

The Council fulfills three major purposes:

- it serves the state as a technological and scientific advisory body and liaison with the scientific community;
- it guides important research activities and selects priorities which will support state objectives and policies;
- it is responsible for the efficient transfer of resulting data and information.

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

Program Activities

The ACST's activities are divided between two major functions -- advisory activities and grants/awards activities.

The advisory activities include:

- testimony and reports serving both the executive and legislative branches of Alaskan government.
- convening of scientific meetings
- communications linkage between the science community, government and the general public.
- identification of research needs. Expert committees have been established in twelve areas:

Agriculture and Animal Husbandry	Health and Human Life
Communication and Information Transfer	Minerals
Community Structure	Natural Hazards
Cultural/Lifestyle Relationships	Renewable Resources
Education	Transportation
Energy	Basic Sciences

The grants and awards activities include:

- Northern Technology Grants Program. A two-year exploratory program designed to stimulate innovative do-it-yourself appropriate technology projects in Alaska. During the life of the program 114 project awards were made to Alaskans.
- Scientific and Technological Research Grants. An ongoing research oriented program designed to fund proposals which address state issues.

Communications/Information Transfer

More a d more the Council is helping to bridge the communications gap between the scientific community, the government, and the public. It is responsible for translating scientific terminology into easily understood general language, to assist the legislature, and the governor in policy making; and it helps to coordinate and relay research to state and federal agencies, as well as the general public.

The Council utilizes a number of methods to achieve this:

- publication of research reports.
- publication of technical briefs.
- electronic media programs.
- press releases. General information stories submitted to the newspapers, radio and television media for their use.
- meetings. Both scientific and general public meetings have been sponsored for review and input on technological themes.

Examples of meetings the ACST supported or assisted in supporting include:

Seminars and workshops on the development of an Arctic Alaska Science Policy

Fourth International Conference on Permafrost

Women in Science Symposium

The Alaska Symposium on Social, Economic and Cultural Impacts of Natural Resources Development

Seventh Annual Alaska Health Congress

Learn Alaska Video Conference

Conferences on Old Growth Forests in Relation to Fish and Wildlife

Workshop on Moss Flora of Arctic North America

33rd Alaska Science Conference

25th Annual Alaska Science and Engineering Fair

Seminars to develop a National Arctic Health Science Policy

Pacific Northwest Regional Meeting of American Geophysical Union

4th Alaska Alternative Energy Conference

Conference on Glaciation in Alaska

6th International Symposium on Circumpolar Health

American Fisheries Society Meeting/Alaska

Symposium on Alaskan Telecommunications

1st International Muskox Symposium

For Information

The Council offices are located in Suite 511, 326 Fourth Street, in Juneau. The mailing address is ACST, Pouch CV, Juneau, AK 99811. For further information contact Christopher Noah, Executive Director, or call (907) 465-3510.

THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

LIVING RESOURCES AND HABITAT PROTECTION

Research Priorities and Recommendations

A Special Report

Based Upon the Results of the

Alaska Council on Science and Technology

Living Resources and Habitat Protection Committee's

Joint Discussions and Individual Contributions

September 1981

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Living Resources and Habitat Protection: Research Priorities and Recommendations

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EXECUTIVE SUMMARY

Alaska's long-term economic stability rests largely with the maintenance and controlled exploitation of her living resources. Leading the list of living resource industries are fisheries and timber. The fisheries industry is the largest employer in the resource sector within the State. Maintenance of these resource industries is inextricably linked to maintenance of habitat. Habitat loss due to community, agricultural and industrial development leads inevitably to the loss, degradation, or malfunction of intricate natural systems that produce fish, timber, wildlife, and aesthetic experience for humankind. Alaska is faced with balancing the demands of groups using these resources and the demands for industrial growth and development wrought by oil wealth--all against a backdrop of state, national, and international politics and law.

The committee recognized immediately that because of the breadth of scope embodied in "Living Resources and Habitat Protection" not every topic worthy of discussion could be included herein. A significant outcome of this recognition is the establishment of a separate committee on "Water Resources".

BACKGROUND AND STATUS OF CURRENT RESEARCH

Many governmental organizations are involved in research in the area of living resources and habitat protection. State agencies include the Department of Fish and Game (ADF&G), Department of Environmental Conservation, Department of Natural Resources, and the University of Alaska. Federal agencies include Fish and Wildlife Service, National Marine Fisheries Service Park Service, Bureau of Land Management, and Forest Service.

The spectrum of studies being conducted is broad, and programmatically, is comprised of the following:

Outer Continental Shelf Environmental Assessment Program
Hydropower Development
Commercial Fisheries Stock Assessment and Forecasts
Effects of Logging on Fish and Wildlife
Marine Ecosystem Interactions and Analysis
Wildlife Biology - Population Dynamics and Predator Prey Relationships
Marine Mammals - Population Studies and Harvest Allocations
Aquaculture - Husbandry and Evaluation
Water Monitoring and Supply Assessment
Statewide Sport Creel Census
Fish and Wildlife Habitat Relationships and Requirements
Fish and Wildlife Surveys and Inventories
Silvicultural Practices

These areas cover resource management and development, and habitat protection.

At this time in Alaska's history, the need to focus research on specific resource management problems is particularly acute. The Nation and the world look to Alaska to provide minerals and hydrocarbons to drive an industrial economy, to supply a source of fish products, and to offer a place of sustained infinite beauty where one can, by choice, adopt a life-style with varying amounts of harness to economic drivers and motivations.

Obviously, such a potpourri of human intentions will produce substantial conflicts among competing users and uses of the resources. For example, rapidly changing land-use patterns in the State are having, and will continue to have, a profound impact on Alaska's valuable living resources. Because of these changes, fish and wildlife resource managers are facing an extraordinary demand for increased exploitation of nonrenewable resources and the orderly disposal of lands while attempting to maintain the capabilities of the State's natural habitats to produce and support fish and wildlife.

MAJOR ISSUES:

1. Economic worth of the fish and wildlife resources.

   The value of Alaska's commercial fisheries reverberates through Alaskan society far beyond prices paid directly to fisherman. What is the reach of this multiplier effect? To what extent does it impact regional and local employment? Income? What is the economic value of the sport fisheries? Is a sport caught king salmon or coho salmon worth more than a commercially caught king salmon or coho salmon? What is the economic value of subsistance hunting and fishing? There are also important non-economic and intangible values to be considered. For example, what are the costs and benefits of maintaining or improving the viability of coastal communities and expanding the opportunities for individuals to develop alternative lifestyles? What are the aesthetic values of our fish and wildlife resources. Are these aesthetic values tangible or intangible?

Recent dedication of additional Alaska lands to national parks, monuments, and wilderness reservations closed many parts of Alaska to sport hunting. What is the nature and extent of the economic impacts, positive or negative, that resulted from these closures? Without a monetary evaluation of the worth of the fish and wildlife resources and their habitats, informed decisions cannot be made with regard to the trade-offs imminent when competing uses of the resource and land/habitat are proposed. Furthermore, both Federal and State legislation and policy require that management plans and regulations serve a range of biological, economic, social, and environmental objectives. Data and analyses are required to identify and measure these objectives and the effects that alternative management strategies will have upon them.

2. Effects of logging on fish and wildlife.

Researchers have long been studying timber harvesting and its associated activities and their resultant impacts on anadromous fish and their habitat. Much has been learned about physical disturbances (e.g. sedimentation, increased stream temperature, and altered stream discharge) created by logging activities; but an understanding of how these disturbances impact fish and fish habitat and the functioning of the aquatic ecosystem is not well understood in Alaska. The problem is complex. The impacts are difficult to assess because of the high variability in natural populations, and this variability is confounded by commercial fishery exploitation. At this time, the most critical issue and data gap is the role of stream bank or waterside vegetation in maintaining and protecting the integrity of fisheries habitat. At the heart of this issue is the use of "buffer or leave strips" in forest management. More and more information is being collected that documents the importance of the wetland and estuarine areas as critical nursery grounds for many commercially valuable fish and invertebrates. However, little is currently known about the impacts of upland logging on these downstream estuarine areas.

Logging impacts wildlife populations. For example, recently it has been determined that old growth, uneven-aged timber stands are necessary for the well-being of Sitka black-tailed deer. Clearcutting produces even-aged stands of timber with much less value as habitat for the deer and possibly for other wildlife. However, further attention and research are needed in this area to provide an understanding of habitat requirements for other wildlife so that deleterious effects of logging may be minimized or eliminated. Timber harvesting in the interior of Alaska is also increasing, and even less is known of its impact on fish and wildlife. In the interior, mature spruce is harvested for saw timber and house logs, plus cants for export and; birch, spruce, and aspen are cut for fuel. Logging is done by clearcutting, the shelterwood technique, and certain forms of selective cutting.

All timber harvesting causes major changes in vegetation and, therefore, in wildlife habitats. Fish habitats may be affected by secondary changes in runoff, erosion, etc. There is a need to understand how removing timber influences fish and wildlife in interior Alaska. Logging operations must be designed to protect fisheries and wildlife.

3. Evaluation of performance of hatchery released salmonids.

Alaska has embarked on an ambitious program of salmon enhancement and rehabilitation. Successful enhancement and rehabilitation efforts will ensure the perpetuation of a healthy salmon fishery. Determination of the number of adult fish which are actually contributed to the various commercial, sport, and subsistance fisheries from hatchery production is critical to evaluation of the program. Further, it is likely that salmon produced from yet-to-be-built hatcheries in Southeast Alaska may be looked upon to balance the salmon interception problem that Alaska has with Canada. This could only come to pass as part of a workable solution by determining, at some future time, how many of the hatchery released salmonids are captured as adults and by whom. Hatcheries must be objectively and analytically evaluated on the basis of performance of hatchery released fish so that intelligent, unbiased decisions can be made regarding the future of Alaska's enhancement program. Some hatcheries will be highly successful; others may fail. In the future, we should be able to tell the two apart.

