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Alaska State Legislature

SPECIAL COMMITTEE ON
THE ALASKA PERMANENT FUND
(907) 276-3433
528 W. 5TH, SUITE 270
ANCHORAGE, AK. 99501
[POUCH V, JUNEAU, AK. 99811]
(907) 465-3873

House of Representatives

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OBJECTIVES FOR THE CONTROL AND MANAGEMENT OF THE PERMANENT FUND

A common concern of many Alaskans after realizing the potential dollar magnitude of their Permanent Fund is who will control this wealth. The only other fund of similar or larger size in state government will be the general fund. As discussed earlier, all appropriations from the general fund are required by the constitution to be made subject to veto by the legislature. After appropriation by the legislature general fund money is, with a few exceptions, administered by some agency of the executive branch*

In regard to the Permanent Fund, the state constitution requires that the legislature determine what kind of investments are eligible for permanent fund money. The day to day management of the money may be, however, delegated to an agency in the executive branch (as it is presently) or to an organization or organizations located outside the legislative or executive branches.

There are two critical questions; First, how much control over policy should be delegated from the legislature to another agency or agencies. Secondly, to what extent will the managers in those agencies be accountable to the people of Alaska, either directly or through their elected officials, the governor and the legislators.

* The court system, the university of Alaska and Alaska Housing Finance Corporation are examples of these exceptions.

The permanent fund managers may make decisions, for example, as to whether to invest in a multi-million dollar hydroelectric project or to make a home loan to a particular individual. If the legislature were to simply direct the managing agency to deversifiy the Alaska economy by making sound investments in Alaska's renewable and non-renewable resources (this is one of the investment guidelines in HB 298) a great deal of discretion is left to the managing agency to decide not only what is a sound investment but what resources as well as individuals or corporations will receive financing.

Permanent Fund managers must be accountable to elected public officials and the public, but at the same time, an expressed desire to insulate the managers from political and special interest pressures. Current proposals call for appointment of managers by the governor (one adds confirmation by the legislature), with removal only for cause. The S.I.A.C. discusses the possibility of elected members, but a brief look at Alaska's highly centralized structure (with only the governor, legislature and lieutenant governor being elected) indicates why this probably would not be consistent with this policy in the state constitution.

It in order to shield the loan making process from "political INfluences" the fund is too insulated from policy directives of elective public officials, a large degree of both responsiveness and accountability to the public will be lost. "Politic" is not necessarily kept out of loan decisions by placing experts on a board which is not accountable to the executive or the legislature.

• The remedy may be, at least in part, to require understandable public notification of what type of loans qualify and how loans are applied for and granted, disclosure requirements for decision makers, public notice of loans or guarantees made, and regular auditing by reporting to the executive and legislative branches of government.

In contrast to the highly centralized and rather independent management structure proposed in HB 298, an alternative for consideration would be to allow the fund to continue to be invested by the State Department of Revenue in liquid and secure money market instruments in order to provide a capital pool which can be allocated by the legislature for loans or loan guarantees to a number of financial intermediaries under this approach, for example, the development bank corporation proposed in HB 298 would not be the Permanent Fund but only one of the types of financial intermediaries which could be designated as elegible for permanent fund money.

The organization of the fund may profoundly affect how the fund performs but the organization should reflect and not determine the goals of the fund. Goals established today may not be that held by tomorrows' Alaskans. There must be built into any permanent fund structure the ability to protect the principal of the fund and the responsiveness to meet changing goals.

The State of Alaska may hold an estimated $8.6-billion in surplus revenues by 1985. Required shares of oil and other resource revenue accumulating in the state's new Permanent Fund is expected to reach as high as $7-million by 1985, while an additional $2.6-billion balance is projected to accumulate in the state's general fund.

The $8.6-billion assumes no new dramatic oil discoveries, or the leasing of potentially rich state owned offshore areas, such as the Beaufort Sea (adjacent to Prudhoe Bay).

Alaska faces difficult tasks in handling the growing excess revenues of the general fund in relationship to the state budget, and the growth of government, and also in setting up and managing the Alaska Permanent Fund.

However, it has now become obvious that the Permanent Fund is in itself one of Alaska's richest resources, and one which could have a strong relationship to future development in the state. It is further likely the Alaska Permanent Fund will accumulate so much capital that a significant portion of its investments must go outside the state for investment at "high but safe" returns, while the remainder will be made available through a variety of investment and consumer-loan programs within Alaska. However, serious philosophical issues will be generated around how the fund is developed, who controls the fund, how remote management should be from direct control of elected officials, and fund infringement into domains of banking.

THE ALASKA PERMANENT FUND IN PERSPECTIVE

Unlike many of his counterparts in other states, the Alaska policy maker has a distinct distaste for special funds in government. In 1955 the people of Alaska drafted a modern and highly streamlined state constitution, and one of its hallmarks was a prohibition against dedicated revenues. The new constitution created a highly centralized general fund concept, into which all revenues would flow, and out of which all expenditures would be budgeted. However, the prohibition excluded not only troublesome dedicated funds --funds where the revenue was tied to some particular spending function-- but also broadbased funds for the purpose of investing excess revenues.

The writers of the constitution did not anticipate the rose-colored world of excess revenues, and even after the entry into that charming world in 1969 Alaska policymakers were hesitant to tamper with the old prohibition for fear of creating a hazy and undisciplined line, one which would keep on moving, leading them back into the world of dedicated funds.

In 1976 a constitutional amendment modified the constitutional prohibition to allow a broadbased fund to accumulate (a minimum) of 25% of all incoming oil and other resource revenue from royalties, fees, land rents, and other bonus payments.

The only restriction on the permanent fund was that monies not be spent on the general operations of government. The funds only dedication was to maintain its principal and produce some income. The broadness of the amendment was also linked to another Alaskan "quality" --one of being double cautious not to "practice general law in the constitution."

In enacting the amendment it appears lawmakers did not see the fund as simply a savings account, nor did they see it as a super-development bank. At the point of initiation many lawmakers viewed the constitutional amendment, and the fund, as first simply a means of excluding a certain percentage of excess revenue from the province of normal operational state spending. The alternative structure created was left to the future as to apportionment of concept of the fund between trust fund, development bank, and source of small consumer loans for individual Alaskans.

BEGINNING WORK ON THE PERMANENT FUND

The legislature and executive are now just beginning the task of filling-in where the constitutional amendment left off. The amendment is intentionally broad, including almost anything that preserves the principal and earns some return.

The refined concepts of the permanant fund were left to "general law," and also intentionally subject to the revisions of future legislatures.

The 1977 legislative session will see a number of permanent fund bills introduced, and these bills will frame some of the permanent fund issues. However, action on the permanent fund will be delayed until the 1978 session, with the permanent fund becoming the subject of a complex hearing and public seminar program during the legislative interim. Portions of the interim effort may be on a cooperative effort between the legislative and executive branches (the seminars ??), despite partisan differences. It is also likely that hearings will use complex TV-coverage via-satellite, with two-way communication for citizen participation from even remote locations.

Additionally, the legislature may approve a number of television public affairs productions, along the lines of "60-minutes" in order to project some of the conceptal issues to the public prior to hearings.

LEGISLATION GOES INTO THE HOPPER

Some of the emerging issues surrounding the permanent fund might best be discussed by discussing one of the legislative proposals. On March 3rd, Governor Jay Hammond intorduced HB-298 " . . . relating to management of the Alaska Permanent Fund . . . ." On the same day the House Special Committee introduced HB-300 providing for the same, and being very close to the concepts of HB-298 except for asserting legislative perogatives in fund management.

The governor's bill was the work of the State Investment Advisory Committee, and consulting work of Price Waterhouse & Company (Washington D.C.), and White, Weld & Company, of New York. A great deal of the consulting work appeared to revolve around the "development bank" concept, and the method of operation of other principal funds in the world --ranging from the World Bank to the Alberta Cultural Hertitage Fund.

A "SUPER BANK" IN OVERALL FORM

The governor's HB-298 casts the permanent fund in the form of a "super bank" with a great deal of autonomy from the operations of the governor and the legislature.

The legislation creates an ALASKA PERMANENT FUND CORPORATION, a public corporation of the state, and while the corporation would be

be lodged within the State Department of Revenue, it would have an independent legal existance ot its own. The serpateness tends to follow the World Bank pattern, providing an insulaticn from the political structure insuring loans will be based on sound economic criteria, even though social and many geographic-political factors will be weighed. In contrast the Alberta Fund is operated in a conventional government manner by their equivilant of our Department of Revenue.

The new legislation provides for 50% of all mineral lease rental income, royalty income, and bonus payments go into the permanent fund, an increase of 25% over the base 25% required by the constitutional amendment. It should be noted SB-300, the legislative version of the permanent fund, would provide that 100% of all bonus payments go into the fund. Additionally, it should be noted that oil and gas (and mineral) severance taxes "do-not" go to the permanent fund, but rather to the general fund. Further, due to the wording of the constitutional amendment, and the legislative history of the resolution, it is doubtful if severance taxes can constitutionally ever be put into the fund.

The constitutional resolution was specifically amended in the senate to exclude severance taxes, creating a definitive negative history that the legislature meant to exclude severance taxes, and other taxes, leaving the legislation only the future option of putting non-tax income in the fund. The action was an example of Alaska's caution in dedicating funds, with the lawmakers wishing to be sure a future legislature could not get "carried away" and catch the state in the mire of dedication of revenue.

SUPERBANK PURPOSE --FUDGING TOWARD FLEXIBILITY

While the current legislative forms of proposed management for the permanent fund are cast in the overall mold of "superbank," the goals and purposes fudge considerably towards and mix of "trust for the future" and current consumer benefits.

The purposes clauses of the legislation tends to shy away from any one concept, such as trust, development bank, or consumer bank. The bill's preamble reads: "The purpose . . . is to provide a means of conserving revenues from mineral resources . . . to the benefit of present and future generations of Alaskans. The revenues . . . shall be invested in income earning investments which will provide further benefits to the present and future generations of Alaskans.

The preamble further speaks to the diversification of the Alaskan economy by investments in renewable and non-renewable resources, smoothing cyclical patterns of growth in the Alaskan economy, encouraging participation of private capital, promoting . . . capital for community purposes, and supplementing private investment.

It appears that the State Investment Advisory Committee considered the more definitive possibilities of trust or development bank, and specifically opted to soften the declared purpose of the fund. Alaska is unique in relationship to its proposed permanent fund, because while Alaskans perhaps want a measure of control over their economic destiny --want a measure of development-- they are aware that the great asset of Alaska may be its small population divided into a high margin of excess wealth.

COMPROMISE TRUST/DEVELOPMENT BANK/CONSUMER BANK

The administration and legislative bills both option for a split concept in the permanent fund, probably representative of the multi-faceted view which most originating lawmakers and the public have of the permanent fund.

The legislation provides the fund "must" invest 40-per cent of the permanent fund in investment grade securities, a bone for the trust fund or savings account principle, and insuring a maintenance of income for future generations of Alaskans. Since the interest from the fund goes into the general fund, or at least can or cannot go into the permanent fund at legislative option, the earnings of a steadily growing 40 per cent could stand to back-stop general Alaska government operations at some future point should the government find itself in revenue jeapordy from exhaustion of tax-paying natural resources.

Second, the proposed legislation provides that not more than 30 per cent of the fund should go to provide a reasonable proportion of longer-term investment capital for financing expansion of productive enterprises, for which capital on reasonable terms is not available --hence, 30% development bank.

Third, the fund may go not more than 30 per cent for investment capital needs of community investment projects of municipalities (utilities) and private dwellings --hence, 30% consumer bank. It should be noted that Alaska is already deep into other consumer loan programs, such as the nation's number one student loan program, an extremely broad vets loan program, a number of fisheries loan programs, and others.

TOWARDS A BANK --THE POWER TO "BARROW"

The apportionment of money perhaps allocated a disappointing 30 per cent to development bank operations of the fund, but the pending legislation also confers the power to raise capital and barrow against the assets of the permanent fund --the power to expand the capital base of the development bank portion of the fund. Hence, the fund twists back from pro-trust in the larger 40% allocation of money to pro-superbank, with the legislation likewise confering the power to grant debt guarantees, in addition to debt, in the case of the 30 per cent development bank portion of the fund.

THE STRUCTURE OF FUND MANAGEMENT

The overall policy board of the fund, called the PERMANENT FUND POLICY BOARD, would consist of the Commissioner's of Revenue and Commerce, and seven other members appointed by the governor. The seven gubenatorial appointments must be Alaska residents and not state employees. Terms would be four years and the issue of legislative confirmation remains a "difference" between the legislature and the executive. Further, members would only be removable for "cause," a familiar feature in boards and commissions of other states, but one foreign to the Alaska system where virtually all appointees serve at the pleasure of the governor. It is possible the policy board may end up serving "at the pleasure," based on the logic that lawmakers want responsibility firmly fixed on the governor, and that any "removal" from the policy board of a multi-billion dollar found would be bound to attract thorough press scrutiny. The chairman of the policy board would be the President (actual manager) of the corporation (although he would not be a voting member).

The policy board would be charged with the broad policies of investment, with selecting the INVESTMENT COMMITTEE (the next layer of management), relations with the legislature and public, reviewing investments and performance, and providing for reports and audits of the fund. The policy board would adopt a five year plan, revised annually, and do the sectorial analysis of the Alaskan economy in order to guide investments into areas of economic need.

Beneath the policy board would be the PERMANENT FUND INVESTMENT COMMITTEE, consisting of the President (also Chairman of the Policy Board), who is appointed by the policy board and would serve at its pleasure, and four other members serving at the pleasure of the policy board.

The investment committee has sole responsibility for all investments, with the concept being one of "seperation and balance" of powers, with the investment committee not interfering in the overall policy decisions, and leaving that body to handle external political and special interest pressures. In the same vein the policy committee may not interfer in the individual decisions of the investment committee on individual loans, with the principle being insulating that investment committee from the pressures fielded by the policy committee.

Under the two board system the President --the executive manager of the fund-- is the link between the policy board and the investment committee, with the President being non-voting chairman of the policy board and a voting chairman of the investment committee. The concept is also one of fixing responsibility on the executive president.

The two board system points towards a procedure where the investment Committee would receive detailed proposals, and the staff produce a detailed analysis and recommendation free from external pressure.

The superbank management operation would have a great deal of discretion beneath the broad guidelines of the policy board. The staff could probably exercise a great deal of judgement in terms of providing all of the debt on a project, participating together with private capital, obtaining an equity share, or perhaps working with equity in such a way as to support offerings of local securities, in providing guarantees of private capital, and with other authorizing legislation, perhaps participate in an arrangement where interest rates are subsidized (the interest subsidy coming from a legislative appropriation in order to maintain the integrity of the permanent fund).

It should be remembered that the fund probably will be able to: 1) barrow to expand its development bank capital, 2) sell its securities and debt to other mortgage markets to recoup base capital, and 3) make investments in financial intermediaries who may be better able to manage small investments deemed to be to small to be under direct supervision of the permanent fund investment corporation.

The legislation as presently written follows normal development bank philosophy in declaring that the state corporation would never seek to control or manage a venture, regardless of financial condition. However, it is likely through its position the state would probably be aware of trouble on an early basis, and be able to 1) insist on various kinds of audits, 2) offer technical assistance, and 3) insist on timely consulting assistance and consulting management.

CONFLICTS OF INTEREST AND BOARD MAKEUP

The sophisticated superbank structure makes interesting drawing on organizational charts, but poses some serious issues in a state as small as Alaska.

Obviously the control of a multi-billion dollar corporation offers a source of great power, and likewise attracts greed from a multitude of special interests One has only to look and see who sought to influence the State Investment Committee in their deliberations of the fund --the bankers.

The question will be posed in legislative scrutiny: "Where do we find people with knowledge and expertise to put on the policy board and investment committee who do not already have 'built-in' conflicts?" In larger states we might well find an abundance of people who have garnered excellent financial management experience, but long since departed those "special interest" institutions for academic life, or work in some large and more distant industry, where one might have reason to think the individual did not one day expect to return to their old occupation.

For example, one can expect the Alaska banker to have immediate conflicts over what are "reasonable terms" in the market, or a banker might not have an immediate interest in a project, but his rival is a participant in the package, or perhaps it might be the bankers "friendly rival." The potential for subtle bias on both the policy board and the investment committee is very high. Compouding the problem is the fact in the small Alaska structure it will be difficult to find knowledgable board members without conflicts, and that same smallness may dictate that bank-employees may have to be prohibited from serving.

Playing with the structure of the superbank is a fascinating mental exercise until the more human issue of "who serves and where do they come from" is considered. Its sort of like a government finding a good director of banking or an insurance commissioner, if they have expertise it is likely they came from banking or insurance, who they are supposed to turn around and regulate. On the flip side of that coin, with political appointments being a precarious occupation, those so chosen likely expect to one day go back to their respective profession. The conflict is one of general institutional bias of both past association and expected future association, all of which stands completely seperate from the problems of actual "hard" conflicts within the investment community.

It is possible that legislative interest could at first run strongly towards the superbank double-board structure, but at the end of the game the legislature throw-in the towel and simply opt for a permanent fund as a sub-unit of the Department of Revenue, or as a seperate agency.

We must remember that Alaska in general has a love affair with a tight and highly centralized executive, and a phobia generally running against independent boards, commissions, and executive officials. The concept is one of fixing all responsibility with the governor and providing no place for that executive to pass-the-buck. In Alaska the governor is not only the sole elected executive official, but with only a few rare exceptions he has "no" officials, boards, and commissions which do not serve at his "sole pleasure." The centralized system with maximum accountability on the governor has worked well in Alaska and breeches in the system are not easily made.

A PROBLEM OF PUBLIC ACCOUNTABILITY

Another problem in structuring the fund is the accountability of permanent fund managers and policy makers to public officials, and therefore the public. The inter-relation of insulation from poltical and special interest meddling versus the need for accountability to the Alaska public stockholder is a difficult one.

The governor's proposed HB-298 puts the board on a staggered term appointment by the governor, but with removal only for cause, while the legislative bill requires "legislative confirmation," with removal also only for cause. There is a special set of constitutional problems in Alaska surrounding confirmation, which will be discussed later. However, it appears the governor's bill probably does not satisfy the issue of public accountability, since the policy makers and managers once appointed would not be accountable to the legislature, and only to a limited extent to the executive.

Consultants to the State Investment Advisory Committee recommended an elected Permanent Fund Policy Board as their way of solving accountability, but providing insulation from the legislature and executive (directly accountable to the public). However, a brief look back at Alaska's highly centralized structure (with no other elected administration officials except Lt. Governor), gives indication why this recommendation was not considered and simply would not "fly" in Alaska.

The next step is therefore confirmation of the policy board, providing involvement in the appointive process of both legislature and executive, but again Alaska's tightly-wound constitution presents some unique problems.

The Alaska Constitution gra ‘s confirmation power to the legisla‘ure for Department heads and certain other enumerated instances, but for years it was felt the legislature could provide by statute further offices to be required for confirmation. A 1975 Alaska Supreme Court decision has given the narrower view, again in line with Alaska's highly centralized executive concept, and there is some doubt as to whether confirmation of policy board members could be required if the corporation is a sub-unit of the Department of Revenue.

It is possible the legislature could set the Alaska Permanent Fund up as an entity in itself, virtually a department with corporate status, and therefore require confirmation of the President, and possible the policy board. If the unit was set up under Section 26 of the constitution, which provides potential for exception from the straight-line executive accountability of the Alaska system (an appointive board with power of hire-and-fire over the departmental manager), then clearly the board would be available for legislative confirmation.

A third option which may be considered is to leave all policy board members serving at the pleasure of the governor, with or without the element of legislative confirmation. Such an option would make the governor publically accountable for their action in the Alaska tradition, with the protection of public questioning guarding against arbitrary removal of board members. In fact, in this day and age of public investigations, special prosecuters, public interest advocacy groups providing a special kind of public watchfulness, plus the scrutiny of the press, it is highly likely no other special protection and insulation for the fund policy board is needed.

THE WORLD OF THE PERMANENT FUND

All manners of potential can be dreamed up for the permanent fund, especially those portions assigned to a development bank concept or the so-called consumer bank.

First, a word about the consumer bank which will be discussed further in a forthcoming Alaska Series report on the history and evolution of the permanent fund (as a guide to understanding the fund in Alaska). The consumer bank is that portion of the fund which the individual Alaskan, the lone citizen, has some reason to think he might call on one day. Second, it is that portion of the fund which might participate in funding a community enterprise, perhaps some recreation function, or a unique utility, or some such entity with which the public might identify as a substantial permanent fund benefit reaching them "as a group."

The Alaska consumer bank has a history in the $900-million bonus money and a variety of legislation which followed setting up loan programs ranging from a extremely liberalized veterans home loan program, a student loan program among the most liberal in the United States, a number of fisheries vessel and enhancement loan programs, to a state Municipal Bond Bank, and others. Many of these programs utilized what was called "madatory purchase," a feature whereby the loaning program qualified and approved the loan, and the Department of Revenue was required to buy the loan with state excess revenues (revenues from the $900-million).

It is likely for practical and political reasons that the permanent fund will have to allow for a portion assigned to public community loans, and other consumer loans.

It is possible that the so-called consumer loans might be loaned to an intermediary better able to administer the smaller loans, or that an automatic purchase system be set-up with a certain percantage of the fund assigned for legislated loan programs.

In the category of development bank there appear to exist many potentials, and also many potentials for conflict. The fund can provide a valuable source of total capital, cooperating capital, equity capital, guarantees, and etc. However, how the fund operates will draw both the bouquets and brickbats of both business and banker.

How will the banker feel about equity and participating capital in projects by-passing their banks? How about potential competitors in a field in relationship to a project in which the fund is a participant. For example, Alaska was brewing no beer of its own, all was exported, but when Alaska tried to grant a tax exemption to a potential brewery, the state and the brewery were mired in litigation with competitors selling beer in Alaska for several years.

Obviously the banker and the managers of the permanent fund may differ greatly as to when private capital is, or is not, available, and whether terms are "reasonable."

The fund may provide a valuable source of participating capital for the Native Land Claims Corporations, especially the more viable Village Corporations who might find that the fund is a key source for expanding their capital to the point where the smaller village corporation is viable.

It would appear that the permanent fund will prove an invaluable tool in providing frontier capital in Alaska's sprawling rural areas, where there is an underdeveloped economy in the extreme. However, such zones also represent a risky area of investment, and poses a difficult conceptual point for fund policy concerning acceptable risk (and the rules of investment).

The native corporation became a source of capital for these same underdeveloped areas, but those corporations also have found: 1) they must balance their portfolio with viable urban investments, and 2) that regardless of available capital frontier enterprise in an almost economyless zone is extremely difficult. Simply adding an associated investor in the form of the fund will not change the fact that any business emerging in the high-cost rural zones of Alaska is going to be a high risk operation.

The fund policymakers will have to wrestle with difficult rules of investment, balancing such aspects as broad social, economic, and political profits, against higher risk and loss of profits and capital (on occasion), and perhaps to what degree the higher profit and more secure portion of the fund portfolio --in the trust sector or more profitable urban bank structure-- should be gaged to offset expected loss from the frontier areas.

Both bills as introduced into the legislature currently declare for applicability of prudent-person rule, which could pose difficulties as the fund is applied to frontier loans.

Nevertheless, despite problems of investment in Alaska sprawling rural areas, it is obvious that Alaska now possesses, in native corporation capital and the fund, two extremely valuable economic tools.

Ten years ago in Alaska there essentially were no economic tools, or real hope of development capital, for the underdeveloped rural areas of Alaska and the peoples who live there.

The permanent fund and native corporation also have interesting parallels. The native corporation is a private firm with a unique social base of stockholders. It is not only motivated for profits but also social profits (jobs, business, etc. in rural areas). The fund is government with a probable twist in management and structure towards the private. Government's usual goal is social, but in the case of the fund it takes on the usual private purpose of "profits." The two unique structures may make good partners and understand each other better than many observers think.

FUTURE PERMANENT FUND REPORTS

The permanent fund will become the subject of a regular and ongoing series of Alaska Series Reports. The Series will follow the fund during the legislative interim as special committee actions begin to mold the policy and philosophy of the permanent fund, and in the near future will issue two brief reports. One of those reports will simply provide historical background of the fund, such things as why Alaska avoided a fund in 1969 when it received the $900-million, and the gradual evolution to the present broadbased fund. The purpose of a report is simply to provide a source for observers to perhaps understand why Alaskans will shape the permanent fund in certain ways. The second report will simply make some comparisons of the Alaska Permanent Fund with other world monetary funds, and also deal with some financial projections dealing with the monetary potentials of the fund.

PERMANENT FUND QUESTIONNAIRE

INVESTMENT

The Permanent Fund belongs to you. What are your suggestions for the investment of the money? Would you please take the time to share your ideas with us by indicating your preferences for Permanent Fund investment proposals. For each proposal please answer the following questions. Feel free to suggest as many proposals as you think viable.

1. What investment proposal do you suggest for the Permanent Fund?

example - Invest in blue chip, preferred stocks.

2. What objectives are acheived by this proposal?

1-High return on investment 2-Flexible: funds can be shifted easily with the flow of the market 3-No growth impact on Alaska 4-Investment is secure

3. What objectives are avoided by this proposal?

1-Does not diversify Alaskan economy 2-Does not effect unemployment in Alaska 3-Does not effect consumer loans

4. What are external constraints of this proposal?

1-Government must be able to move quickly in the stock exchange
2-Initial investment is high and tied up for the duration of the investment

5. Which groups would benefit from this proposal?

1-Financeers - brokers 2-All Alaskans because of guaranteed earnings.

6. What groups would be likely to oppose this proposal?

1-People who want to develop Alaska fast 2-People who don't understand basic economics 3-People who are looking for a government dole through a subsidized loan.

PERMANENT FUND QUESTIONNAIRE

CONTROL

In addition to the investment of Permanent Fund monies a policy on the control of the Fund must also be established. What are your suggestions for who should manage the Fund? Would you please take the time to share your proposals with the committee and answer the following questions about your suggestion?

1. Proposal for control of the Permanent Fund.

example - Two-tiered board. Policy board appointed by Governor, confirmed by legislature for 3 year, rotating terms. Management board composed of financial consultants hired by policy board. They are monitored in relation to the achievement of goals established by the Policy Board. A five year investment plan must be presented to and adopted by the legislature. This plan is reviewed and updated annually.

2. What objectives are acheived by this proposal?

1-Maintains accountability through the annual adoption of the investment plan 2-Removes political tinkering through the use of professional financial staff.

3. What objectives are avoided by this proposal?

1-Does not directly involve the citizenry in investment decisions.
2-Does not give either the Governor or the legislature direct control over the investment decision.
3-Does not allow great flexibility in investment except annual updates of the plan.

4. What are the constraints of your proposal?

1-Policy Board could become too powerful if the legislature does not take the time to thoroughly review the investment plan.
2-The integrity of both Policy Board members and management board members must be unquestionable.

PERMANENT FUND — Tom Singer's questions

General

1. Do you believe that the government should use the permanent fund to actively intervene in the State's economy to pursue public policies?

   a. If yes, how:

      -market interest rate loans to any enterprise which can pay back the loan plus interest
      -market interest rate loans to only a certain set of enterprises chosen by state policy - makers
      -subsidized loans to chosen sectors to achieve clearly stated goals
      -state organizations to assist certain sectors, such as state marketing, organizing, or information efforts, or technical aid or research efforts, etc.
      -state owned and operated enterprises in chosen sectors

   b. If no, what should the state do with the permanent Fund?