4. Hydroelectric development and instream flow requirements.

The development and construction of hydroelectric power stations necessitate an analysis of the changes that will accrue in the river system that has been dammed. Incremental changes in streamflow and stream channel alterations resulting from proposed hydroelectric development will effect the instream uses and aquatic habitat of fish and wildlife. Changes in streamflow will influence water quality, freshwater recruitment to estuaries, water requirements for riparian vegetation and the amount and timing of streamflow required to maintain the desirable aquatic habitat values of the river itself, i.e. thermal regimes, sediment load, width/depth ratios, channel gradient, stream velocity, and riffle/pool ratios. Reservoir construction may result in inundation of key wildlife habitat or restrict natural movements of some wildlife species. The specific focus and degree of analysis involved in instream flow assessment will depend upon existing or proposed river uses and the concerns of local citizens, public interest groups, and government agencies.

5. Ecosystem analysis (Bering Sea).

The Bering Sea is uniquely productive, and its stocks of fish and shellfish are harvested annually by fisherman from the United States, Japan, Soviet Union, Korea, Taiwan, West Germany, and Poland. In 1972, the commercial catch of fish from the eastern Bering Sea amounted to 5% of the total world catch. In the future, the United States will harvest an ever-increasing proportion of the total catch now allocated to foreign nations.

Because of its high productivity, the Bering Sea is also one of the major congregating areas in the world for marine birds and mammals. These marine animals form the foundation of culture and economy for Aleuts and Eskimos on the Alaskan shore of the Bering Sea and are a major, increasingly valuable asset to the Alaskan economy. Marine mammals also are major users of the commercial and forage fish and invertebrates of this region. For example, it is estimated that marine mammals annually consume more than twice the annual commercial catch of fish. Marine birds consume somewhat less than the annual commercial harvest. The continental shelf of the Bering Sea contains geological structures suitable to oil and gas accumulation. If found in commercial quantities and economic and technological conditions permit the structures will undoubtedly be exploited. The Federal Government is accelerating leasing of parts of the Bering Sea (such as the St. George Basin and the Aleutian Shelf) for petroleum exploration and possible development.

This development and its related activities will impact living resources of this region and the people and animals that use the resources. Understanding the Bering Sea ecosystem and its dynamics is the key to developing rational decisions for competing resource users of this and other regions adjacent to the Alaskan coast.

Federal funding for the necessary fish and wildlife ecosystem research is declining amidst the clamor for increased exploitation of both the living and nonrenewable resources of the Bering Sea. To protect Alaska's vital interests in this resource-rich area, the State will be moved to contribute a greater portion of those research dollars allocated to fish and wildlife ecosystem analysis. Research should be oriented towards the dynamics of relationships among fish, marine mammals, and marine bird populations; the distribution and productivity of their basic forage species; and the impact of petroleum development on the dynamics of these species.

Information is required to assess which ecosystem components and processes are fragile and which are resilient, which are unique and which are redundant, and which must be protected and which can be exploited.

ANALYSIS AND DISCUSSION:

The environmental problems that confront Alaska are multiple and varied. Many needed research projects are currently underway and will continue into the future. Others have not yet been funded, and some are in jeopardy of losing financial support.

Members of the Living Resources and Habitat Protection Committee have identified specific areas of research (discussed below) that have high priority because of their relevance to the major issues discussed above. These should be addressed by the State at this time. For some state and federal agencies, funds are already devoted to conducting the research required; however, the funds are insufficient for problem resolution. We recommend the commitment of additional state funds. Where state funds have already been requested by the normal budgetary process, we support this request. Some

areas of research require more detailed descriptions of what is required and how results will aid in problem resolution. Before funding levels can be recommended in these cases, State funds are sought to accomplish this task. Some problem areas addressed by the proposed research require long term investigations, and the year and level of funding recommended do not imply complete resolution of the problem in the specified time.

The research priorities discussed below in no way constitute a complete listing of the research needs under the broad umbrella that we have titled "Living Resources and Habitat Protection". Absent are such problem areas as atmospheric pollution, groundwater supplies and hydrology, stock dynamics of mixed stock fisheries, fish disease, fish genetics, and placer mining, just to name a few. Nevertheless, the committee does feel that sufficient information is at hand to at least point out several areas of vital importance to the state where no or insufficient research is presently conducted.

PRIORITIES AND RECOMMENDATIONS:

1. Economic Worth of the Fish and Wildlife Resources

Presently, Alaska is making no attempt to assess the value of its fish and wildlife resources. This must change. We recommend that 1.5 million dollars be appropriated over the next 3 years to the Commissioner, Alaska Department of Fish and Game, for this analysis. Such an undertaking will be extremely complex and difficult because values, both tangible and intangible, of the fish and wildlife resources reach into many facets of Alaskan economy and lifestyle.

2. Effects of Logging on Fish and Wildlife

To resolve the conflicts between the timber and fishing industries in southeastern Alaska, the creation of an Interagency Fish and Wildlife Habitat Research Council has been proposed consisting of four agencies (Alaska Department of Fish and Game, Sport Fish and Commercial Fish Divisions; National Marine Fisheries Service, Auke Bay Laboratory; U.S. Forest Service, Forestry Science Laboratory; and the U. S. Fish and Wildlife Service). This council would coordinate and prioritize the research efforts of the four agencies in southeastern Alaska. Together, these agencies are currently spending about $900,000 annually to investigate and monitor the effects of logging on the fisheries resources. This expenditure is indicative of the concern by these agencies but inadequate to resolve the problem in a timely manner. Consequently, we recommend that the State appropriate $900,000 annually, as matching monies, over the next 5 years to the Commissioner of the Alaska Department of Fish and Game for use by the proposed Interagency Fish and Wildlife Habitat Research Council. Disbursal of funds within the Council should be based upon each agency's contribution toward the program.

To continue research on the effects of clearcutting on Sitka black-tailed deer, bears, goats, and furbearers, we recommend that $230,000 be appropriated yearly to the Division of Game, Alaska Department of

Fish and Game for the next 3 years.

We also recommend an initial appropriation of $450,000 to the University of Alaska for a 3-year study on the effects of logging on the fish and wildlife resources of interior Alaska.

3. Evaluation of Performance of Hatchery Released Salmonids.

Enhancement programs are now demonstrating that large-scale salmon production is resulting in millions of additional adult salmon. Hatchery-supplemented returns now comprise a significant portion of localized runs and will soon constitute a substantial part of the State's total salmon production. A coordinated statewide tag-recovery program will help evaluate each hatchery's production of adult salmon. The program will also provide information on harvest rates, time and routes of migration, and separation of stocks. The Fisheries Rehabilitation, Enhancement, and Development Division of the Alaska Department of Fish and Game has requested 1.2 million dollars for mark, tag, and recovery efforts statewide. We support this effort and recommend that it be funded.

4. Hydroelectric Development and Instream Flow Requirement.

Because of the many potential hydroelectric facility sites in Alaska and the several advantages of hydroelectric power production, many dams are under reconnaissance, design, or construction. Project funds usually permit site-specific fish and wildlife studies once a potential project has been identified and up to the beginning of the construction phase. However, funding is rarely adequate for: (a) studies of whole watersheds identified for possible development before identification of a specific project; (b) post-construction studies of ecological changes up- and downstream of the dam(s); and (c) construction and validation of hydrologic models used to predict instream flow requirements of affected flora and fauna. Such studies would increase the ability of the State to predict effects of future projects, identifying optimum mitigation projects, and prescribe project operation changes that will benefit fish and wildlife resources.

We recommend that $375,000 be appropriated to the University of Alaska's Arctic Environmental Information and Data Center to further research the application of the incremental flow model as a predictive instrument for measurement of impact and impact mitigation of the major reservoir projects presently contemplated by the Alaska Power Administration. This effort will identify information gaps to be filled by the resource agencies and will ensure that the data collected are compatible with the needs of the model.

5. Ecosystem Analysis (Bering Sea)

To ensure perpetuation and continued long-term exploitation of the various living resources of the Bering Sea, the data base for this region must be improved in specific areas where informational

gaps exist. In addition, research must be continued to improve and verify ecosystem models that could forecast interactions in multispecies fisheries and interactions between fossil-fuel extraction and fisheries and wildlife. Information needs should be listed for each research category, e.g. interactions between fish and birds, mammals and fish, different species of fish, as well as interactions between petroleum development and fish and wildlife.

The extent to which these research needs are being addressed by State, Federal, and University groups should be determined before research priorities can be established and funding requested. To accomplish this task, we recommend that $80,000 be appropriated to the ACST to convene a series of workshops involving scientists from State, Federal, and University groups involved in ecosystem-related research in Alaskan waters.

In addition to producing a priority listing of information needs and funding levels in each research category, the workshop would be used to establish an interagency task force of highly qualified scientists to formulate and guide future ecosystem-related research that will best serve the interests of the State.

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ABOUT THE COUNCIL:

The Alaska Council on Science and Technology reports annually to the Governor and the Legislature on research activities funded by the state and recommends research and funding priorities. Although the Council does not perform research, it is charged with helping to coordinate research activities and to enhance standards of research. Nonpartisan advisory services to assist planning at both state and local levels are provided by the Council; for this and other purposes the Council convenes committees, task forces and conferences as the need arises. Utilizing funds appropriated to the Council's Alaska Account for Scientific and Technologic Research, the Council conducts the Northern Technology Grants Program to foster Alaskan innovation. From this account the Council also administers the Research Grants Program, supporting Alaskan Research identified in reports such as this and other areas of investigations identified by the Council.

THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

ALASKA MINERALS

Research Priorities and Recommendations

A Special Report

Based Upon the Results of the

Alaska Council on Science and Technology

Minerals Committee Workshop

Held February 1980 in Anchorage, Alaska

April 1980

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ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

ALASKA MINERALS: Research Priorities and Recommendations

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EXECUTIVE SUMMARY:

Mineral development in Alaska holds considerable promise but greater attention to state policies and accelerated investigations, mapping and research are essential to progress which can be both economically productive and environmentally safe. Expected placer mining activity is a particularly acute problem for the state and should be dealt with aggressively on all fronts: policy, education, and regulation.