      -put it in a savings account
      -invest it in securities
      -other

2. The permanent fund consists of two basic parts - principal and income. The principal is that sum which goes into the fund from oil revenues and is put to work (invested) to earn a return and perpetuate itself - i.e. it is permanent. The income is the return on those investments. Presently, the principle is expected to be _____ in 1977 and grow to _____ by 1985. Income from these funds, if invested at 8%, would be _____ in 1977 and _____ in 1985.

   Consideration of the usesof the fund should be broken down into uses appropriate for the principle and for the income.

   a. Regarding the principle, which alternative uses do you favor:

      -Investments which maximize income, yet are secure and relatively riskless
      -Investments which sacrifice some income in the pursuit of social objectives (e.g. subsidies to renewable resource industries, heavy industry, or consumers), yet are still relatively safe

   b. Regarding the income, which alternative uses do you favor:

      -Return it to the fund to earn money
      -Return it to the General Fund for the legislature to use to persue social objectives as it sees fit.
      -Have the legislature earmark it for existing and new state loan programs
      -Distribute it to Alaskans through an Alaska, Inc. type program
      -Some combination of the above

c. Regardless of whether the fund maximizes its return or is used to subsidize, are there areas of the state's economy you wish to see supported or discouraged through the permanent fund?

Heavy industry (coal development, aluminum refining, oil refining, petrochemicals, uranium refining, dams)

Light Industry (electronics,

Retail Trade (cooperatives,

Fishing

Timber

Hard - rock mining

Tourism

Agriculture

d. In the previous question, you expressed your preferences about various sectors of the Alaskan economy. For the sectors which you prefer, why do you prefer them? For the sectors you disfavor, why do you disfavor them?

	(write sector in column)	
	Prefer	Disfavor
Employment potential		
Personal income potential		
Growth-inducement potential		
Personal stakes		
Lifestyle implications		
Impact on recreation values		
Impact of environmental quality		
Impact on immigration		
Other		

e. In the previous Public Forum, renewable resources received considerable public support as an area for state intervention.

Alaska State Legislature

SPECIAL COMMITTEE ON
THE ALASKA PERMANENT FUND
907) 276-3433
528 W. 5TH, SUITE 270
ANCHORAGE, AK. 09501
[POUCH V JUNEAU, AK. 99811]
(907) 465-3873

MEMBERS
REP. CLARK GRUENING, CHMN.
REP. TERRY GARDINER, V. CHMN.
REP. E. J. HAUGEN
REP. RUSS MEEKINS
REP. BILL MILES
REP. LEO SCHAEFFER
REP. RICK URION

House of Representatives

July 15, 1977

THE ROLE OF THE PERMANENT FUND IN ALASKA'S FUTURE: A PRELIMINARY REPORT

Figures

I. Introduction

An overwhelming majority of Alaska voters approved an amendment to the state constitution last November which provides that at least 25 percent of certain state nonrenewable resource revenues be placed in a permanent fund. The amendment requires that the fund's "principal shall be used only for those income-producing investments" the legislature designates as eligible for permanent fund money. The amendment also provides that income from the investments will go into the State's General Fund (where all other revenues and taxes are deposited) unless the legislature designates that income for other purposes.

In 1978 the Tenth Alaska Legislature will consider several different proposals for management and organization of the fund and use of the fund's earnings. Three bills introduced in the last session were referred to the House Special Committee on the Alaska Permanent Fund. Our task is to find out what Alaskans want the fund to achieve and to recommend legislation for a permanent fund that can best attain those goals.

The intent of this report is to inform Alaskans about the Alaska Permanent Fund--how it evolved, present management, possible future roles, and investment and management options for its principal and earnings. This report also allows committee members to state what they feel are the main issues to be resolved in the permanent fund enabling legislation.

We hope that you will take the time to study this booklet, jot down your comments and questions as you read, and send us your views by filling out and mailing the postage-paid questionnaire on the last page. You may obtain further information about the Alaska Permanent Fund by calling or writing:

House Special Committee on the Alaska Permanent Fund
528 West 5th Avenue, Suite 270
Anchorage, Alaska 99501 Phone: (907) 276-3433

Above all, please watch for and participate in the public meetings and

forums on the Permanent Fund to be held throughout the state beginning in September. If we have your comments by then, we can incorporate your ideas in the Public Forum program. Legislators will attend each forum to discuss the Permanent Fund, answer your questions, and find out what you want your Permanent Fund to be.

II. Evolution of the Permanent Fund

The permanent fund idea in Alaska gained popularity only after the $900 million North Slope lease sale in 1969. Following this sale, the Brookings Institute conducted a series of seminars concerning "The Future of Alaska." More than 100 Alaskans were invited to attend, explore some of the major emerging policy issues, and set future goals and a practical policy plan for Alaska's future. The participants agreed that the "Alaska way of life" should be preserved. They defined this life-style as one which combines the conveniences of technological innovation with the opportunity and values of living as close to nature as possible.

After the Brookings seminars, several bills were introduced in the 1970 legislative session to establish some sort of "permanent fund" with the $900 million. However, other more immediate uses for the money were judged to be more important, and no permanent fund was established.

The 1974 legislature passed a bill creating the Alaska Renewable Resources Development Fund. This legislation provides that not less than five percent of nonrenewable resources income will be deposited in a separate fund beginning July 1, 1978. Monies can be appropriated from the fund only for capital and operating expenditures for the rehabilitation, enhancement, and development of renewable resources programs.

Another bill, which would have created a permanent fund by statute, passed the legislature in 1975. However, because of a disagreement with the legislature over constitutionality, the governor vetoed it. The 1976 legislature passed House Joint Resolution 39, calling for a constitutional amendment to establish the Alaska Permanent Fund. The voters approved that amendment in November 1976 by a margin of nearly nine to one.

The amendment lifted the prohibition against special dedicated funds to

allow a minimum of 25 percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue-sharing payments, and bonuses to accumulate in a special fund separate from the General Fund. The only restriction on the use of the principal of the fund is that it must be for "income-producing investments" and, therefore, not for the general operating costs of government. The income from these investments will be deposited in the State's General Fund unless otherwise provided for by law.

The Joint House Finance and Judiciary Committee Chairmen's Report, detailing legislative intent for HJR 39, stated that sufficient revenue would be accumulated in the Alaska Permanent Fund to allow diversification of Alaska's economy and to insure that future generations receive benefits from development of the State's nonrenewable resources. The report noted that the fund would be restricted to income-producing investments "which the legislature would establish and change from time to time to meet the needs of the state." Use of the fund's earnings was left open to the legislature "to give future legislatures the maximum flexibility in using fund earnings--ranging from adding to fund principal to paying out a dividend to resident Alaskans."

Understanding the difference between permanent fund principal and the income the investment of principal earns is important. The principal represents Alaska's mineral wealth transformed into dollars through the sale of natural resources to private developers. The House Committee on the Permanent Fund must decide what forms of wealth-preserving and income-producing assets this money should take. Our mineral sale revenues have recently been financing about 60 percent of state expenditures. When revenue from mineral sources begins to decline, part of the future role of the Permanent Fund may be to supplement the General Fund with earnings from fund investments or to help create a tax base to provide new state revenue sources.

Presently, the income earned by permanent fund investments can be channeled into any use the legislature designates. The committee, therefore, must also recommend where and how to use the fund's earnings which, unlike use of the principal, need not produce income.

The governor anticipated voter approval of the permanent fund amendment. In August 1976 he temporarily expanded the membership and duties of the State Investment Advisory Committee, which is charged by statute to advise the commissioner of revenue on investment policy for the State. He appointed additional members from the general public and the legislative and executive branches and directed the entire body to study and report on the estimated size, investment goals, management, organization, and public interest in the Permanent Fund.

The State Investment Advisory Committee conducted its deliberations with energy and diligence. Members conferred with consultants to produce a draft proposal for a permanent fund structure. To arrive at its findings, the State Investment Advisory Committee examined consultants' reports on many of the resource-based monetary funds and development banks throughout the world.

In March 1977, two bills were introduced in the State House to begin debate on the structure of the Permanent Fund. Both bills would strucutre the Permanent Fund essentially as a development bank; both propose a two-tiered management system, a policy board with overall policy-making power, and a committee under the policy board to approve investment proposals. Both bills also give the president of the fund's corporation strong executive power and sole responsibility for presenting investment proposals of at least 40 percent of the Permanent Fund in high-grade securities, up to 30 percent in Alaska development loans, and up to 30 percent in community projects and private dwellings.

The two bills differ in level of funding and provision for confirmation of policy board members. House Bill 298 calls for deposits of 50 percent of proceeds from bonuses, mi[illegible]al lease rentals, royalties, and federal mineral revenue-sharing payments, while House Bill 300 includes 100 percent of bonus payments and the same percentage from other sources. Except for the policy board appointment power of the goverror (which is subject to legislative confirmation only under the provisions of H.B. 300), either proposal would operate the fund rather independently from the executive and legislative branches of state government.

In 1977 the legislature passed an interim permanent fund management bill that will stay in effect until specific investment objectives and management structure have been thoroughly examined and agreed upon. It directs the commissioner of revenue to invest permanent fund money into various "money-market instruments," such as U.S. treasury notes, certificates of deposit, and high-grade securities (not stock), all of which are relatively liquid and secure. By July 1, 1977 more than $3.9 million had accrued to the Permanent Fund and been invested.

During the 1977 legislative session, the Speaker of the House and the President of the Senate appointed special committees to consider alternative proposals for the Permanent Fund during the legislative interim. The committees will gather and distribute information, listen to public opinion, seek expert advice, consider how the fund should be administered, establish major goals for the fund, and present their recommendations to the full legislature in January 1978. The committees will make major efforts in the areas of public education and participation to learn what Alaskans want their permanent fund to be. This booklet marks the beginning of this phase.

III. The Fund's Relationship to the Constitution and Other State Funds

Oil and minerals are a removable portion of Alaska's statehood entitlement to its citizens--past, present, and future. This nonrenewable wealth is now being extracted and transformed into another form of wealth--money. The decision to keep a portion of that wealth in a renewable status through dedication to the Permanent Fund provides an opportunity to protect that wealth from being spent and lost to future generations.

The form of the wealth is changing, yet the State still stands in the role of trustee, holding this resource wealth in trust for the benefit of the people of Alaska. Any objectives established for the Permanent Fund must be consistent with the same legislative obligations required for resource management. The legislature must decide into what income-producing assets permanent fund money should be placed. It is important to clearly define the obligations of the State before setting fund objectives.

The income earned from fund investments provides another source of wealth. Presently, a significant portion of state expenditures relies upon oil wealth. The legislature has already stated that one objective of the fund is to diversify the state economy. As oil wealth declines, the Permanent Fund may bear the responsibility of supplementing the General Fund through income from fund investment, creation of an expanded tax base, or some combination of the two.

The Permanent Fund is one of several tools policy makers can use to achieve public objectives. Each year the legislature appropriates money from the General Fund to finance state activities. As required by the constitution, the General Fund is the sole repository (with the exceptions of

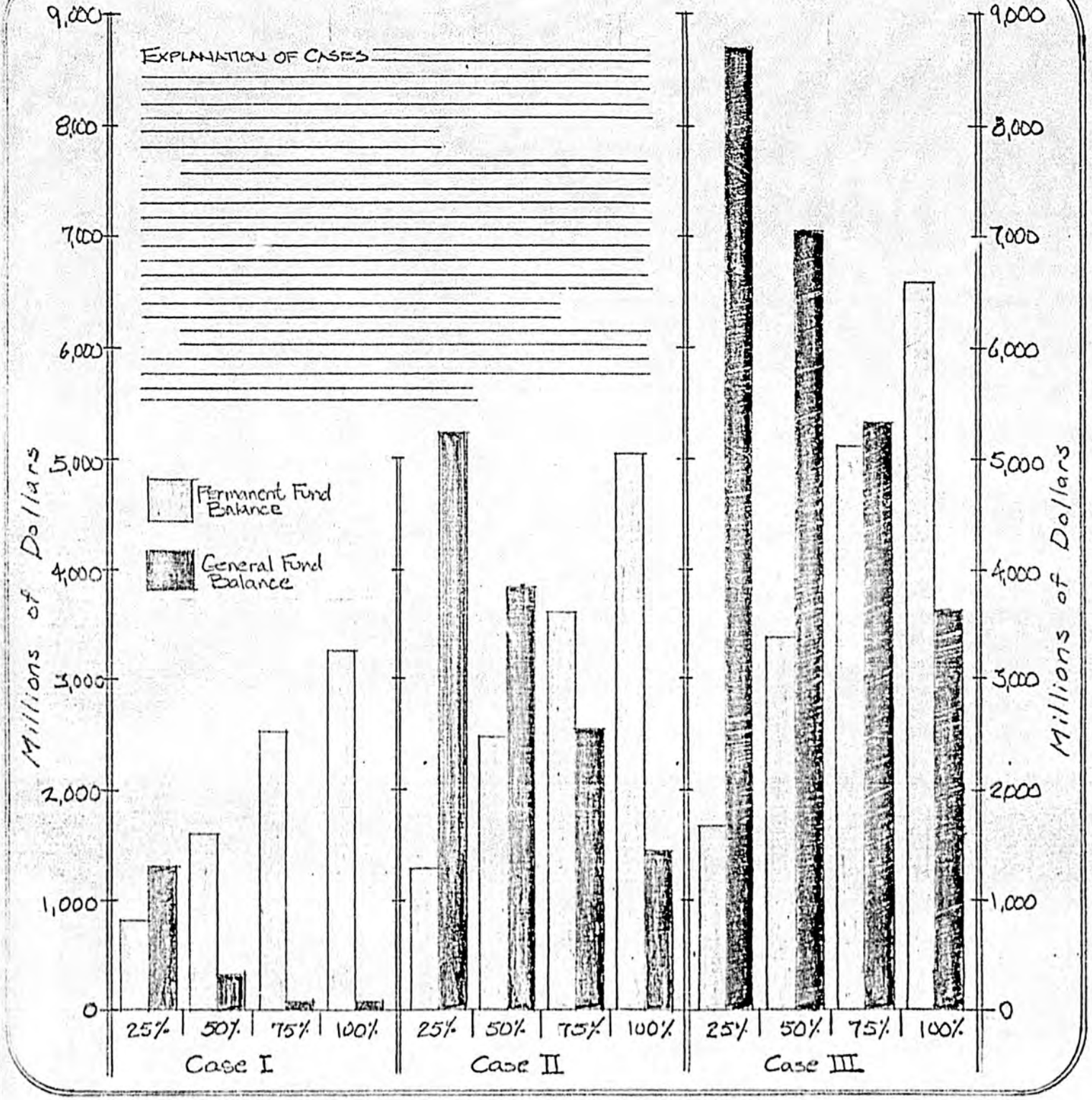
the Alaska Permanent Fund and the Renewable Resources Development Fund) of all state revenues from all sources. The legislature is the only body empowered by the constitution to make appropriations (subject to veto by the governor) from the General Fund for whatever purposes the Tegislature deems proper.