BACKGROUND AND STATUS OF CURRENT ACTIVITIES IN ALASKA MINERAL RESEARCH:

Geologic Mapping

The U.S. Geological Survey has an ongoing program to map and otherwise compile Alaska's geologic features on a broad-scale, regional basis. This mapping provides basic geologic information but does not provide the detailed information necessary for in-depth understanding of mineral districts. The scale of 1:63,360 (1" = 1 mile) is generally taken as the dividing line between reconnaissance and detailed mapping. To date, less than five percent of Alaska has be covered at 1" = 1 mile, and much of this mapping does not address hard minerals.

The Alaska Division of Geological and Geophysical Surveys (DGGS) has indicated that it considers detailed mapping an appropriate activitiy for itself. The DGGS has proposed programs for more detailed mapping for five areas: McGrath/Lime Hills, north flank of the Chugach Range, Brooks Range,

Lake Clark area, and southeast Susitna Basin. To date, however, only the program for the Brooks Range has been funded.

Placer Mining

Despite the fact that almost all of the mining in Alaska is placer mining, only limited research has been conducted on the effects of placer mining on the environment and the best methods to minimize these effects. The Mineral Industry Research Laboratory (MIRL) at the University of Alaska, Fairbanks, has recently completed a limited study on the effects of placer mining in the Fairbanks and Interior mining districts. In addition, the Alaska Miners Association conducted a study on the effects of placer mining on wildlife habitat in the Nyac area. However, the scope of both of these studies has been limited.

The effects of placer mining on water quality have been studied by the Department of Environmental Conservation (DEC) and by the Water Laboratory of the University of Alaska. DEC has stated that more research is necessary in order to develop the best management practices to reduce water pollution from placer mining.

The MIRL is presently updating the Bureau of Mines' publication on Placer Mining Methods of Alaska. However, when this project is completed more research will be needed to develop better mining methods to maximize mineral recovery and to minimize environmental degradation.

Coal

Only limited research has been undertaken on the development of Alaska's coal resources, in addition to general field-related studies conducted by Don McGee of DGGS and the USGS Conservation Division on coal-bearing areas. The only state research underway at present is a contract by the Division of Policy Development and Planning (DPDP) for a study of export marketing for coal. No thorough research has been conducted on the state's coal royalty and leasing policies. Present state coal royalty-leasing policies appear to be moving toward those appropriate for oil and gas only, when in fact, there are many substantive differences upon which to base separate policy approaches.

The National Academy of Sciences is currently conducting a study on the unique characteristics of the Alaska environment which may require or suggest modification of the federal Surface Mining Control and Reclamation Act of 1977.

Locatable Minerals

Several studies have been completed on the policies and procedures for the disposal of hardrock minerals by the Congressional Office of Technology Assessment, the General Accounting Office, and the Joint Federal-State Land Use Planning Commission. One of the studies by the Office of Technology Asssessment dealt specifically with Alaska and is still reasonably current.

MAJOR ISSUES:

The basic issue in hardrock mineral development and research is the need to establish underlying state policy for the development of these minerals. The development of such a policy statement is most desirable. Based on federal experience, however, where much effort was put forth in the drafting of a national policy (the Mining and Minerals Policy Act of 1970), it would appear most productive to divide the policy development question into discrete parts rather than to try to achieve a holistic approach. The Council urges policy resolution in a step-by-step manner, along the following lines:

1) Mineral development management—subdivided mainly into coal, placer, and major hardrock;

2) Productivity of an Alaskan mining industry—attention should be given to both commodity production and secondary benefits;

3) Geologic mapping—policies should prioritize the extent and type of such mapping most beneficial to Alaska;

4) Land status—the ownership of land clouds mineral development; the policy issue here is for the state to assert rules for mineral development on its land, including the assertion of state ownership, particularly river and stream beds, and to prescribe policy relationships to lands held by the federal government and private interests;

5) Water ownership and management—Alaska has a good body of water law, nevertheless the allocation of water for mineral as well as other development will be a basic issue for the next decade. The state needs to examine its water policies pertinent to mineral development in the light of the prioritization of beneficiary uses under law and the economic and environmental considerations of such potential developments;

6) Mineral leasing and royalty policy—the rules for the leasing of state lands for mineral development need to be overhauled from balanced economic and environmental viewpoints consonant with other state land management approaches;

7) Transportation and access to mineral holdings—policies need specific articulation in order to provide set rules for state lands and their relationships with and between federal and private interests; and

8) Education—policies for the education of miners on mining methods and the conduct of mining operations and for the public as to mining problems and potentials, need to be set forth and carried through at the program level.

ANALYSIS AND DISCUSSION:

Various opinions exist on the economic viability of Alaska's coal and hard minerals. Nevertheless, it is clear that extensive mineral resources exist within the state, and that potentially, their development can have a major impact on the state. Currently, mining and exploration for hard minerals in Alaska is about a $100,000,000 industry. Industry projections exist for a $1,000,000,000 industry by 1990, exclusive of coal, which in itself has potential for hundreds of millions of dollars annually by the same date.

At present, though hard mineral development lags behind fisheries and petroleum, it may be very important for operations in the state. It is estimated that there are about 300 small mining operations in the state. The exact number and potential worth of these operations, particularly in local economic and environmental terms, requires research and assessment.

Current research efforts do not adequately address the diverse geologic nature of the state in any detailed fashion, nor are relationships with developmental management programs, particularly those involving water and downstream effects, being adequately analyzed.

The following discussion focuses on particular priority concerns:

1. Geologic Mapping

Detailed geologic mapping (at scale of 1" = 1 mile or less) has benefits in both hard and soft minerals, both at the site of the geologic map and, for fuel minerals, in adjacent nonexposed lowlands. The U.S. Congress and many state legislatures have, in general, opted for purported resource evaluation programs with more immediate glamour than geologic mapping per se. One state, Kentucky, was, however, mapped geologically at 1" = 2000' by a massive USGS/Kentucky cooperative program; the direct and indirect benefits of the state from this program are sufficient to provide the value of such mapping if carried out here in Alaska.

The needs of the state for both reconnaissance mapping, as done by the USGS, and more detailed mapping by the DGGS, are so great that both types of programs need to be expanded or worked on cooperatively so that a more realistic view of Alaska's geologic base will be apparent within the next few decades. From a cost/benefit point of view, geologic mapping is of positive value. Direct and in-depth legislative hearings on this subject are recommended strongly.

2. Placer Mining (Mineral Management and Environmental Research)

The immediate placer mining season is perceived to be one in which management of mining will be strained by a influx of new miners, and one in which there may be unnecessary local environmental damage which, in turn, could lead to legislative and regulatory actions going well beyond the actual scope of the problem.

An immediate need is evident for researching new miners to give preliminary information on permits required, the necessity of evaluating a prospect prior to starting to mine, good mining practices, and pollution and reclamation plans.

Placer mining has been ongoing in some of the same areas of Alaska for several generations, establishing a history of water use, soil disturbance, and growth cycles. No comprehensive study has ever been conducted on the effects of miing activities upon Alaska's particular environments. Because of complex effects on mining on waters, vegetation, and animal life, historical study plays an important role in identifying factors which are difficult to quantify experimentally.

3. Placer Mining (Education)

Essentially no information center is available for miners to learn mining and recovery methods, or to learn about legal requirements for mining in Alaska. Water pollution control, waste disposal, and reclamation information and assistance must be made available to miners at all stages of mining. Safety permits, property evaluation, and more efficient recovery methods are also areas of need for miners.

Furthermore, an antipathy between miners and bureaucrats has been heightened in recent years by new laws and land withdrawals. An impossible gap between the regulatory bureaucracy and the small miner is being established, and demonstrates a need for an informational and assistance program outside of a regulatory agency. The framework and legislative mandate for such work is contained in the MIRL of the University of Alaska, Fairbanks.

4. Water Rights and Management

Critical issues, which will affect the future development of a minerals industry in Alaska, concern water rights and management. There has been little case law on water rights in Alaska, although litigation will increase as conflicts arise regarding federal, state, Native, and private water rights. Water rights litigation involving the Native village of Paugvik will set some additional rules for water appropriation in Alaska and the relationship of the Alaska Native Claims Settlement Act and the state water appropriate code. The Department of Law is undertaking some research into federal/state conflicts with respect to water. Also, the federal government is in the process of quantifying federal reserve water, both reserve water required for federal purposes and water required in connection with its trust responsibilities toward Native peoples.

The unresolved nature of most water management issues, suggests the necessity of monitoring the complex development of water law in Alaska as it particularly affects mineral development.

PRIORITIES AND RECOMMENDATIONS:

1. Expand the State's Geological Mapping Program

The single most valuable research and land planning tool would be detailed geological mapping at a scale of 1" = 1 mile. Such mapping would provide basic geologic information necessary for state land classification and would stimulate private exploration and development.

Specific Recommendations:

The proposed programs of the DGGS for detailed geological mapping of the following areas should be approved:

1. McGrath/Lime Hills
2. North flank of the Chugach Range
3. Brooks Range
4. Lake Clark area
5. Southeast Susitna Basin

In addition, the DGGS should intitate an even more detailed mapping program in cooperation with the U.S. Geological Survey, similar to the ten-year cooperative program for mapping in Kentucky, at a scale of 1" = 2000'. Appropriation of funds by the Alaska legislature for such a program could well demonstrate to the federal government a positive attitude on the question of resource research expenditure. The Council highly recommends hearings on this subject.

2. Detailed Mapping of the Fairbanks Mining District

There is an immediate need in the Fairbanks area for highly specific mineral information for land purposes. This area has 1:24,000 base topographic map (1" = 2000'). Detailed geologic mapping at the same scale would provide the necessary input to study the feasibility of an ore-processing plant in the Interior.

Specific Recommendations:

The Committee believes that the budget proposal of the Fairbanks North Star Borough's Program for Progress relative to ore processing should be evaluated. Either under this program or under a similar one, the DGGS should be given the funding for a detailed mapping program in the Fairbanks mining district.

3. Map Coal Resources Available for Village Use

A coal mapping program in and near villages would provide the necessary information to evaluate coal as an alternative energy source for local needs.

Specific Recommendations:

An additional appropriation of $200,000 should be made to the DGGS for field investigations and mapping of Alaskan coals surrounding villages. The DGGS should also be asked for priority recommendations pertaining to pilot development efforts.