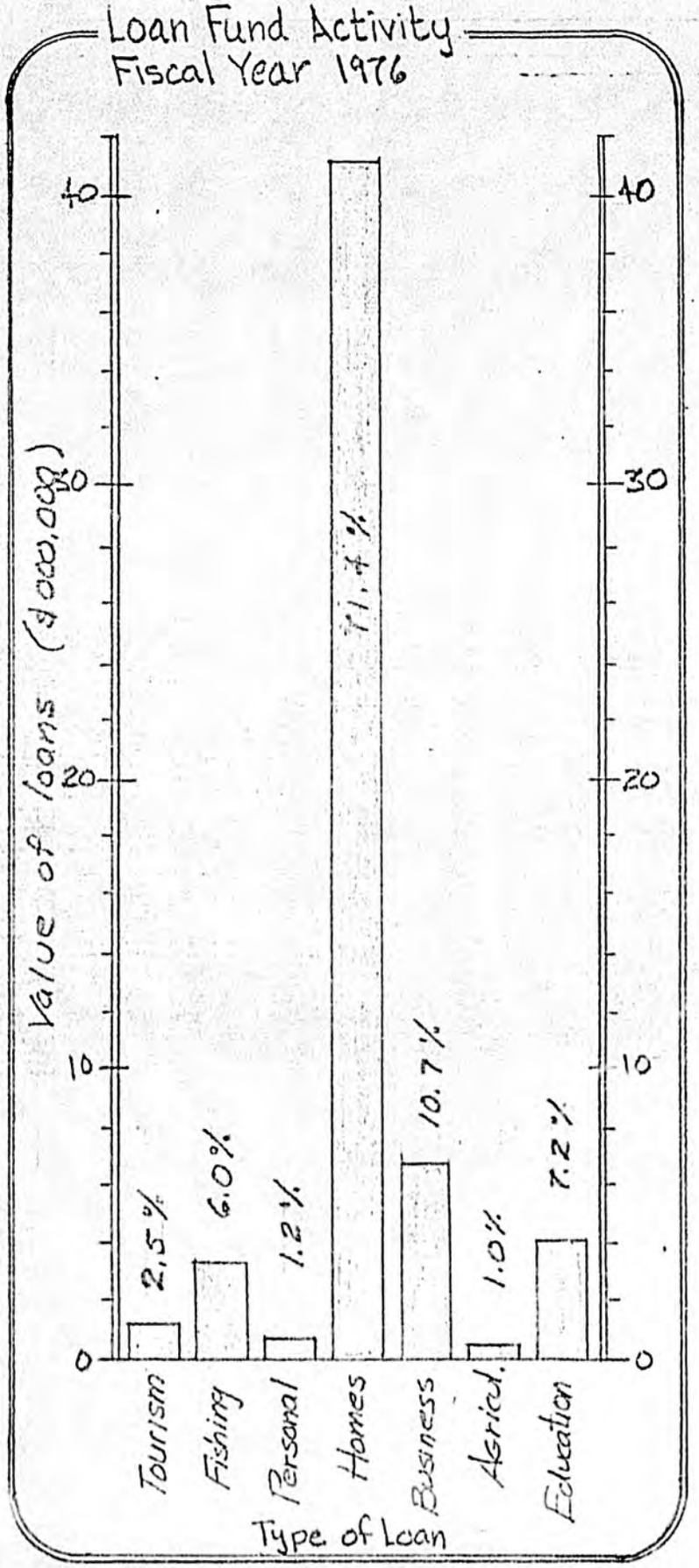
The objectives of some of these activities may be similar to certain proposed uses of the Permanent Fund. For example, the State currently maintains loan programs to promote a variety of interests, ranging from businesses to senior citizens housing and home loans. Careful coordination with existing loan activities will help avoid duplication and conflict of programs.

The State also posseses extensive bonding powers and can pursue major projects by issuing general obligation or revenue bonds. Special purpose agencies, such as the Alaska Power Authority, can (with legislative approval) provide for the financing of specific facilities. The State additionally has mechanisms, such as the Municipal Bond Bank, to assist local governments borrowing money to achieve their objectives.

These various tools should be considered as we ponder alternative fund uses so that we can best match tools with objectives. Further, provisions for coordinating permanent fund and other government activities will be a crucial element in developing the enabling legislation.

Revenue Projections through 1985




Loan Fund Activity
Fiscal Year 1976
Value of loans ($ 000,000)
0
10
20
30
40
2.5%
6.0%
1.2%
71.4%
10.7%
1.0%
7.2%
Tourism
Fishing
Personal
Homes
Business
Agricul.
Education
Type of Loan

(Copy for loan graphic)

The following state loan programs and activities are potentially eligible for permanent fund investment (i.e., they are "income-producing"):

(1) The Scholarship Loan Program provides loans to Alaska residents for post-secondary vocational and academic training with a forgiveness incentive to remain in Alaska after completing school.

(2) The Fisheries Enhancement Revolving Loan Fund supports loans to nonprofit organizations or individuals for the development of hatcheries.

(3) The Municipal Bond Bank Authority is an independent public corporation established to assist communities in Alaska to develop needed public facilities by marketing general obligation bonds. The bond bank will purchase these bonds, offering its own revenue bonds to the public bond market.

(4) The Division of Business Loans administers five revolving loan funds and two public corporations--the Small Business Revolving Loan Fund, the Tourism Revolving Loan Fund, the Commercial Fishing Revolving Loan Fund, the Child Care Facilities Revolving Loan Fund, the Water Resources Revolving Loan Fund, the Alaska State Development Corporation, and the Small Business Development Corporation. These five loan funds enable qualified businesses and public utilities to obtain long-term financing for developing, expanding, or modernizing their operations.

(5) The Veterans Affairs Revolving Loan Fund makes loans to qualified Alaska national guardsmen and veterans in Alaska. These loans may be used to purchase, refinance, build and remodel homes, farms, businesses, and multiple dwellings. In addition, a qualified veteran may receive a loan for education, fishing, mining, or personal use.

(6) The Agricultural Revolving Loan Fund provides long-term, low in-

interest loans to promote rapid development of agriculture as an industry throughout the state.

(7) The Senior Citizen Housing Development Program provides loans and grants to municipalities, housing authorities, and other nonprofit local sponsors to stimulate new housing construction and for rehabilitation of existing units for senior citizens.

(8) The Alaska State Housing Authority (ASHA) and the Alaska Housing Finance Corporation (AHFC) are operated by the state for public and low-cost housing programs and state-supported financing for low- and moderate-cost private sector housing development. Currently, ASHA receives almost all of its funding from the U.S. Department of Housing and Urban Development, and currently manages housing units throughout the state. AHFC makes or buys mortgages on low- or moderate-income housing, insures mortgages, and makes home improvement loans and loans for other associated costs of home ownership, including down payments, to qualified persons or developers. In addition, the State has established 13 regional native housing authorities with powers essentially similar to those of ASHA. The federal government provides virtually all of the funds for these activities, so state participation is minimal and limited to insured short-term loans.

(9) The Alaska Power Authority is designed to promote the development of hydro-electric and fossil fuel power sources for domestic Alaska usage. The authority is generally empowered to issue bonds and notes to finance power development activities in the state, with the debt being secured by the projects themselves or by the earnings of these projects. This program is still in the formative stages and has yet to issue bonds.

IV. Objectives for Permanent Fund Investment

The people of Alaska should establish the overall objectives for their permanent fund. The committee hopes to achieve this through public meetings and other public participation information and participation programs to be held throughout the state in the coming months and through direct solicitation, such as the attached questionnaire. We need to know your priorities to write permanent fund enabling legislation.

The proposals listed below have emerged from the Alaska Public Forum, the State Investment Advisory Committee, survey research, and concerned individuals. The list is not exhaustive, nor are the proposals or objectives mutually exclusive. Remember that the types of investments made will determine the amount of income the fund earns.

Before you evaluate these proposals, consider the following: Many of the proposals for in-state investment may involve an interest or risk subsidy; that is, the money is loaned at lower interest or in greater quantities than borrowers can obtain from private lenders. The fund would earn a lower return than the market rate, unless the General Fund made up the difference (which has been proposed).

Subsidies may only make sense if the loan or guarantee launches an in-state enterprise that not only repays the loan, but also creates new individual tax sources to cover the original subsidy as well as the cost of additional state and local government services and environmental and social costs generated. If no such in-state opportunities exist, the Permanent Fund can't create them. In-state investments must be

thoroughly evaluated to separate the winners from the losers.

Another point to ponder is that objectives often conflict. Although different strategies may pursue the same objectives, each proposal lends itself to the achievement of some more than others and even some to the exclusion of others. For example, a strategy which seeks to distribute fund benefits directly to individuals, such as consumer loans, will provide public facilities, such as through loans to municipalities. Likewise, strategies which seek to guide the state's economy through economic diversification, for example, will not maximize the income from fund investment.

Some other possible "tradeoffs" are:

employment	vs.	immigration
economic diversification	vs.	environmental degradation
size of state government	vs.	quantity and quality of public service

Tradeoffs are inevitable. As you identify the proposals that might best achieve your objectives, think about the tradeoffs involved. Figure 3 shows sample investment proposals, their objectives, and a brief outline of the implications.

Figure 3

Possible Objectives and Implications for Investment Proposals

Investment Proposal	Possible Objectives	Possible Implications
1. Loans or loan guarantees subsidizing various in-state basic industries with emphasis on renewable resources.	-Diversify the Alaska economy -Employ Alaska residents -Enhance a stable economy -Prepare for oil production downturn -Create future economic tax base for state	-Lower return, higher risk -Possible stimulus for immigration -High potential for government inability to achieve objectives -Environmental degradation -Government growth through increased demand for facilities and services -Less equal distribution of benefits
2. Investment in high-yield, low-risk securities either inside or outside the state.	-Provide earnings higher than available from subsidized loans -Maintain flexibility of the fund for investment in Alaska during economic downturns	-State economic development will proceed according to national and international considerations -Less economic diversification
3. Loans to or loan guarantees for small business and for purchase of homes.	-Encourage small business and home ownership -Expand availability of consumer loans to distribute benefits of resource wealth -Stimulate the economy	-Fund used more for consumption, less for investment -More equal distribution of benefits
4. Loans to or bond guarantees for municipalities for capital improvements.	-Provide more financing for public projects	-Lower return due to tax exempt status of government borrowing -Increase in municipal budgets for operating expenses -Provide more amenities, stabilize communities -Decentralizes actual investment decisions
5. Loan or loan guarantees for energy development A. Large-scale: hydroelectric, geothermal, tidal, wind B. Small-scale: wind, solar, heat exchange, hydroelectric	-Decrease dependence on fossil fuels -Increase availability of power throughout the state	-Large scale investments may be locked up for long periods of time; will attract high energy-consuming industries -Potential stimulus for immigration -Possible environmental degradation and subsequent industrialization -Cheaper electricity for consumers -Small-scale promote energy efficiency -Lower cost of energy for state use

SAMPLE FORM FOR

Figure 3

Major Proposals	Sought to be Achieved
Diversification of Alaska's economy.	Diversification of Alaska's economy.
Loans or loan guarantees to various basic industries with emphasis on renewable resources industry.	Employment of Alaska residents.
	Enhancement of a stable economy compatible with environmental concerns.
Investment in savings such as high yeild-low risk securities which involve investments mostly outside the state.	Maintain lipuidity of Fund and a capital pool for investment in Alaska during an economic downturn while preventing over investment during times of high economic activity.
	Provide higher earnings than available from in-state subsidized loans for operating expenses of government.
	Same as a) except to pay out indirect dividends to Alaskans or return to the Fund to keep it abreast of inflation.
Loans to or loan guarantees for small business and for purchase of homes.	Encourage small business and home ownership.
	Expend availability of conumer loans to distribute benefits of oil wealth.
	Stimulate the economy.
Loans to or loan or bond guarantees for municipalities for capital improvements.	Provide more financing for improvements and amenities which the quality of life in Alaska communities.
Loan or loan guarantees energy development such as hydroelectric, wind, geothermal, tidal and heat exchange.	Decrease dependence of fossil fuels.
	Provide power for a growing population.
	Raise standard of living in rural areas.

V. Use of Fund Income

The income derived from investment of the Permanent Fund can be used for any purpose designated by the legislature. Before we present some of the most-often discussed proposals for use of the earnings from the Permanent Fund, we invite you to invent your own and include it as part of your response to this booklet.

The people who attended Alaska Public Forum meetings throughout the state last year and those who mailed in forum questionnaires expressed three main preferences for use of permanent fund income:

1. Reduce taxes for Alaska residents.
2. Loan it to Alaskans for renewable resource development.
3. Return it to the Permanent Fund for reinvestment.

The governor has proposed that a portion of the income be distributed directly to Alaska residents. This plan, which he calls "Alaska, Inc.," would issue "shares" to each Alaskan based on residency. Each shareholder would receive a percentage of the fund income as a dividend, a process which the governor feels would draw public attention to the operation and effectiveness of permanent fund investments.

Each of these options for use of the fund income involves trade-offs, as discussed in the previous section on objectives for investment of the principal, and you should consider them as you decide how you would like the income used. However, since the investment policy and structure of the fund itself will determine the amount of earnings and since the fund involves much more money, its potential impact on

the Alaska economy and society may be far greater.

Therefore, the committee feels that the basic use-of-income question should not overshadow thorough analysis of permanent fund investment goals.

VI. Objectives for the Control and Management of the Permanent Fund

A common concern of many Alaskans after realizing the potential dollar magnitude of their Permanent Fund is who will control this wealth. The only other fund of similar or larger size in state government is the General Fund. As discussed earlier, the constitution requires that all appropriations from the General Fund be made by the legislature and be subject to gubernatorial veto. After appropriation by the legislature, some agency of the executive branch usually administers general fund money. (The court system, University of Alaska, and Alaska Housing Finance Corporation are examples of some of the exceptions.)

The state constitution requires that the legislature determine what kind of investments are eligible for permanent fund money. However, the day-to-day management of the money may be delegated to an agency in the executive branch (as it is presently) or to an organization or organizations outside the legislative and executive branches.

The two critical management questions are: How much control over policy should be delegated by the legislature to another agency or agencies? To what extent will the managers in those agencies be accountable to the people of Alaska, either directly or through their elected officials?

If the legislature simply directs the managing agency to diversify the Alaska economy by making sound investments in Alaska's renewable and nonrenewable resources (one of the investment guidelines in H.B. 298), a great deal of discretion is left to the managing agency as to what is a sound investment, what resources to invest in, and which individuals or corporations will receive financing. For example, fund managers may decide to invest in

dollar bonding or a multimillion-dollar hydroelectric project, or they could use the same money for home loans to individual Alaskans.

Permanent fund managers must be accountable to elected officials and the public, but at the same time, they shouldn't be vulnerable to political and special interest pressures. If the loan-making process is to be shielded from political influences by insulating fund managers from policy directives of elected officials, a large degree of both responsiveness and accountability to the public will be lost.

Current proposals call for appointment of managers by the governor (one adds confirmation by the legislature) with removal only for cause. The State Investment Advisory Committee discussed the possibility of elected members, but a brief look at Alaska's highly centralized government (with only the governor, legislators, and lieutenant governor being elected) indicates why this probably would not have been consistent with the state constitution.

"Politics" will not necessarily be kept out of loan decisions by placing experts on a board which is not accountable to the executive or the legislature. Clear, widespread notice to the public about the types of loans that qualify, how loans are applied for and granted, disclosure requirements for decision makers, publishing list of loans or guarantees made, and regular auditing by the executive and legislative branches of government might provide at least a partial remedy to the control and accountability problems.

An alternative to the highly centralized and rather independent management structure proposed in H.B. 298 would be for the legislature to provide for the administration of the Permanent Fund under the existing constitutional power of appropriation. The legislature, with approval of the governor, would designate eligible investments by law. The legislature annually would pass an investment bill for the Permanent Fund, much like the budget

bill for the General Fund. The permanent fund investment bill would apportion available permanent fund money among the eligible investments.

Funds deposited in the Permanent Fund would temporarily be invested in liquid and secure money-market instruments pending each year's investment bill, as is now being done with permanent fund receipts. The legislature might choose to create new types of financial intermediaries and designate them as eligible for loans or loan guarantees in order to meet Alaska's changing capital needs. For example, the development bank corporation proposed in H.B. 298 could be one of the new financial intermediaries designated as an appropriate recipient of fund money.

The organization of the fund may profoundly affect how the fund performs, but the organization should reflect--not determine--the goals of the fund. Goals established today may not be those held by tomorrow's Alaskans. There must be built into any permanent fund structure both ability to protect the principal of the fund and responsiveness to meet changing goals.

VII. Permanent Fund Questionnaire

A. Investment

The Permanent Fund belongs to you. What are your suggestions for use of the money? Would you please take the time to share your ideas with us by indicating your preferences for permanent fund investment proposals? For each proposal, please answer the following questions. Feel free to suggest as many proposals as you think we should consider.

1. What investment proposal do you suggest and how is income-producing for the Permanent Fund? [Example - invest in blue chip, preferred stocks]

2. What objectives are achieved by your proposal? [Example - high return, flexible, no growth impact on Alaska, investment as secure as stock market]

3. What objectives are avoided by this proposal? [Example - no diversification of Alaska economy, does not affect unemployment, does not effect consumer loans]

4. What may limit the effectiveness of this proposal? [Example - government can't move quickly in the stock market, investment is high and tied up for the duration of the investment, possible large losses]

5. Which groups would benefit from this proposal? [Example - financeers, brokers]

6. What groups are likely to oppose this proposal? [Example - developers, people looking for a government dole through a subsidized loan, people who don't trust the stock market]

7. What other comments do you have on this proposal?

B. Management

In addition to the investment of permanent fund monies a policy on the management and control of the Fund must also be established. What are your suggestions for who should manage the Fund? Would you please take the time to share your proposals with the committee and answer the following questions about your suggestion?

1. Proposal for management of the Permanent Fund. [Example - two-tiered board, with policy board appointed by governor, confirmed by legislature; management board of financial consultants hired by policy board. Board monitored in relation to their achievements. A five-year investment plan presented to and adopted by the legislature, reviewed and updated annually]

2. What objectives are achieved by this proposal? [Example - maintains accountability through annual adoption of investment plan, removes political tinkering through use of professional financial staff]

3. What objectives are avoided by this proposal? [Example - doesn't directly involve citizens in investment decisions, no direct control by the governor or the legislature, doesn't allow great flexibility in investment except for annual updates of five-year plan]

4. What are the constraints of your proposal? [Example - policy board could become too powerful if the legislature doesn't thoroughly review the investment plan, the integrity of both policy board members and management board members must be unquestionable]

5. What other comments do you have on this proposal?

PLEASE NOTE: THE FOLLOWING PAGES WERE TREATED AS A UNIT IN THE ORIGINAL DOCUMENT.

INTRODUCTION

An overwhelming majority of Alaska voters approved an amendment to the state constitution last November which provides that at least 25 percent of certain of the State's nonrenewable resource revenues be placed in a permanent fund. It further states that the fund's "principal shall be used only for those income-producing investments" the legislature designates as eligible for permanent fund money. The amendment also provides that income from the investments will go into the State's General Fund (where all other revenues and taxes are deposited) unless the legislature designates that income for other purposes.

In January 1978 the Tenth Alaska Legislature will consider several different proposals for management and organization of the fund and use of the fund's earnings. Three bills were introduced in the last session and were referred to the House Special Committee on the Alaska Permanent Fund. Our task is to find out what Alaskans want the fund to achieve and to recommend legislation for a permanent fund that can best attain those goals.

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THE BIRTH AND EVOLUTION OF THE PERMANENT FUND

Following the 1969 Prudhoe Bay lease sale, the Brookings Institute conducted a series of seminars concerning "The Future of Alaska." More than 100 Alaskans were invited to participate, to explore some of the major emerging policy issues, and to set future goals and a practical policy plan for Alaska's future. The participants agreed that the "Alaska way of life" should be preserved. They defined the Alaska life-style as one which combines the conveniences of technological innovation with the opportunity and values of living as close to nature as possible.

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The 1974 legislature passed a bill creating the Alaska Renewable Resources Development Fund. This legislation provides that not less than five percent of renewable resources income will be deposited in a separate fund beginning July 1, 1978. Monies can be appropriated from the fund only to provide for capital and operating expenditures for the rehabilitation, enhancement, and development of renewable resources programs. Funds not expended within the fiscal year will be invested in the same manner as general fund balances, but use of the income is restricted to funding

capital and operating appropriations for renewable resources programs. When the unappropriated balance reaches $250 million, the development fund ceases and this balance is invested as other surplus funds are, with the interest dedicated to renewable resource programs.

A bill which would have statutorily created a Permanent fund passed the legislature in 1975, but Governor Hammond vetoed it and reintroduced the concept in 1976. The 1976 legislature passed House Joint Resolution 39, calling for a constitutional amendment to establish the Alaska Permanent Fund. The voters approved that amendment in November 1976 by a margin of nearly nine to one. While it is not possible to specifically state the intentions of the voters in approving the Permanent Fund amendment, it has been widely and probably fairly assumed that most voters hoped that by establishing the fund, a portion of Alaska's nonrenewable resource wealth would be saved from the day-to-day spending for operations of state government.

The amendment modified the constitutional prohibition against special dedicated funds to allow a minimum of 25 percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue-sharing payments, and bonuses to accumulate in a permanent fund.

The only restriction on the use of the principal of the fund is that it must be for "income-producing investments" and therefore not for the general operating costs of government. The income will be deposited in the State General Fund unless otherwise provided for by law.

The joint House Finance and Judiciary Committee chairmen's report on HJR 39 stated that "sufficient income would be accumulated in the Alaska Permanent Fund to allow diversification of Alaska's economy and to insure that future generations receive benefits from development of the State's nonrenewable resources." The report noted that the fund would be restricted to income-producing investments "which the legislature would establish and change from time to time to meet the needs of the state." Use of the fund's earnings was left open to the legislature "to give future legislatures the maximum flexibility in using fund earnings--ranging from adding to fund principal to paying out a dividend to resident Alaskans."

In August of 1976, prior to voter approval of the Permanent Fund amendment, the governor, in anticipation of the establishment of the fund, temporarily expanded the membership of the State Investment Advisory Committee (S.I.A.C.) to include additional members from the public at large and the legislative and executive branches. The S.I.A.C., which is charged by statute to advise the commissioner of revenue on investment policy for the state, was then directed by the governor to study and report on the following questions:

1. The estimated size of the Permanent Fund.
2. Investment goals of the fund.
3. Fund management and organization.
4. Public interest in the fund.

The S.I.A.C. quickly began its deliberations with energy and diligence, and over the next seven months worked with consultants from Price-Waterhouse and Co., White, Weld and Co., and the Alaska Pacific Bank to produce a draft proposal for a permanent fund structure. That proposal was introduced on March 3, 1977 as House Bill 298. On the same day, this committee introduced H.B. 300, which is very similar to H.B. 298, except for a higher level of funding and provision for legislative confirmation of the governor's appointments to the permanent fund policy board.

48 Both H.B. 298 and 300, now under consideration by the legislature and this committee, would structure the Permanent Fund essentially as a development bank, which except for the appointment authority of the governor would operate rather independently from the executive and legislative branches of government. In arriving at its findings, the S.I.A.C. through its consultants examined a great number of resource-based monetary funds and development banks throughout the world.

Deposits to the fund were raised in HB 298 to include 50 per cent of all mineral lease rentals, royalty income, and bonus payments. (H.B. 300 includes 100 percent of bonus payments.) Both bills propose a two-tiered management structure, a policy board with overall decision-making power, and a committee under the policy board to approve investment proposals. Forty percent of the Permanent Fund would be invested in high-grade securities, 30 percent in Alaska development loans, and 30 percent in community projects and private dwellings.

In 1977 the legislature passed an interim management bill for the permanent fund until specific investment objectives and management structure have been thoroughly examined and agreed upon. The interim management bill directs the commissioner of revenue to invest permanent fund money into various "money-market instruments," such as U.S. treasury notes, certificates of deposit, and high-grade securities (not stock), all of which are relatively liquid and secure. By July 1, 1977, the more than $3.9 million accruing to the Permanent Fund to that date had been invested in these liquid money-market instruments.

In the 1977 legislative session, the House and Senate appointed special committees to consider alternative proposals for the Permanent Fund during the legislative interim. The committees will gather and distribute information, listen to public opinion, seek expert advice, consider how the fund should be administered, major goals for the fund, and present their recommendations to the full legislature in January 1978. The committees will spend a major effort on public education and participation to learn what Alaskans want our permanent fund to be. This booklet marks the beginning of this phase of the House committee's work.

ALTERNATIVE OBJECTIVES FOR THE PERMANENT FUND

Before the legislature establishes a management structure for the Alaska Permanent Fund, the objectives of the Fund should be considered in widely held public discussions and clearly delineated in the enabling legislation. If a consensus on various broad visions for Alaska can be reached, legislation to enable the Permanent Fund to achieve these visions can be more easily drafted.

The Permament Fund can be viewed as a fiscal tool - one of many possible tools available for management of the state's short term surplus wealth. Before decisions are reached on the objective or objectives to be assigned the Permanent Fund it should be recognized there are, in addition to the all-purpose general fund, over a dozen active state loan funds through which millions of state dollars are funnelled to achieve objectives similar to those which may be considered for the Permament Fund.

The Committee believes that the legislature, by defining a limited number of objectives for the Permanent Fund and by devising an effective method for coordinating and reviewing the objectives and performance of all the various loan programs, better management of Alaskan short term wealth could result.