4. Education of New Miners

Since this coming spring, summer, and fall will see an influx of new miners, many of them inexperienced in mining, an educational program directed at informing miners of regulatory requirements and good mining practices is of immediate importance.

Specific Recommendations

A simple, attractive brochure should be devised to be distributed at various statewide check-in places where miners may be expected to inquire. The brochure should depict the problems encountered in starting to placer mine, possible solutions, permits needed, evaluation needs, mining methods, and pollution and reclamation practices. Because this medium must be as simple as possible in order to attract the attention of many interested in mining, it will only touch the surface of a longer educational process. The brochure should list places where further information may be collected and various bibliographic sourcres of reference.

It is suggested that $15,000 might be appropriated through the Alaska Council on Science and Technology to contract for professional production of this brochure.

5. Promotion of Good Mining Operations

A tremendous amount of expertise is held by long-time successful miners in Alaska. Distribution of such expertise should be a priority for the state in order to 1) educate the public on the individual ingenuity and ability essential to develop successful mine properties, and 2) share such expertise with less knowledgeable miners. This expertise will also enable miners to maximize mineral recovery.

Specific Recommendations:

It is suggested that funds in the amount of $50,000 should be appropriated through the Alaska Council on Science and Technology to contract for the production of a videotape focusing on how successful Alaskan miners have solved specific problems in evaluation, mining and recovery methods, and waste control.

Because of the variation in conditions faced by miners, such as frozen and thawed ground, negligible to thick overburden, and terrain types, the film should focus on representative geographic examples.

The film would have a two-fold purpose: educational for other miners, and information for the general public. The videotape approach will suit wide-scale distribution.

6. Mining Extension Service

A mining extension program, starting with a mining engineer, should be considered a high priority on a long-term basis for offering qualified assistance to miners in complying with environmental regulations—leading to better mining practices in the areas of water pollution control, waste control, and reclamation. The program would furnish information on mine safety, permits, property evaluation, and more efficient recovery. The extension agent would travel extensively to mine sites, and would also be in regular communication with the Division of Minerals and Energy Management (DMEM), the Alaska Department of Fish and Game (ADF&G), and DEC. Although the immediate concern is with placer mining, the extension program could also apply to hardrock and coal mining, especially by small operators in future years.

Specific Recommendations:

The mining extension program at the MIRL of the University of Alaska, Fairbanks, should be expanded. Intitially, a mining engineer should be added to the MIRL staff to serve as an extension agent.

Initial funds of:

Salary and Benefits	$ 50,000
Travel	25,000
Program	50,000
TOTAL	$125,000

are recommended for MIRL to initiate the first year's program.

7. Research on Effects of Placer Mining

Due to the complex effects of mining on waters, vegetation, and animal life, research in the area of mining-environmental relationships should receive high priority. Compilation of all data currently available, supplemented by further study in areas lacking information, and highlighted by case study of an area such as the Fairbanks region, with its mining history, would be valuable working took for future mining plans.

Specific Recommendations:

As data are still available on the Fairbanks area to quantitatively determine the changes effected by mining, it is suggested that the Fairbanks area could be used as the type example for a placer research program which would evaluate:

1. post-mining land uses, capability, and land value;

2. on-site and downstream effects of soil removal and redeposition; and

3. specific effects of mining on fish, birds, and mammals at and downstream from the mine site.

Funding of $100,000 should be allocated to DNR or to a University consortium and ADF&G working together for a one-year period to cover research and compilation by 1) aquatic and terrestrial biologists, 2) a hydrologist-soils scientist, and 3) a mining engineer. The work should be correlated with other site-specific studies.

8. Research Directed at Placer Mining Activities

Four areas of need have been identified as priorities in the area of active placer mining evaluation and research. These are:

1. techniques of evaluation of placer ground;

2. mining methods;

3. recovery methods;

4. reclamation and pollution problems and opportunities.

Applied research is needed on traditional methods of ore evaluation such as shaft sinking, as well as on the possibilities of the use of neutron activation analysis and large-scale rapid drill sampling using either in situ or through extractive methods to obtain samples.

Mining methods are essentially unchanged since the 1930's. In deep ground, drifting--not used extensively since the early 1900's--may have modern application. Older mining techniques, such as bucket line dredging, may be modified to make the discharge "better" in terms of both dredge pond retention and capability for revegetation and land reclamation.

Several improved recovery systems are available, but there is need to analyze the benefits of when to concentrate on higher recovery of fines or of by-product minerals. Research should focus on pragmatic systems which will allow increased recovery, but possibly use less water or permit discharge of cleaner water.

Pollution and reclamation problems and opportunities both need to be extensively researched. In some deposits, it appears that an attempt to return placers to alluvial valleys to original contour would have adverse consequences in regard to recolonization by fish, plants, and animals. Work is needed on physical and chemical means to economically reduce silt discharges.

Specific Recommendations:

It is recommended that the House and Senate Resource Committees consider appropriations of $100,000 for each of the four projects to be completed

within one year. Proposals would be requested for each area and contracted to the program best suited to carry out the intent of the priorities of the proposal. The Council could assist both the legislature and the administration, if requested, in the evaluation of these proposals.

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THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

ALASKAN ENERGY

Research Priorities and Recommendations

A Special Report

Based Upon the Results of the

Alaska Council on Science and Technology

Energy Committee Workshop

Held February 1980 in Anchorage, Alaska

March 1980

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ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

ALASKAN ENERGY: Research Priorities and Recommendations

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EXECUTIVE SUMMARY:

For the world as a whole, energy has suddenly become recognized as a key requirement for maintaining the economic welfare of nations and the quality of life of all people. For Alaskans, energy seems even more signficiant because the energy industry is the state's greatest source of income and it provides growing numbers of jobs for Alaska's work force. Furthermore, it is increasingly apparent that individual, community and regional lifestyles are seriously threatened unless Alaska can bolster energy self-reliance at the community and regional level. Although a great deal of general energy research is underway, thus far it has been of shotgun character. The state should target in on specific opportunities.

BACKGROUND AND STATUS OF CURRENT ACTIVITIES IN ALASKAN ENERGY RESEARCH:

Current energy research in Alaska is primarily devoted to assessment of energy sources, toward developing solutions to problems associated with the extraction of non-renewable resources, and toward Alaska-specific problems in utilizing renewable energy resources. These research activities, most of which are primarily funded by federal agencies, involve petroleum, coal, hydroelectric, geothermal, wind power and solar energy resources. The largest scientific program currently active in Alaska--the Outer Continental Shelf Environmental Assessment Program--deals specifically with the extraction of petroleum resources, chiefly from the offshore regions of the State. Other similar long-term environmental assessment programs are underway and, by necessity, will take some years to complete.

In addition to these research efforts, there are a number of active projects that involve research but which emphasize technological development and demonstration, public education, conservation and economic or societal aspects of Alaskan energy production and usage. Among such projects funded by the State are geothermal demonstrations at Pilgrim Hot Springs and Unalaska Island, and wind energy demonstrations at Nelson Lagoon, Kotzebue, Council, and Newhalen. Other projects funded include energy alternatives and conservation potential in the marine industries, the energy demand within Alaska, energy-intensive industrial development, solar energy resources and utilization potential, and wind power applications. Energy conservation projects include those involving waste heat and waste oil.

Worthy of note is the high interest among individual Alaskans in small-scale private development of, and even research into, energy alternatives. Support of these activities currently comes from both federal (Department of Energy) and state (the Northern Technology Grants Program administered by the Alaska Council on Science and Technology) sources.

Bearing upon Alaskan progress in energy resource development is the aggressive Canadian approach to development of energy in the Mackenzie Delta and arctic island regions, particularly the Canadian emphasis on maritime technologies that may affect the extent to which pipelines are used in the future, (i.e., ice-stressed oil and gas transport ships).

MAJOR ISSUES IN ALASKAN ENERGY RESEARCH:

- Alaska has a variety of potentially viable energy resources. A major issue surrounds the identification of these energy sources, how to gather the environmental and physical baseline data, and policy alternatives relevant to their development. Although an excellent data base has existed for years (i.e., hydro opportunity) and a great deal of work is generally underway, more attention needs to be directed to two areas of major potential: coal and large-scale geothermal energy sources.

- Serious economic problems exist for remote communities of Alaska needing energy to supply basic community needs. There is need for innovative pilot projects that will lead to feasible small-scale energy usage in communities remote from population centers or transportation corridors. Emphasis must be placed on economic justification and community acceptance and there must be adequate consideration of operating and maintenance burdens under conditions that exist in rural Alaska.

- Transmission of electrical power over long distances is costly in both energy and economic resources. Alaska can benefit from the development of improved power transmission systems that would provide a more reliable energy supply and more efficiently utilize available energy. In a northern environment particularly, the development of these technologies is worthy of high state priority.

A major problem that is particularly severe at high latitudes where there is large seasonal variability in energy supply and demand is how to store energy. There is need for the development of improved energy storage capability to utilize off-peak supply in small-scale systems as well as for better long-term storage technology applicable to northern use.

ANALYSIS AND DISCUSSION:

With its production and export of oil from the North Slope and Cook Inlet, Alaska has, in the last few years, become a major contributor to the energy needs of the nation. This role is likely to continue for several decades, with export of natural gas and development of other oil and gas fields.

A consequence of Alaskan petroleum production is the availability of petroleum products along the major transportation corridors at prices comparable to or lower than other West Coast locations. Nevertheless, the general increase in the cost of petroleum products, even where the supplies are plentiful, creates a favorable economic climate for the development of major alternative energy sources such as coal and hydro. Rapidly rising transportation and supply costs are creating economic hardships for families and communities in remote areas of Alaska; the disparity in energy costs between urban and rural locations continues to grow and require attention.

The needs of both urban and rural areas provide the incentive to conserve energy and to develop, especially in remote areas, alternative energy sources --coal, hydro, geothermal, wind power, etc. Secondly, there is strong reason to improve power transmission technology so that rural systems might be linked to larger systems to take advantage of demand average.