General proposals for use of the Permanent Fund money have already emerged through the Alaska Public Forum, the State

Investment Advisory Committee and survey research. These proposals broadly stated together, intended objectives are as follows:

Major Proposals	Major Objectives Sought to be Achieved
1. Loans or loan guarantees to various basic industries with emphasis on renewable resources industry.	a) Diversification of Alaska's economy.
	b) Employment of Alaska residents.
	c) Enhancement of a stable economy compatible with environmental concerns.
2. Investment in savings such as high yeild - low risk securities which involve investments mostly outside the state.	a) Maintain liquidity of Fund and a capital pool for investment in Alaska during an economic downturn while preventing over investment during times of high economic activity.
	b) Provide higher earnings than available from in-state subsidized loans for operating expenses of government.
	c) Same as a) except to pay out indirect dividends to Alaskans or

	return to the Fund to keep it abreast of inflation.
3. Loans to or loan guarantees for small business and for purchase of homes.	a) Encourage small business and home ownership.
	b) Expend availability of consumer loans to distribute benefits of oil wealth.
	c) Stimulate the economy.
4. Loans to or loan or bond guarantees for municipalities for capital improvements.	a) Provide more financing for improvements and amenities which the quality of life in Alaska communities.
5. Loan or loan guarantees energy development such as hydroelectric, wind, geothermal, tidal and heat exchange.	a) Decrease dependence on fossil fuels.
	b) Raise standard of living in rural areas.
	c) Provide power for a growing population.
	d) Attract high energy consuming industries.

The above list of proposals is certainly not exhaustive nor are the proposals or objectives mutually exclusive. Various uses of the income earned from any of the investments are possible but it should be recognized that many of the in-state proposals for investment would involve an interest subsidy and therefore lower earnings for the Permanent Fund or shareholders in "Alaska, Inc."

Before picking the proposal or proposals and objectives you feel may most properly be assigned to the Permanent Fund, a brief discussion of the implications of the above investment proposals or strategies is in order.

LOANS TO BASIC INDUSTRIES FOR DIVERSIFICATION OF THE ECONOMY

If diversification of the Alaska economy is a main objective of making loans or loan guarantees to basic industries involving either renewable or non-renewable resource development, it is reasonable to assume that the particular enterprises needing venture or development capital would seek help from the Permanent Fund only because it provided cheaper capital (lower interest charges) or capital that otherwise was not available from private sources. The Fund in comparison with other possible investments would be most likely getting a lower return for taking relatively high risks in making these loans or loan guarantees to encourage new or more diversified basic industries.

Under what circumstances, then, would it be wise to forego

higher income from earnings on our state investments where no subsidy in terms of low interest loans was involved? The objective of diversification only makes sense when the loan or guarantee is reasonably expected to launch an in-state enterprise which at some time in the near future will not only pay back the loan but will produce corporate or individually taxable incomes which can cover the original subsidy and the cost of state and local governmental services required by the enterprise. If there are no such enterprises there is nothing the Permanent Fund or any development banking scheme can do to create them. Obviously, a method of analysis which seperates most of the winners from the losers is required.

CONSTITUTIONAL, LEGAL, AND MANAGEMENT ISSUES

Once objectives for the permanent fund have been established, there are still a number of issues to be resolved, within certain constitutional and legal limitations, such as the permanent fund's relationship to other state funds, its management structure, investment guidelines, and the use of the permanent fund income.

The Alaska Constitution is the fundamental limitation of the pc of the state legislature. Article VIII (Natural Resources) of our constitution allows for evolving principles of management of all resources of Alaska under State jurisdiction. For example, it directs that fish, wildlife and water, in their natural state, be reserved for the common use of the people. The "common use" principle has evolved over thousands of years since it was first introduced into script in Roman law.

The Alaska Constitution declares that lands, and resource interests in them, wherever under state jurisdiction, are "public lands." The framers originally intended to add that those public lands would be held in trust. However, they finally withdrew that specific language and provided for certain fundamental constitutional limitations and obligations in natural resource management and gave broad powers to the legislature to "provide for the utilization, development and conservation of the public domain." The framers intended that the limitations and obligations of the State in managing our resources evolve through legislative

policy making and judicial interpretation.

The legislature presented the Permanent Fund to the voters because members recognized that changing needs in developing non-renewable resources of the State since Alaska's constitutional convention dictated a more specific mandate of trust obligations. In essence, the legislature asked the voters, "Pursuant to our broad obligation to manage your resources in the capacity of trustee, do you want us to create a permanent trust fund with part of the nonrecurring resource wealth?" The imperative language of the amendment created the trust fund.

This is an important perspective while analyzing the constitutional limitations of Permanent Fund investments. The one obligation the Permanent Fund amendment burdened the State with was that investments be "income-producing." The definition of this obligation will undoubtedly evolve as the other fundamental constitutional concepts have, but it is fairly clear that the intent was that the Permanent Fund be used to help diversify Alaska's economy and ensure that future generations benefit from nonrenewable resource development today.

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Investment guidelines have not been defined beyond those fundamental objectives of the trust fund. One crucial investment question is whether the fund must be managed to keep abreast with inflation. If protection of the fund's principal was foremost in the minds of the amendment's creators, as the dominance of the word "permanent" in the amendment suggests, then the State may well be obligated to

ture may adopt certain of these for Fund management, ranging as widely as guaranteeing that a certain percentage of investment in commercial projects in Alaska will flow to "small businesses" to mandating a cost-benefit analysis in renewable resource projects.

Relationship to other State Funds

The Permanent Fund is not an isolated part of state financial workings; it does not exist in a void. The legislation enabling operation of the Permanent Fund must recognize its relationship to the State General Fund, existing (and proposed) loan programs, and to capital projects.

While the Permanent Fund will be strucured in an attempt achieve state goals, the effort to shape the growth of the State's economy through the permanent fund will only succeed if the expenditure or investment of these other state funds must also be tied to state goals. In fact, the impact of general fund surpluses may prove even more critical in terms of state policy since fewer constraints exist on how such money may be used.

The State's General Fund is a relatively inefficient mechanism for dealing with short-term revenue surpluses because (1)the political process tends to allocate total available revenues without systematic consideration of longerterm economic and social consequences or actual effectiveness of spending; (2) Existing fiscal mechanisms were virtually all enacted during periods of revenue scarcity and have an innate bias towards maximizing their share of fiscal

keep the Fund's earnings in pace with the rate of inflation. The legislature could adopt that as a policy in the enabling act. Nevertheless, we know that if Fund earnings must at least match the inflation rate, investment policies will probably differ from policies if they need not match inflation. It could mean that the Fund would have to secure its money in high return-minimum risk investments in order to keep up with inflation, which could preclude most Alaskans from participation.

Another issue for resolution involves the constitutional provision which states that "at least 25 percent" of mineral-derived income shall be put in the Permanent Fund. Are amounts in excess of this 25 percent that might be designated by any legislature for deposit to the Fund a permanent part of the Fund or subject to removal under certain circumstances?

One other possible constitutional problem is legislative confirmation of the appointment of managers for the Permanent Fund. The Alaska Constitution grants confirmation powers to the legislature for department heads and certain other officials, but the Alaska Supreme Court recently held that the confirmation powers are restricted to those specific officials. A resolution was introduced this year to remedy this problem by proposing an amendment to the constitution subjecting the managers to legislative confirmation.

Beyond specific constitutional obligations, the legislature is left with broad enabling powers of the natural resources article to mandate other Fund obligations. Trust law places many obligations on fund managers that are not specifically referred to in our constitution. The legisla-

resources; and (3)political pressures on future legislatures will be virtually insurmountable to distribute available revenues if surplus general fund revenues exist. Thus, the General Fund should only receive those funds which will not be detrimental to long-run growth objectives set for the state.

The State maintains loan programs to promote a variety of interests, ranging from businesses to senior citizen housing and home loans. Before considering the potential effectiveness of these programs, several points are important to consider:

(1) Since loans are interest-bearing investments, they are potentially eligible for backing by the Permanent Fund.

(2) Under current law, however, there is no requirement that the Permanent Fund purchase such securities, nor is there any provision allowing permanent fund monies to be used for funding such programs directly.

(3) There is no current provision requiring coordination between ongoing state objectives (as exemplified by the loan programs and their statutory objectives) and the investment objectives of the Permanent Fund. Also, though it is generally argued that the State operated these loan programs to enhance development by providing goods and services which otherwise would not be available in the private sector, there is no concrete evidence that they have.

While investments of permanent fund money in state loan programs may be attractive, several problems exist which should be considered. State loan programs intentionally sub-

sidize specific sectors of the economy and society, so the Permanent Fund would earn a lower return on invested capital than it could if invested elsewhere.

The State Investment Advisory Committee suggested one answer to the problem of differential rates of return. The General Fund could reimburse the Permanent Fund for the difference between the subsidized rate and the market rate. However, the growth impacts of such a program are not easily predictable or controllable. Presently, there do not appear to be any legislative or administrative checks on the quality or volume of loans. Unless controlled by permanent fund legislation, this could result in a ballooning of state loans with only marginal increases in carrying costs (since the only appropriated cost to the State would be the interest differential subsidy).

Accordingly, if existing loan programs are to be used as investment vehicles for the Permanent Fund, a policy that would make such investment levels contingent on annual appropriations or an absolute or percentage limit on permanent fund participation in state loan programs would be appropriate.

If the legislature chooses to allow use of some permanent fund money to support state loan programs, the existing and prospective investment and development activities of the fund must be coordinated. Otherwise, prospective borrowers in Alaska could have access to three or more major state funding sources, only one of which would be directly accountable to the legislature for appropriations.

It would be possible to use the Permanent Fund as a purchasing agent of state bonds, thus financing at least portions of the State's capital improvements. This has the advantage of internalizing the State's bonding activity and turning long-term obligations into long-term revenue sources (as repayments are made to the Permanent Fund). However, the differential in rate of return to the Fund (since State bonds are tax-exempt, their rate of return is lower than high-grade corporate securities) and possible distorting effects on the state's growth rate argue against such a use of the fund. In addition, the bond market currently acts as a brake on the temptation for the state to issue excessive amounts of debts, preventing problems when revenue sources dry up.

Another important public policy question is whether the Fund should be decentralized through the use of regional funding mechanisms or financial intermediaries. Development banks, cooperative banks, credit unions, community development corporations, technology development corporations, and use of land and water conservation funds and the Renewable Resource Development Fund have all been suggested as ways to decentralize the Fund's economic power.

Management Structure

The organization of the Fund's management may profoundly affect how the fund performs, but it should reflect, and not determine, the goals of the fund. Who will invest the money and how the investment process will work are as important as the choice of investments.

Permanent Fund legislation must address the following management issues:

(1) Structure - The Permanent Fund could organizationally resemble a corporation, a credit union, a development bank, or some other financial entity, or could be managed through our current legislative and executive system. Presently, the Fund (under the interim management bill) is being administered by the Department of Revenue and could continue to be so administered. The structure will largely determine whether the economic power of the Permanent Fund is centralized or decentralized. For example, the development bank model centralizes the fund's economic clout, but leaves questions about responsiveness to community and regional needs.

(2) Evaluation of Fund Performance - The legislature must delineate methods for evaluation and audit of Permanent Fund performance. How are the benefits and costs of investments to be evaluated? How can the benefits of job stimulation be balanced against the costs of environmental degradation? This is a complex area that is closely tied to the fund's goals as well as its structure.

(3) Flexibility - The legislature intended that the Permanent Fund would be flexible enough to meet changing

state needs. The structure must allow a shifting of the flow of capial investment as rapidly as conditions demand.

(4) Accountability and Control of Fund Managers - Permanent Fund managers must be accountable to elected public officials and the public, but at the same time insulated from political and special interest pressures. Current proposals call for appointment of managers by the governor (one adds confirmation by the legislature), with removal only for cause. The S.I.A.C. discusses the possibility of elected members, but a brief look at Alaska's highly centralized structure (with only the governor and lieutenant governor being elected) indicates why this probably wouldn't be consistent with the rest of state government policy.

If in order to shield the loan making process from "political influences" the fund is too insulated form policy directives of elective public officials, a large degree of both responsibeness and accountability to the public will be lost. "Politics" is not necessarily kept out of loan decisions by placing experts on a board which is not accountable to the executive or the legislature.

The remedy may be, at least in part, to require plain understandable public notification of what type of loans qualify and how loans are applied for and granted, disclosure requirements for decision makers, public notice of loans or guarantees made, and regular reporting of activities to the executive and legislative brances of government. It might also be wise to require legislative approval of large loans (e.g. all loans over $25 million).

Use of Permanent Fund Income

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Income derived from Permanent Fund investments (interest) will be deposited in the general fund unless otherwise provided for by law. The interim management bill now governing the fund specifies no other use of the income; however, several alternatives have been suggested for enactment in the final management bill.

Participants at Alaska Public Forum meetings throughout the state last year expressed three main preferences for the use of Permanent Fund income. Many suggested that the income simply be returned to the Permanent Fund for reinvestment.

Others suggested that the income be loaned to Alaskans for renewable resource development. This could be accomplished through the Permanent Fund, the Renewable Resources Development Fund, or other state loan programs for resource development. A third major choice voiced at the Public Forum was to use the income for tax cuts for Alaska residents.

The governor has proposed that a portion of the income be distributed directly to Alaska residents. This plan, which he calls "Alaska, Inc.," would issue "shares" to each Alaskan based on residency. Each shareholder would receive a percentage of the fund income as a dividend, a process which the governor feels would draw public attention to the operation and effectiveness of Permanent Fund investments.

Obviously, the income the fund earns will vary from year to year, but because no restrictions have yet been made

on its disposal, more innovative and creative choices can be considered. In terms of potential impact on the Alaska economy, the investment policy of the fund itself is more significant than the use of the income. Accordingly, it would not be wise to allow the question of possible use of the income to overshadow thorough analysis of investment goals to be established by the legislature.

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ALTERNATIVE OBJECTIVES FOR THE PERMANENT FUND

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I. THE ROLE OF THE PERMANENT FUND IN ALASKA'S FUTURE

A Preliminary Report

An overwhelming majority of Alaskan voters approved an amendment to the ~~Alaska~~ State Constitution last November which provides for a permanent fund. The amendment requires that 25 percent of all the State's nonrenewable resource revenues be placed in ~~the~~ a "~~Alaska~~ Permanent Fund" ~~and perpetuated~~ It further states that the fund's "principal shall be used only for ~~through~~ those "income-producing investments" the legislature designates as eligible for permanent fund money. The amendment also provides that income from the investments will go into the State's general fund (where all other revenues and taxes are deposited) unless the legislature designates that income for other purposes.