Since Alaska is now a major energy contributor to the nation and will likely increase that contribution in the coming years, we also have the opportunity to participate in the scientific and technical research related to energy production and delivery. We can enhance this opportunity by providing college training for technologists in energy fields, particularly in oil and gas technology. This training could likely be initiated with a cooperative program with the oil industry.

PRIORITIES AND RECOMMENDATIONS:

General Recommendations:

1. Coal: Alaska's major coal reserves and the distribution of these reserves over the state provide the opportunity for both large-scale and small-scale research and development. The Council believes great opportunity for research pay-off exists in coal development interests. Priorities in coal research are:

a. Assessment of available coal resources; particularly the assessment of deposits most valuable for local or regional consumption need to be examined in relationship to environmental and technological constraints;

b. Research on burning technology, pollution control, ash disposal, and coal quality with emphasis on small-scale usage application;

c. Existing programs for the orderly accumulation of environmental and physical data about prospective source sites need to be continued but on a long-range and maintained basis;

d. The establishment of a new, innovative and full-scale pilot project for the examination of coal extraction technologies, particularly those applicable to permafrost ground;

e. Research into the use of Alaskan coal to produce synthetic fuels such as syncrude; into gasification of coal and its use in producing hydrogen as an energy source; as well as related research into storage methods for these fuels.

Specific Recommendations:

f. It is recommended that in response to the need for expanded coal research in Alaska, there be established in Alaska a coal research laboratory under federal Public Law 95-87, which provides for the creation of thirteen such laboratories in the nation;

g. It is recommended that Alaska establish several pilot projects to advance the capability to utilize coal in small-scale applications, the projects to be selected in the areas of small-scale use technology, mining techniques in permafrost, assessment and environmental aspects of deposits for local consumption. Projects selected should include economic appraisal of reducing rural power costs. Initial funding required to select, plan and initiate pilot projects: $50,000 - $100,000.

2. Oil and Gas: As an owner of extensive oil and gas deposits and real property, Alaska has high motivation for giving priority to:

a. Research on secondary and tertiary recovery methods applicable to Alaskan oil fields; a cadre of research personnel on secondary and tertiary recovery methods is needed in Alaska and might be best achieved through a joint University-industry program;

b. Research on permafrost problems associated with the transport and delivery of petroleum and gas raw materials and products (i.e., particularly cold gas pipeline investigations);

3. Water: Alaska should give priority to research needed to develop small-scale hydro-electric projects. Applications of this kind are particularly desired since this renewable resource is available at many locations in the state and there already is a vast collection of necessary baseline data. Specific needs are for:

   a. The Alaska Power Authority to provide a listing of potential hydro-electric projects of potentially satisfactory cost effective ratio and where work over the past 30 years has already developed a data base for environmental assessment. This will provide a basis for accelerated project decisions.

   b. The identification and development of usages and technologies for low-head, high-volume (run of the river) sources, including under-ice technologies.

   c. An acceleration of analysis pertaining to economic hydropower projects, including studies of economies of scale and the optimization of small-scale systems and seasonal flow variations.

4. Geothermal Energy: As a follow-up to the currently active program to assess the low and moderate temperature geothermal energy resources of Alaska (hot springs), priority should go to site-specific geological and geophysical investigations that will define the extent of the selected reservoirs. There is also a need to further develop and test geothermal exploration techniques uniquely suited to the arctic and subarctic environment. However, the main promise of geothermal energy is in applications that take advantage of Alaska's high-grade level of tectonic activity to extract large amounts of highgrade energy from active volcanoes and buried plutons (igneous rock bodies derived from cooling magmas).

Specific Recommendations

   a. It is recommended that several pilot projects be funded by Alaska to investigate in detail and develop selected low-grade geothermal energy resources. These projects should utilize the capabilities of the Alaska Geological and Geophysical Surveys, the Alaska Division of Energy and Power Development, the University of Alaska, and other groups in cooperative activities. The activities should be directed to:

      - development and testing of geological and geophysical techniques.

- application of the resource to heating, gardening, and other local uses.

- development of usage technologies.

- economic appraisal and community acceptance.

b. It is recommended that Alaska initiate an active program in the technological frontier area of extraction of large amounts of energy from volcanic and deep hydrothermal sources. The first step should be to develop a scientific and logistic plan for a major initiative of several million dollars annually. For initial assessment and definition an appropriation of about $300,000 is desirable.

5. Windpower: Priority needs in developing windpower usage in Alaska do not require research per se:

a. Rather the task is to evaluate the application of on-shelf wind generators and systems for individual usages and to improve or develop wind energy systems with promise for community use. These applications can best be evaluated in pilot or test projects. Of additional concern beyond those of applicable technology are questions of social acceptance and attitudes which require examination and understanding.

b. Wind data for equipment and systems design and location is non-existent for many Alaskan communities. These data must be gathered if wind generation design and application is to proceed apace with technology. The most practical expansion of the state's wind data base is through the expansion of the number of meteorological observatory sites for rural airports and the people gathering this data. In addition, in communities without airports, (e.g. Western Alaska) or in areas where wind resources appear marginal, observation systems might utilize community buildings or schools.

6. Solar Energy: Solar energy is increasingly attractive for small-scale applications, e.g., residential, greenhouse, and powering of remotely situated instruments. This application of existing and new technology to the use of solar energy is satisfactorily fostered by existing state and federal small grants and similar programs. While maintaining those programs, priority should go to research that develops better energy storage technologies and into obtaining baseline data on solar radiation received at Alaskan sites.

7. Energy Distribution: Alaska's size and location at a high latitude present special problems to long-distance power transmission systems. Priority should be given to research on the use of

ground return and ground electrodes in the Alaskan environment where cold and frozen soils create extremely low conductivity in the earth medium. Similarly, priority should be given to research into ways to protect large-scale distribution systems from outages or damage created by the large magnetic disturbances inherent to Alaska's location at high geomagnetic latitude.

Another priority need is to improve long-distance power transmission through use of direct current or low-frequency alternating current technologies, including the technologies of DC to AC conversions, maintenance of phase stability, frequency conversions in multiterminal systems, and the evening out of supply and demand variations.

8. Energy Storage Systems: Alaska's climate and latitude combine to create an out-of-phase seasonal relationship between energy demand and several forms of energy supply. Hence, there is a special need in Alaska for research into Alaska-specific methods for long-term energy storage, the emphasis to be on small-scale systems since large-scale systems likely are not practical.

9. Energy Conservation and Other Research Needs: Since conservation is an extremely effective means to minimize energy costs and reliance upon distant energy sources, priority should be given to research and development activities that conserve energy. Examples are:

   - Utilization of biomass wastes for energy production.

   - Utilization of waste heat and waste fossil fuel products.

   - Energy-efficient residential and other building designs.

   - Production of methane from sewage and other wastes.

10. Advanced Training in Energy Technology: It is recommended that the University of Alaska give serious consideration to increasing programs that provide training for technologists in energy fields, particularly in oil and gas recovery technology. Industry involvement should be investigated.

CONTRIBUTORS:

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ABOUT THE COUNCIL:

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ACST
THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

ALASKAN SEISMOLOGY:

Research Priorities and Recommendations

A Summary Report

Based Upon the Results of the

ACST WORKSHOP ON ALASKAN SEISMOLOGY

Held September 1979 at Fairbanks, Alaska

February 1980

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

ALASKAN SEISMOLOGY: Research Priorities and Recommendations

* *

CONTENTS

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EXECUTIVE SUMMARY:

Geophysical hazards, particularly earthquakes and volcanoes, are a fact of Alaskan life. The effects can be minimized through better knowledge of the physical processes involved in producing these hazards, by learning how to predict their occurrences and developing planning and response policies.

The Working Group on Alaskan Seismology was convened in 1979 by the Alaska Council on Science and Technology. The membership is composed of persons actively involved in collecting data or performing research on Alaskan earthquakes and volcanoes and who have volunteered their time to the workshop effort. Recommendations from the workshop are directed to state and federal governments and to the scientific community.

BACKGROUND AND STATUS OF CURRENT ACTIVITIES IN SEISMOLOGY:

Despite Alaska being the most seismically active state in the nation, little research and collection of data was conducted in the state prior to the 1964 Good Friday earthquake. That earthquake and the development of the petroleum industry caused recognition of the need for extensive seismic investigation to evaluate the hazards of Alaskan earthquakes and to develop zoning and other hazard reduction activities.

Currently, approximately 200 seismic stations are operated in Alaska by approximately ten different federal agencies, universities and private organizations (USGS, NOAA, USAF, U of Alaska, U of Colorado, Columbia U., U of Texas, Alyeska, Exxon, Shell Oil). The existing stations are primarily located in coastal regions, particularly along the Gulf of Alaska. Recognizing a lack of coordination among these groups, the Alaska Council on Science and Technology, in 1979, assisted in organizing a "Working Group on Alaskan Seismology" composed of scientists actively pursuing seismic investigation in the state.

To date, there is no systematic reduction and archiving of the data being collected by the various organizations. One step in this direction--the compilation of a quarterly bulletin listing all earthquakes located by the several networks operated by the University of Alaska and incorporating data from other networks--was successfully conducted for one and one-half years and then abandoned in early 1979 because of lack of funds.

Despite such weaknesses in the overall program, significant advances are being made in identifying the levels of seismicity and the degree of seismic hazard in the Gulf of Alaska region in consequence of the strong effort being supported by NOAA through the Outer Continental Shelf Environmental Assessment Program (OCSEAP). But, at the same time, there is almost a total lack of effort in such critically important areas as the route of the proposed gas pipeline were it runs along the Alaska Highway between Delta and the Canadian Border. Nor is there yet any detailed seismic monitoring being done in the area of the proposed Susitna dams.

MAJOR ISSUES IN SEISMOLOGICAL RESEARCH:

- The primary determinant of seismic activity in the southern half of Alaska and the Aleutians is the northeasterly motion of the North Pacific tectonic plate at the rate of about 2-3 inches per year. Rubbing past the fixed coastal region of Southeast Alaska, the plate accumulates strain in the rocks there and generates very large strike-slip earthquakes such as those near Yakutat in 1899 and at Lituya Bay in 1958. The plate subducts beneath southern Alaska and the Aleutians and in the process creates large thrust earthquakes like the 1964 Good Friday earthquake and those along the Aleutians that have struck this region frequently, often causing large tsunamis that have devastated coastal areas of Hawaii. A major issue in Alaskan seismology is to gain a better understanding of this large earthquake system and the hazard it creates for economic development and the people in southern Alaska.