In January 1978 the tenth Alaska Legislature will consider several different proposals ~~(some of which have already been introduced as bills)~~ for management and organization of the fund and use of the fund's earnings. (Three bills introduced in the last session failed to pass.) The task of the House Special Committee on the Alaska Permanent Fund is to find out what Alaskans ~~think the goals of the fund should be~~ want the fund to achieve and to recommend permanent fund legislation that creates a fund that can best attain these goals.

The Committee produced this report to inform Alaskans about the Alaska Permanent Fund -- how it evolved, present management, possible future roles for the fund, and investment and management options for ~~the~~ its principal and earnings. This report also allows committee members ~~wished~~ to state ~~early in the committee's deliberations~~ what they ~~felt were~~ feel are the main issues to be resolved in the permanent fund enabling legislation. ~~by the legislature in giving the Alaska Permanent Fund the stature~~ to be Alaska Permanent Fund ~~protection provided by the constitution~~

We hope that you will take the time to ~~read~~ study this booklet, jot down your comments and questions as you read, and send us your views ~~or comments~~ by filling out and mailing the postage-paid questionnaire on the last page. You may obtain further information about the Alaska Permanent Fund by calling or writing to the committee office:

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IV STATEMENT OF ISSUES

C. Investment Guidelines

1. Constitutional and legal limitations
2. Possible statutory requirements

The Alaska Constitution is the fundamental limitation of power of the state legislature. Article VII (Natural Resources of our constitution) allows for evolving principles of management of all resources of Alaska under State jurisdiction. For example, it directs that fish, wildlife and water, in their natural state, be reserved for the common use of the people. The "common use" principle has evolved over thousands of years since it was first introduced into script in Roman law.

The Alaska Constitution declares that lands, and resource interests in them, wherever under state jurisdiction, are "public lands." The framers originally intended to add that those public lands would be held in trust. However, they finally withdrew that specific language and provided for certain fundamental constitutional limitations and obligations in natural resource management and gave broad powers to the legislature to "provide for the tilitzation, development and conservation of the public domain." The framers intended that the limitations and obligations of the State in managing our resources evolve through legislative policy making and judicial interpretation.

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This is an important perspective while analyzing the constitutional limitations of Permanent Fund investments. The one obligation the Permanent Fund amendment burdened the State with was that investments be "imcome producing." The definition of this obligation will undoubtedly evolve as the other fundamental constitutional concepts have, but it is fairly clear that the intent was that the Permanent Fund be used to help diversify Alaska's economy and ensure that future generations benefit from nonrenewable resource development today. (House Journal, March 24, 1976).

Investment guidelines have not been defined beyond those fundamental objectives of the trust fund. One troublesome investment question is whether the fund must be managed to keep abreast with inflation. If protection of the fund's principal was foremost in the minds of the amendment's creators, as the dominance of the word "permanent" in the amendment suggests, then the State may well be obligated to keep the Fund's earnings at least apace with the rate of inflation. The legislature could adopt that as a policy in the enabling act. Whichever policy direction evolves, we know that if Fund earnings must at least match the inflation rate,, investment policies will probably differ than if they don't. It could mean that the Fund would have to secure its money in high return - minimum risk investments in order to keep up with inflation, and this could preclude most Alaskans from participation.

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businesses" to madating a cost-benefit analysis in renewable resource projects.

Another issue of public policy that will affect investments is whether the Fund should be effectively decentralized through the use of regional funding mechanisms which would have to be created. Development banks, community development corporations, land and water conservation funds, the Renewable Resource Development Fund, cooperatives banks, and credit unions have all been mentioned as ways to decentralize the Fund's economic power.

I. Introduction

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#50 H FIN

II. Constitutional and legislative background

Following the 1969 Prudhoe Bay lease sale, the Brookings Institute conducted a series of seminars concerning "The Future of Alaska." More than 100 Alaskans were invited to participate, to explore some of the major emerging policy issues, and to set future goals and a practical policy plan for local action. They agreed that the "Alaska way of life" should be preserved, and they defined this lifestyle as one that combines the conveniences of technological innovation with the opportunity and values of living as close to nature as possible.

As a result of the Brookings Seminars, several bills were introduced in the 1970 legislative session to set up some sort of "permanent fund" made up of the $900 million generated by the Prudhoe lease sale. However, other uses for the money were judged to be more important, and no permanent fund was established.

The 1974 legislature passed a bill creating the Alaska renewable resources development fund. This legislation provides that not less than five percent of renewable resources income will be deposited in the development fund beginning July 1, 1978. Monies can be appropriated from the fund to provide for capital and operating expenditures for the rehabilitation, enhancement, and development of renewable resources programs. Funds not used within the fiscal year will be invested in the same manner as general fund balances, but use of the imcome is restricted to funding capital and operating appropriations for renewable resources programs. When the unappropriated balance reaches $250 million, the development fund goes out of existence.

#49 H F.N

A bill which would have statutorily created the Alaska Permanent Fund passed the legislature in 1975, but Governor Hammond vetoed it and reintroduced the concept as a constitutional amendment in 1976. The 1976 legislature approved a resolution calling for the constitutional amendment to establish the Alaska Permanent Fund. The voters passed that amendment in November 1976 by a margin of nearly nine to one. It provides for the dedication of at least 25 percent of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue-sharing payments, and bonuses received by the State into a permanent fund. The principal of the fund is limited to "income-producinginvestments." The income will be deposited in the state general fund unless otherwise provided for by law.

The joint House Finance and Judiciary Committee report on the resolution stated that "sufficient income would be accumulated in the Alaska Permanent Fund to allow diversification of Alaska's economy and to insure that future generations receive benefits from development of the State's nonrenewable resources." The report noted that the fund would be restricted to income-producing investments "which the legislature would establish and change from time to time to meet the needs of the state." Use of the fund's earnings was left open to the legislature "to give future legislatures the maximum flexibility in using the Fund's earnings -- ranging from adding to Fund principal to paying out a dividend to resident Alaskans."

An interim study, conducted by executive and legislative staff, under the direction of the State Investment Advisory Committee (SIAC), concentrated on alternative investment

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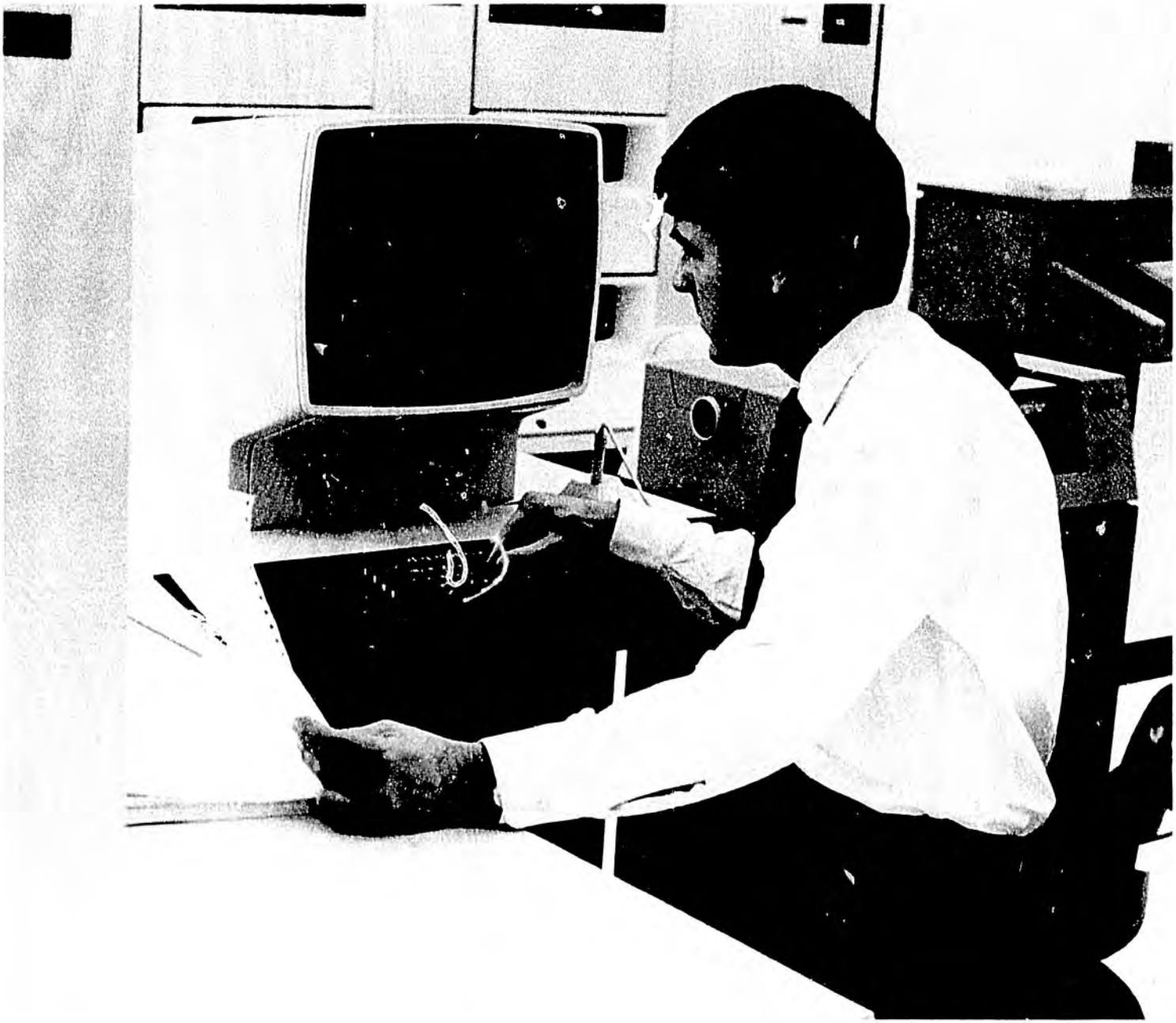
structures for the fund. During the 1977 legislative session, two proposals, House Bills 298 and 300, resulted from SIAC findings, but neither passed. Both would have structured the Permanent Fund as a development bank, centralized under the authority of the governor and the legislature. Following the example of the World Bank, permanent fund investments would be guided by economic criteria and not political influence. Deposits to the fund would include 50 per cent of all mineral lease rentals, royalty income, and bonus payments. (H.B. 300 includes 100 percent of bonus payments.) Both would establish a two-tiered management structure with a policy board with overall decision-making power and an investment committee to approve investment proposals. Forth percent of the Permanent Fund would be invested in investment-grade securities, 30 percent in development loans, and 30 percent in community investment projects and private dwellings.

The 1977 legislature did pass a bill that provides for interim management of the permanent fund, until the statutory permanent fund management structure can be researched and agreed upon. This bill directs the commissioner of revenue to place 25 percent of the aforementioned resource income into the permanent fund, investing it in several designated types of investments, all of which are relative liquid and secure. By June 30, 1977, more than $3.9 million had been invested.

The House and Senate set up special committees during the 1977 legislative session to consider alternative proposals for the Permanent Fund during the legislative interim. They will present their recommendations to the full legislature in January 1978. The committees will gather and distribute

information, sample public opinion, and seek expert advice on how the fund should be administered and what major goals the fund should strive to meet. Both committees will spend a majority of their efforts on public education and participation to find out what Alaskans want their permanent fund to be. This booklet marks the beginning of this phase of the committee's efforts.

PLEASE NOTE: THE PRECEDING PAGES WERE TREATED AS A UNIT IN THE ORIGINAL DOCUMENT.



Continuing the logical evolution to greater function, higher performance

Destined to make computer history is the exciting new IBM System/370 Model 158.

The advanced function growth system for the high-performance Model 155, the 158 embodies the latest in computer technology to provide you with all-monolithic storage . . . integrated attachment of IBM direct access storage devices . . . and valuable central processor enhancements.

More importantly, Model 158—running under the new IBM advanced function system control programming discussed in the following pages—allows you to take advantage of the considerable benefits provided by virtual storage.

A most significant development

Virtual storage is an evolutionary technological development. And one bound to have revolutionary impact on computer operation from this day forward.

Virtual storage is the image of processor —or "real"—storage, and is normally much larger in size. Programmers can use this virtual storage as if it were real.

In the past, they had no choice but to create programs within the limits of real processor storage available.

Virtual storage, on the other hand, is intended to help programmers take advantage of the Model 158's full address capability—over 16 million bytes. The Model 158 automatically maps virtual storage into real storage in a manner that is transparent to the programmer.

The advantages of virtual storage

Virtual storage can circumvent the limitations of real storage. It can reduce concern about program overlays, partition and region boundaries, and the need to dedicate real storage for system services.

Virtual storage gives you unprecedented flexibility in the design of applications. It permits the vital growth of existing applications. It allows the writing of more comprehensive programs. It simplifies maintenance of operational programs.

In again, out again without special programming

Virtual storage relieves the computer's real storage facilities of the burden of holding the entire application while it is being used. Instead, real storage residence is governed by frequency of use. This characteristic alone offers particularly significant advantages in online applications, where use varies greatly from hour to hour.

Lesser-used routines are stored on direct access devices. They're brought to real storage only when they're needed. And it's important to keep this in mind—the control of virtual storage is done by the system control programming. It requires no special programming effort by the application programmer.

Keeping pace with growth

As time passes, it's likely that work volume will increase. You may want to add a number of new jobs. Or enlarge some old ones.

This should not be a problem. With virtual storage, your applications do not have to be reprogrammed to take advantage of the additional real storage that may be needed to handle this growth.

Smooth upward transition

There is upward compatibility from System/370 Model 155 to System/370 Model 158, as well as from System/360. This compatibility does more than merely protect your original investments in Model 155 programming. It also makes for an orderly transition to the Model 158.