- Another major issue is to gain a better understanding of the immediate cause and cycling of activity of the many Alaskan volcanoes that also are generated by the subducting North Pacific plate and which contribute a major geophysical hazard, the predictability of which may be partly related to earthquake activity. Current methods of short-term prediction do rely upon seismic monitoring of the volcanoes.

- There is need to learn the source mechanisms, expected sizes and recurrence rates of earthquakes in the active seismic zone which extends northward from Cook Inlet up along the railbelt and population axis of Alaska to the Fairbanks area.

- Yet another major need is to learn the cause and the characteristics of the surprisingly active seismic areas in the vicinity of the Seward Peninsula, to identify the active faults that create this activity and the hazard they create for petroleum and other development in this region.

- o There is need to develop better models of the propagation velocities of seismic waves throughout Alaska and the attenuation of these waves as they traverse the various parts of the state.

- o Since local soil conditions are a major influence upon the hazards of earthquakes (as Anchorage discovered in 1964), there is need to perform extensive mapping of near-surface materials and to better learn their response to seismic waves, especially in regions of discontinuous permafrost.

- o There is need to develop an effective distribution and operation of seismic stations throughout Alaska to meet economically the current and future needs of the state and to develop standardized methods of data processing and standardized catalogs of earthquake data.

ANALYSIS AND DISCUSSION:

Seismology is an important area of science for Alaska because of the major influence of tectonic activity upon the structure of the state and the geophysical hazard earthquakes created for Alaska's people and future development. Unfortunately, continuous monitoring over periods of many years is required to evaluate earthquake risk and to gain the fundamental knowledge needed to understand the underlying causes of Alaskan earthquakes.

The major NOAA/OCSEAP program in earthquake hazard evaluation is helping to build the data base around the margins of Alaska as are other significant monitoring programs conducted in southern Alaska by USGS and NOAA. These programs are a foundation upon which Alaska can assemble a cost-effective program to meet its needs in seismic safety, earth science and resource development activities.

The time is ripe for Alaska to establish a state policy in earthquake hazard reduction. That policy might well borrow from current federal efforts to frontally attack earthquake hazards by: *

1. Developing feasible design and construction methods for areas of seismic risk, in order to make new and existing structures earthquake-resistant, giving priority to nuclear power generating plants, dams, hospitals, schools, public utilities, public safety structures, high occupancy buildings, and similar other occupancies.

2. Implementing systems for predicting damaging earthquakes in all areas of moderate or high seismic risk.

3. Developing model safety codes in conjunction with state and local officials, and professional organizations.

4. Improving understanding of earthquakes, and of capability with respect to earthquake safety, disseminating earthquake warnings, organizing emergency services, and planning for reconstruction and redevelopment following earthquakes.

5. Educating the public, including state and local officials, on the significance of earthquakes and related seismic and geologic events.

6. Encouraging research on:
   a. Ways to increase the use of existing scientific and engineering knowledge.
   b. The social, economic, legal, and political consequences of earthquake prediction.
   c. Ways to improve the availability of earthquake insurance or some functional substitute.

* Items 1 to 6 constitute a direct quote of a statement of purpose of the Earthquake Hazard Reduction Act of 1977, PL 95-124 as given by Stanley Scott, Policies for seismic safety: elements of a state governmental program, Inst. of Governmental Studies, U of California, Berkeley, 1979.

PRIORITIES AND RECOMMENDATIONS:

1. Alaska State Policy For Seismic Risk: As the nation's most seismically active state, Alaska should give high priority to establishing a comprehensive state policy for seismic safety. The policy should involve codes and standards for the design and construction of buildings; means of dealing with critical facilities such as dams, hospitals and schools; planning, development and land-use control; emergency preparedness and post-disaster recovery; and seismic research needs.

   Specific Recommendation: Funds in the amount of $50,000 should be appropriated to the Research Fund of the Alaska Council on Science and Technology with the instruction that these funds be utilized to bring together representatives of state and federal agencies, and others from academic organizations, industry and public interest groups to evaluate Alaska's current stance toward seismic risk and what might be done to improve it, the results to be made available in a report prior to the next session of the Legislature.

2. Establishment of Statewide Seismic System: State and Federal priority should be given to establishing an integrated statewide system to collect, process and archive seismic data and which has the capability to provide a variety of data products to users in a timely manner. This system should be operated and financed jointly by the federal and state governments and should be developed around existing capabilities. Modern telecommunications and computers permit the conduct of data collection and analysis activities at separated locations, and this possibility should be considered.

Specific Recommendation: The Alaska Council on Science and Technology should take leadership in seeking to develop a state-federal partnership agreement to undertake jointly the establishment of a statewide seismic data collection and analysis system that utilizes modern seismic instruments, communications and computer techniques. The Council should seek to convene representatives of the federal Office of Science and Technology, USGS, NOAA, the ACST Working Group on Alaskan Seismology, the Alaska Division of Policy Development and Planning, the Alaska Division of Emergency Services, the Alaska Division of Geological and Geophysical Surveys, the Alaska Department of Transportation and Public Facilities, the University of Alaska and other organizations deemed necessary. As part of its effort, the Council should seek a statement of interest from the State of Alaska regarding its willingness to provide appropriate fiscal participation. An initial commitment by the State of $125,000 likely would create the statewide system.

3. Tectonic Study Corridors: Several panels of the National Academy of Sciences have recommended that certain corridors cutting across continental boundaries receive the focus of tectonic investigation. For the Alaskan continental margins three transects are recommended. First priority - the Fairweather corridor in the eastern Gulf of Alaska; Second priority - the Kodiak corridor in the western Gulf of Alaska; and Third priority - the Shumagin corridor in the eastern Aleutian island arc.

4. National Seismic Network: In the proposed National Digital Seismographic Network it is recommended that the following Alaskan sites be included: Shemya, Adak, Kodiak, Palmer, College and Sitka/Juneau.

5. Data Preservation: It is recommended that the National Geophysical and Solar-Terrestrial Data Center include Sitka in its project to microfilm all records from certain stations and also that the threshold for copying all available records be lowered to magnitude 5.5 for Alaska.

6. Catalog of Existing Alaskan Data: It is recommended that data for selected past earthquakes be processed to produce a uniform catalog of Alaskan earthquakes and that continuing funding be made available to develop and continue the catalog. The State of Alaska should consider an initial investment of $75,000, perhaps through the Research Fund of the Alaska Council on Science and Technology.

CONTRIBUTORS:

This special report is based upon the Report of the Workshop on Alaskan Seismology, September 1979, by John Davies, Co-chairman of the Working Group on Alaskan Seismology. Contributing members:

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ABOUT THE COUNCIL:

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ACST
THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

GRANTS FOR SCIENTIFIC RESEARCH IN ALASKA

INFORMATION AND GUIDELINES FOR APPLICANTS

September 1981 - June 1982

THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Christopher Noah, Executive Director · Pouch AV, Juneau, Alaska 99811

ABOUT THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY (ACST)

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Christopher Noah
Executive Director
Alaska Council on Science and Technology
Pouch CV
Juneau, Alaska 99811
(907) 465-3510

TYPES OF RESEARCH SUPPORTED

The ACST considers proposals for support of research in any field of science relevant to Alaska. However, funding available to date is limited so the chances of funding are best when an applicant proposes research in an area of science specified by the Council in its research needs reports (see attachment for research needs categories).

WHO MAY SUBMIT

Proposals normally are initiated by individual scientists or engineers interested in performing specific research or investigations. In most instances the proposal is submitted on the individual's behalf by an employing organization. Prior to formal submission, the proposal may be discussed with the Council or its staff, either by letter, telephone or in person.

Proposals may be submitted by colleges and universities, by non-profit, non-academic research institutions, by private profit organizations, by state or federal agencies, and by unaffiliated scientists.

Proposals should be submitted to the Alaska Council on Science and Technology, Pouch CV, Juneau, Alaska, 99811 (Telephone: 907-465-3510).

THE PROPOSAL

When proposals are submitted in response to funding opportunities announced by the Council, fifteen copies of each proposal should be submitted with at least one copy bearing the signature of the principal investigator and authorized representative(s) of the organization, if applicable.

An abstract of approximately 200 words describing the proposed research and suitable for publication is required. This should appear at the front of the proposal.

There is no set format for proposals, but each should provide a statement describing:

(1) the objectives and significance to the people of Alaska - indicating the magnitude of the problem and a statement of need;

(2) the methods to be employed and their suitability to the project;

(3) a plan of work;

(4) a statement indicating the guiding hypothesis and the potential result to be attained;

(5) the qualifications of the investigator and the grantee institution; (if consultants are to be used, they must be listed by name and a summary of their qualifations must be presented);

(6) a detailed budget which separately identifies salary costs, staff benefits, overhead, equipment, travel, materials and supplies, other direct costs (a budget sheet is attached to these guidelines is to be used when submitting a proposal); and

(7) desired effective date of grant and time period for which support is requested.

PROCESSING OF PROPOSALS

The Council has available as of August 24, 1981, the sum of $2,075,000. for research grants in appropriate fields of science and technology.

The process of proposal review and decision for this current period (September 1981 - June 1982) is as follows:

(1) The Council will maintain an open program of grant awards throughout the period, or until available funds are exhausted;

(2) All proposals in the Council offices as of the 15th of each month, commencing on September 15, 1981, will be assigned to panels or individuals for peer review;

(3) Within 30 days following such assignment, reviews will be completed and the advice of reviewees and staff recommending appropriation action on individual proposals forwarded to the Council for final award decision. These decisions will be made at regular Council meetings.

In the evaluation of each proposal, the Council normally will seek the assistance of scientists or engineers knowledgeable in the subject matter of the proposal. Depending upon circumstances, the Council may submit proposals to individuals for review or it may convene panels for the purpose of evaluating proposals. In special circumstances, other methods of evaluation may be utilized.

If a proposal results in a grant from the Council, the proposal becomes part of the record of the transaction and may be made available to the public upon request. If a proposer desires his or her unfunded proposal to be returned, a letter of request should accompany the proposal. To the fullest extent possible, confidentiality of the proposals will be maintained.

GRANT AWARDS

Notification of a grant award is by letter signed by the Council's Executive Director. The grant letter is addressed to the individual or the institution to which the grant is made.

The grant period begins on the date of the grant letter unless otherwise specified, and runs until the expiration date indicated in the grant letter. Expenditures incurred prior to the effective date of the grant may not be charged against the grant. Expenditures after the scheduled expiration date of the grant may be made only to honor commitments made prior to the expiration date. At the discretion of the Council, no-cost extensions will be granted.

Payment normally will be made in response to quarterly billings from the grantee. Ten percent of grant monies may be withheld pending the receipt of the final report.

GRANT REPORTING

The grantee is required to submit two final reports describing: (1) the results of the activities and expenditure of funds within 60 days of the expiration of the grant period; and (2) within six months of project completion a comprehensive final report delineating the findings, usefullness of the final product, and the knowledge gained for science and the state of Alaska. Formats

for this final substantive report will be made available to grantees at the time of the award. If the grant period exceeds six months, semi-annual reports not longer than a page and one-half will be required. On grants over $75,000, the ACST may require quarterly progress reports. Investigators must submit one reproducable copy of the final research report to ACST. ACST encourages publication of research results when appropriate. Presentation at the AAAS, annual Alaska Science Conference is also encouraged. Any publication or presentation based upon research activity supported by the Council should acknowledge that support. The Council welcomes suggestions from the proposer on the most appropriate means to make research results available to other researchers, policy makers and the public. All reports will be made available to the public on request. Renewal proposals to the extent they constitute a report of progress on an earlier grant likewise will be released. However, in recognition of the investigator's interest in being the first to publish the results of the research, the ACST may allow a reasonable period of time to permit publication, if specifically requested to do so, prior to public release. The ACST encourages the publication of research results in open scientific literature whenever appropriate and worthy. The ACST reserves the right to publish grantee research in a series of Council research publications.

The ACST would appreciate being informed of any results of unusual interest as soon as they are obtained.

Grants for support of data banks or the creation of computer software of wide usefulness are subject to conditions reserving to the ACST and to the general public certain rights of access to the data.

The right to use published materials resulting from the performance of work under the grant is retained by the State of Alaska for governmental purposes, unless otherwise agreed. Commercial publication or distribution of papers, monographs, proceedings, films or other works produced under ACST grants must be approved in advance by the ACST.

ADHERENCE TO ORIGINAL RESEARCH OBJECTIVES AND ORIGINAL BUDGET ESTIMATES

The principal investigator, operating within the established policies of the grantee institution, if any, should feel free to pursue interesting and important leads which may arise during the conduct of the research. The principal investigator may discontinue or modify unpromising lines of inquiry, without jeopardizing continuation of support for the remainder of the grant period. When it appears from a scientific standpoint that the inquiry as originally envisaged will no longer be fruitful or that a related line of inquiry will be more promising, the research may be modified. However, prior approval by the ACST must be obtained when such modification would result in a major deviation from original research objectives, or when research activities are to be undertaken which were specifically excluded from support at the time the award was negotiated. Without

prior approval from the Council, the principal investigator is free to reallocate funds from one budget category to another up to a limit of 15%, except to the salary or permanent equipment categories. Specific, written, prior approval by the ACST must be obtained prior to other reallocation of funds.

CHANGES IN PERSONNEL

The ACST should be informed of any changes in senior personnel where the period involved is 3 months or less. However, written ACST approval is required for any permanent change or for any temporary change in excess of 3 months; such as an investigator taking sabbatical leave. Further, when it appears the principal investigator(s) or other senior personnel will devote substantially less effort to the work than anticipated in the approved proposal, the ACST must be informed.

TRANSFER OF PRINCIPAL INVESTIGATOR

The ACST does not transfer grants from one institution to another. In the event that a principal investigator changes his or her organizational affiliation, a new proposal through the new institution may be initiated. The original grantee institution may terminate the grant, or when appropriate propose a substitute principal investigator to continue the research. The principal investigator and the appropriate representatives of the grantee institution or the new institution are encouraged to consult with the ACST if unusual problems are expected in providing for an orderly termination or continuation of the research.

EQUIPMENT

Title to equipment purchased or fabricated with grant funds will be vested in the grantee institution. In special situations, the ACST may reserve the right to require the grantee institution to transfer title to items of equipment costing $1,000 or more to a third party named by the ACST. The right may be exercised anytime prior to 4 months after the ACST has received a final fiscal report from the grantee institution following completion or termination of the project.

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

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University of Alaska

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Auke Bay Laboratory
U.S. Department of Commerce/NOAA

DETAILED BUDGET BREAKDOWN

A. Proposal Title:

B. Estimated Time of Project Personnel: Cost

1. Salaries and Wages

2. Staff Benefits

C. Travel: In-state:

Out-of-state:

Per-diem:

D. Materials and Supplies:

E. Equipment:

F. Other Direct Costs:

G. Indirect Costs (overhead, fees):

TOTAL:

Attachment A

August 31, 1981

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

Completed Research Needs Reports

Agriculture and Animal Husbandry

Rural Primary and Secondary Education

Alaskan Energy

Health and Human Life

Alaskan Minerals

Alaskan Natural Hazards (Including Alaskan Seismology)

Alaskan Transportation

Living Resources

Reports Underway

Basic Sciences

Communication and Information Transfer

Community Structure

Cultural/Lifestyle Relationships

THE ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY

ALASKAN COMMUNICATIONS AND INFORMATION TRANSFER

Research Priorities and Recommendations

A Report

Based Upon the Results of the

ACST Communications and Information Transfer

Committee Workshop

Held February 1980 in Anchorage, Alaska

Revised January, 1982

Christopher Noah, Executive Director - Pouch CV, Juneau, Alaska 99811 - (907) 465-3510

ALASKA COUNCIL ON SCIENCE AND TECHNOLOGY SPECIAL REPORT

ALASKAN COMMUNICATIONS AND INFORMATION TRANSFER: Research Priorities and Recommendations

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CONTENTS

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EXECUTIVE SUMMARY

Alaska has the need and the opportunity to develop a statewide telecommunication network serving both rural and urban areas of the state, one that can evolve as technology and demand change. Such a network interfaced with data processing systems, informational storage systems and instructional capabilities located around the state can create for Alaska vastly improved services that are more cost-effective than those in use today.

BACKGROUND AND STATUS OF RESEARCH

The Alaska-Siberia Telegraph project, and by virtue of it, Alaska's early role in international communications was terminated in 1866 by successful completion of the Atlantic telegraph cable. Not until Alaska's emergence as a strategic military location during World War II did communications again become a major issue in this region. Then recognition came of the special complications auroras and related geomagnetic disturbance phenomena presented for arctic and sub-arctic communications.

In response, Congress passed a bill in 1946 to establish the Geophysical Institute at the University of Alaska to research communications and related problems. Since then, steady progress has been made toward solving the technical problems of long-distance communication in Alaska, although the use of new radio frequencies and new space-age techniques have required ongoing fundamental research in the propagation of electromagnetic waves and in transmission technology. Much of current research involves the effect of the variable geophysical environment upon the ability of radio signals at different frequencies to carry information over satellite-ground station links.

Alaska's high-latitude location has made it impossible to use the ionospheric reflection of high-frequency radio waves for reliable long-distance communications, as was common at lower latitudes prior to the satellite era. Partly for that reason, and partly because Alaska's great geographic extent created special demands on communication capabilities, Alaska was quick to move into the application of satellite technology to the state's needs. In fact, the state has taken a leadership role, both politically and technically, in the innovative application of new technology to the needs of Alaskans throughout the state. Probably more so than in any other state, Alaska's elected officials and others in government have maintained awareness of and appreciation for the benefits of modern communications technology.

Compared to that of research and development in the technologic areas, the status in the non-technologic areas is far from satisfactory. In such areas, the definition of what the problems are can be as difficult as finding the best solutions. Research in these areas often must deal with combinations of economic, social, legal and psychological questions in situations where the technological and social climates are changing rapidly.

MAJOR ISSUES IN COMMUNICATION AND INFORMATION TRANSFER RESEARCH

- A leading issue in Alaska is how best to provide for the orderly development of the state's telecommunications network. It is certain that the demand for telecommunications capability will continue to grow. The desires for two-way voice and one- or two-way video communication capabilities are strong, and there is increasing demand for transmission of data, fueled in part by the wide assortment of telecommunications and data-processing devices available on the market.

- An important issue affecting all aspects of Alaskan communications and information transfer involves the unique physical and social environment surrounding all activities in this general field. Alaska is unique among the states in its combination of great size, its location in the disturbance-prone auroral region, its low population density, its cultural and social diversity, its current economic wealth, and its strategic economic and military location on the North Pacific Rim. At issue is the appropriate degree of federal responsibility for arriving at solutions to the Alaskan communications problems and the extent to which federal regulations should flex or otherwise accommodate solutions appropriate only for Alaska.

- A large proportion of Alaskan scientists, technologists and governmental decision-makers, regardless of their individual fields of speciality, recognize the need for more effective technology and information transfer as a major issue deserving greater attention. The problem is perceived as having many facets ranging from strictly technological aspects to how to better provide information to those who need it for making informed decisions.

- A never-ending but important issue is how to build and manage Alaskan data bases in a cost-effective manner that yet provides for useful integrations of data sets, eliminated duplication of effort, and allows easy access to users.

- As the Alaskan telecommunications capability rises, we become more able to utilize it for teleconferencing and instructional purposes. An issue of importance is how to foster through research and development the most effective ways to use this capability. At issue also is the psychological and social impact of increased telecommuncation use, especially on rural peoples.

ANALYSIS AND DISCUSSION

The issue of how Alaska can best develop its telecommuncations network is complicated by national developments over which Alaska has little or no control. Telecommuncations economics is a particularly troublesome area. Economic problems have manifested themselves most visibly in increased intrastate telephone rates that already are limiting innovative uses of telecommuncations in Alaska. Some change in the economic structure of telecommunications is inevitable, and it is clear that new arrangements will be needed to assure the economic viability of Alaskan telephone service. In particular, we need to examine economic problems peculiar to village telecommunications.

Telecommunciations technology has undergone great advances during the past decade. Many of the new developments are applicable nearly everywhere over the globe and, therefore, usable in Alaska, yet there remain some specifically Alaskan needs. These needs largely center around dealing with environmental contraints created by Alaska's far-north location and provision of low-cost technology for village use. Research and development to meet these needs likely will require funding from state sources.

The problem of identifying and setting priorities on research needs in the area of technology and information transfer is particularly thorny because of the diversity in the user audience. Technologies and informational products suited to technical workers may be unsatisfactory for non-technical persons. A further complication in the assessment of the utility, feasibility, and consequences of adopting a particular technology of informational procedure often must involve many considerations. These can include user availablity, user needs, user perceptions, identification and definition of the technology, delivery and maintenance support for the technology, cost-effectiveness, and analysis of the economic, social and environmental impacts.

Since Alaska is the subject of much research, there is considerable information available about a variety of topics. However, much of this information is available only to the individual or agency collecting the data and making the analysis. Printed materials produced by state agencies are required by statute to be deposited in the State Library, but even there large gaps exist, especially in consultant studies and surveys. Some information collection and dissemination is presently accomplished through such activities as the Current Research Profile for Alaska, an annual listing issued by the Arctic Environmental Information and Data Center; participation in the Washington Library Network computer bibliographic center by several major Alaskan libraries; and data management activities by various agencies such as the Alaska Department of Natural Resources and the U. S. Bureau of Land Management.

Historically, the initial step in solving information problems has been to collect data on a piecemeal basis without thought to multiple uses, external access, or delivery to others in forms or formats different from those used by the collecting agency. As an information need occurs in a specific area, a system is established to handle it but with little regard for other applications of the same data. This results in desparate and virtually unlinked sets of information resources that are underutilized for decision-making and planning purposes. Steps that can be taken to improve the situation include:

- Development and use of compatible formats for data prior to integration;
- Development and use of machine-readable presentations;
- Use of accessing terms (e.g., those used in the Washington Library Network authority files) that foster logical growth and multidisciplinary use; and
- Adoption of geographical location entries with sufficient accuracy to computer draw maps of many different scales.

During the 1970's the hopes of Alaska's educators for instructional telecommunications capability were raised exponentially by a series of experiments that showed conclusively that technology was no longer a barrier to the delivery of a wide range of educational services. The time has come when these hopes must be realized by operational systems which are an integral component of the educational delivery system and not an exotic add-on. In effect, we must now bring into one network at the local, state, national and international levels the whole range of audio/visual materials that are in common use in the classroom. Through such networks the abilities of each individual teacher or student working independently can be expanded to whatever level is necessary to achieve the desired education goal.

PRIORITIES AND RECOMMENDATIONS

1. Research on Development of a Statewide Telecommunications Network: Alaska should give top priority to researach oriented toward the orderly development of a statewide telecommuncations network. Research and assessment efforts needed to permit this development include:

   - Formulation of a full range of technological and organizational options for the network;
   - Estimation of economic benefit associated with various telecomunications capabilities; and
   - Evaluation of the probable effects of regulation, competition and subsidy upon the development and economic viability of a statewide network.

2. Telecommunications Technology: Specific research and development needs in Alaskan telecommunications technology are:

   - Development of satellite technology that employs high effective radiated power and, therefore, requires only small, low-cost ground facilities;
   - Development of low-cost, application oriented ground equipment for use be telecommuncations consumers;
   - Development of a small, low-cost telephone office suitable for use in a village, or development of an alternative to a central office for providing service to a number of telephones in a village;
   - Research to determine the best way to bury telephone cable in permafrost locations;
   - Research to determine the effect of rain attenuation on satellite earth stations operating in Alaska that use the 14/12 and 30/20 GHz up/down links;
   - Investigation and demonstration of packet broadcasting in Alaska;
   - Demonstration and evaluation of reliability and economic feasibility of meteor burst communications;
   - Development of a "source book" for Alaska telecommuncations; and
   - Development of design handbook for television earth stations that only receive.

3. Information and Technology Transfer: There needs to be a reasonable on-going level of research directed toward monitoring and evaluation of available technologies and of the informational and technological needs and desires of Alaskans, both rural and urban.

One aim is to provide insight into the educational, social and cultural impacts of the growing availablity of new technologies and informational services, the help guide decisions on future developments.

4. Data Management: Rapidly improving computer and related technologies are permitting the accumulation of large amounts of data on Alaska -- especially on its natural and human resources. Ongoing research is needed on the best means to build, maintain and access data banks. First priority should go to an evaluation of existing data collections, the evaluation to include user identification and need, physical location and format of data, accessing and processing methods, and attendant costs.

5. Educational Applications of Telecommunications and Computers: In Alaska, we now have networks for instructional video, computer-assisted instruction, and teleconferencing. Plans are under way for the expansion of those networks to a statewide capability in which each educational administrative unit in the state will be able to take part and in which each unit will have systems that are integral to its own local needs. To proceed beyond the present level of planning, research is needed into the best ways to use the available networks in such areas as cross-cultural education and Arctic and Alaska-related science disciplines. Second in priority is research into how best to incorporate into Alaskan use the wide body of general instructional material available to others elsewhere.

CONTRIBUTORS

This report is based on the deliberations of the ACST Committee on Alaskan Communications and Information Transfer held in February 1980 in Anchorage, Alaska chaired by Alex Hills. Contributing members represent academic institutions as well as federal and state agencies possessing appropriate expertise.

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ABOUT THE COUNCIL

The Alaska Council on Science and Technology reports annually to the Governor and the Legislature on research activities funded by the state and recommends research and funding priorities. Although the Council does not perform research, it is charged with helping to coordinate research activities and to enhance standards of research. Non-partisan advisory services to assist planning at both state and local levels are provided by the Council; for this and other purposes the Council convenes committees, task forces and conferences as the need arises. Utilizing funds appropriated to the Council's Account for Scientific and Technologic Research, the Council administers the Northern Technology Grants Program to foster Alaskan innovation. From the account it also administers a research program to fund projects based in part on reports such as this which are produced periodically. The Council also awards research grants and contracts for purposes specified by legislation and appropriating or assigning monies to the account.

February 14, 1983

TO: Sen. Vic Fischer, Chairman
Senate State Affairs Committee

FROM: Brian Rogers BR

RE: Alaska Council on Science and Technology

You requested that I look at the current situation of the Alaska Council on Science and Technology and provide you with a brief memo outlining possible courses of action. During the past few weeks I have discussed the role and future of ACST with Chris Noah (executive director), David Hickok (chairman), and T. Neil Davis (former chairman) of the Council and Pat O'Rourke, Chancellor of the University of Alaska-Fairbanks. I am also aware of discussions between ACST members, the University, and the Governor's Office of Strategic Planning in the Office of Management and Budget.

The ACST was created by the legislature in 1978 to advise the legislature and governor on Alaska science policy. It was attached to the Office of the Governor. Unfortunately Gov. Hammond made little use of the Council's expertise. In 1979, the northern technology small grants program was given to the Council by the legislature. By 1980, the Hammond administration decided by executive order to transfer the Council to the Dept. of Environmental Conservation. The legislature objected, and the Council was moved once again by executive order to the Department of Administration, for administrative purposes only. The FY 1982 capital budget contained $5 million (reduced by line item veto) to fund special research projects by the Council; in FY 83 another $500,000 was appropriated for such projects. The Council established a peer review process for these research projects which has won national acclaim; the legislative auditor has reportedly criticized the Council for funding too many research projects at the University of Alaska (audit report pending at this time). In the FY 84 operating budget, Gov. Sheffield deleted all funding for ACST and, until recently, did not respond to requests for a meeting with Council members. The Alaska scientific community has been concerned about the possible termination of ACST at the same time that legislation is pending in Congress to establish an Arctic Science Policy.

Indications are now that the Sheffield administration did not intend to abolish the Council with the cut in funding. A recent meeting in Juneau between Council members, Governor's staff (Allen Blume and Ben Harding) and Gordon Harrison (head of the Office of Strategic Planning within the Office of Management and Budget) helped alleviate some of the ACST concerns. The governor's people indicated that Governor Sheffield does intend to make use of the Council and is considering a move of the Council to OSP/OMB. Ironically, this would put the Council back where the legislature intended: assisting the Governor and legislature in planning policy. Still up in the air are questions of whether the Council will have its own staff (probably not as an independent office, but perhaps staff designated within OSP); the level of funding, if any, for the research grants program, and the relationship between the Council and the legislature (given the current relations between OMB and the legislature). Also not settled is whether a transfer would be accomplished by executive order or by legislation.

The Council is scheduled for sunset review this year. Given the fact that legislation will be necessary to continue the Council's existence, the State Affairs Committee may wish to explore possible statutory changes with the Governor for inclusion in the continuing legislation. Questions which could be addressed include:

- -placement of ACST in the Office of Strategic Planning, or movement to the University of Alaska
- -increasing the size of the Council (now 7 members; many recommend an expansion to 9 adding two non-state members)
- -establishing a "task force" approach to scientific problems identified by the Council
- -giving statutory authorization and guidance for operation of the research grants program (mini-NSF?)
- -requiring the executive director be a scientist who can him/herself be the governor's science advisor when the entire Council is not available
- -establishing a mechanism for increased use of University research/academic faculty to meet state research needs identified by the Council
- -methods for addressing legislative needs for scientific and technological advice during sessions and through the interim
- -staff needs of the Council
- -the Council's role in development and execution of a national Arctic Science Policy

I would be glad to provide you with analysis of any of these or other questions as needed by the committee.

NOTE REGARDING THE FOLLOWING FRAME(S) ON MICROFILM:
COMPLETE DOCUMENT IS AVAILABLE IN ORIGINAL FILES.
TITLE PAGE ONLY HAS BEEN FILMED.

Alaska
Science Policy

Alaska Council on
Science and Technology
September, 1982