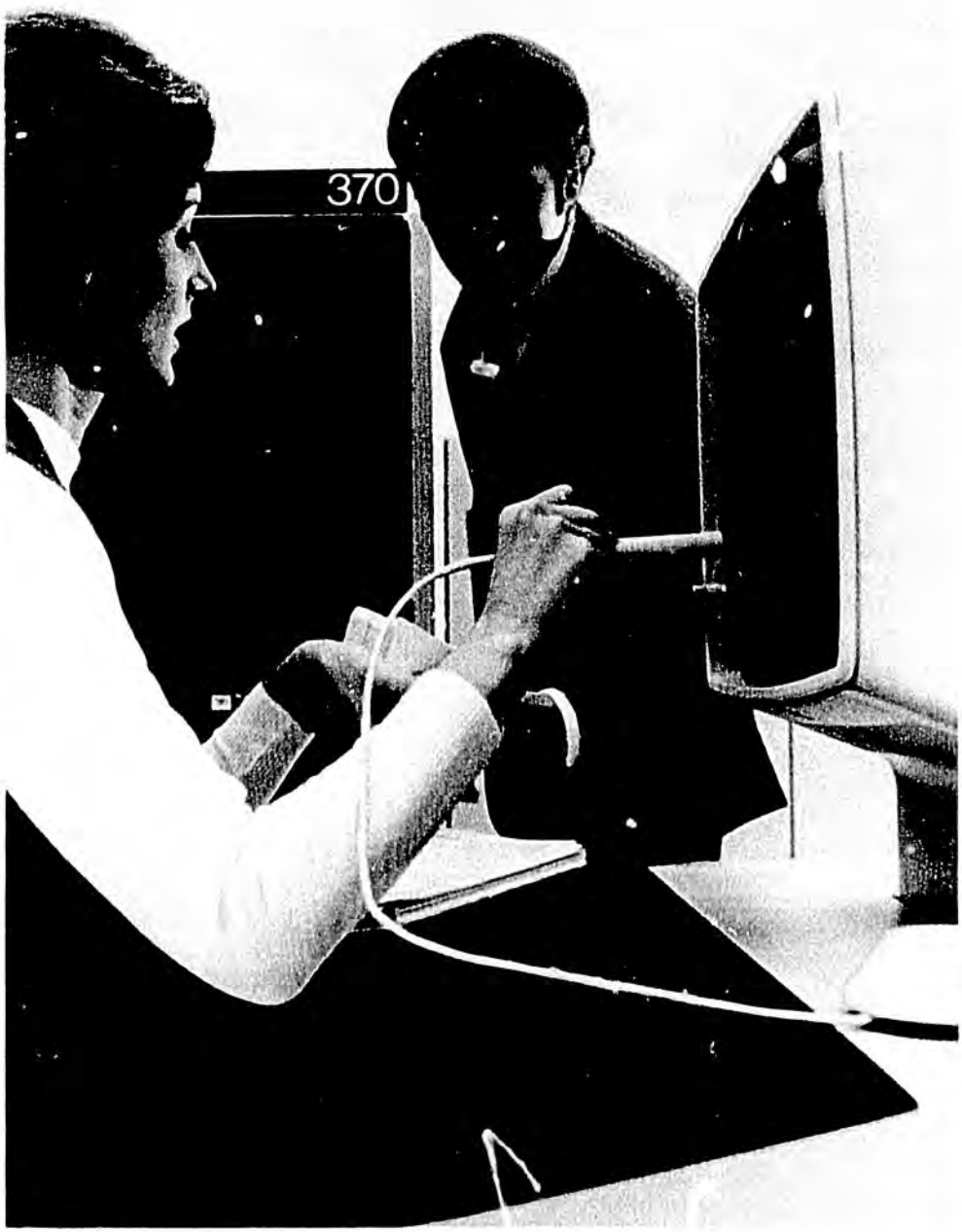
All-monolithic storage, another of the outstanding features of the Model 158, contributes significantly to the responsiveness, economy, and compactness of this powerful computing system.

This new implementation of processor storage makes system expansion more economical. Real storage capacity is available in 512K increments ranging from 512K to 2,048K bytes.

New instructions have been added to the System/370 instruction set to implement virtual storage. Other instructions have been redesigned to enhance performance.

The combination of monolithic storage and the improved instructions results in an increase in internal performance over the Model 155 when using the same operating system.

The 158 retains the instruction fetch-execution overlap of the 155, as well as the high-speed 8,192-byte buffer with an access time of 230 nanoseconds.



Integrated attachment of direct access storage

You can also get the optional Integrated Storage Controls feature that resides in the processor and provides for integrated attachment of direct access storage devices. Each of the two controls in the feature can accommodate up to sixteen 3330 Disk Storage drives, for a total integrated attachment of 32 drives per Model 158. This provides both a practical and economical way to attach DASDs.

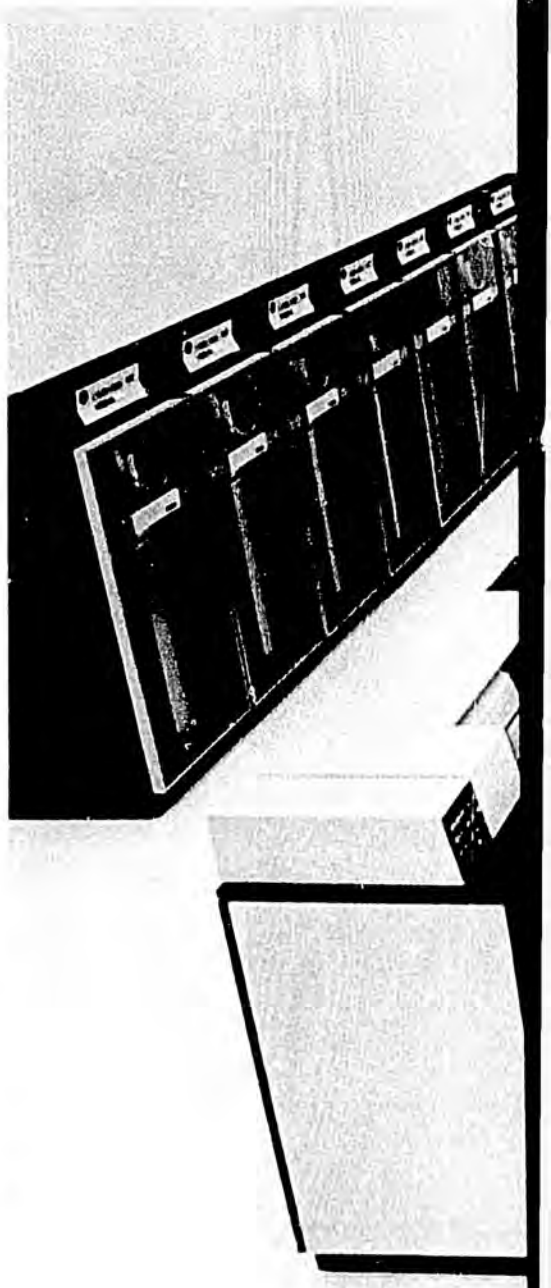
Other valuable features

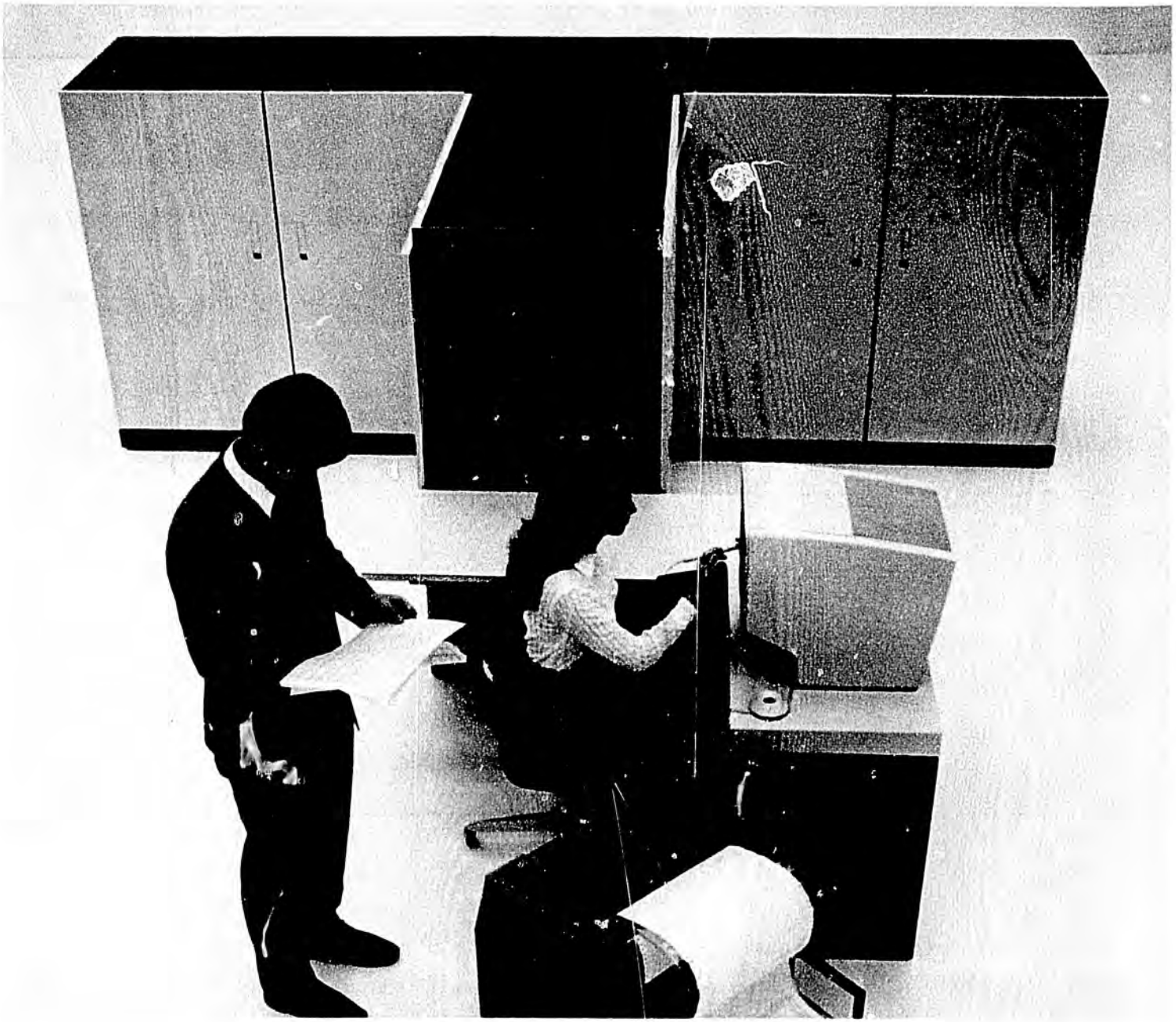
Reloadable Control Store (RCS) with a 115-nanosecond cycle time is used for controlling processor functions and channel operations. RCS can also contain the same emulators and extended precision floating point features previously available on the Model 155. The 1401/1440/1460, 1410/7010, 7070/7074 and DOS emulators and extended precision floating point may all be installed—on the same system—at the same time, and at no charge for any of them. More flexible than the Model 155 read only control storage, RCS also means easier and quicker installation of some engineering changes.

A new operator display console with light pen simplifies operation. Standard on the 158, the new console provides for operator/system communication and allows control of the system by a light pen. Service capabilities for maintenance are also provided. An optional 85-character-per-second console printer is available for use when hard copy records are wanted.

Up to five high-speed block multiplexer channels are available on the Model 158. Matched to the high-performance capabilities of the IBM 3330 and 2305 direct access storage devices and the 3705 Communications Controller, these channels provide the I/O capability needed in your data base/data communications applications. One or two byte multiplexer channels are also available.

Despite all that has been included, most configurations take up less floor space than present Model 155s.





New system control programming

A computing system as revolutionary as the Model 158 demands operating systems like none that have gone before.

And the Model 158 has them—in new IBM system control programming...OS/VS1 and OS/VS2, DOS/VS and VM/370.

OS/VS1 and VS2 are two new extensions of IBM's time-tested OS. VS1 is an extension of MFT, and VS2 of MVT. They are quite similar, but VS2 is more powerful and covers more ground.

OS/VS provides the software support for the Dynamic Address Translation facility, the vital element of System/370 hardware that makes virtual storage possible.

With OS/VS, the responsibility for the allocation of storage space to the jobs being processed rests with the system control software rather than with the programmer.

Automatic storage management, and the movement of required parts of executing programs from disk resident storage to main storage and back, enable your system to function as if it had much more storage than it really has.

What system control programming does

OS/VS programs supervise and coordinate the components of the system in handling many different jobs concurrently.

They execute and process the user's instructions. . . .

They schedule jobs so they can be processed on a continuous basis, and control the storage and retrieval of programs and data. . . .

They allocate real storage to the jobs being processed on a priority basis, to make most efficient use of available storage and other system resources. . . .

They perform the many housekeeping and service functions that combine to improve total operating effectiveness and to reduce job processing time.

In brief, they manage the machines so that your people don't have to. As a result, systems analysts and programmers can be more productive, because they are able to devote more time to creative programming, and cut down on that spent working on system management problems.

A boon to programmers

With OS/VS, your programmers can design programs to do the job in what they consider to be the best way. No longer must they work them out to fit available real storage.

With more storage on call, programs can be written in a more straightforward manner, with a minimum of overlays, multiple passes and other complicated programming devices.

Future additions to programs can be more easily implemented. And program maintenance simplified.

One program fits different size computers. Under OS/VS, a program written for a model of System/370 of one processor storage size can run on another System/370 with a different storage size when that system has Dynamic Address Translation capability.

Think what this means if you have System/370 computers of different sizes in several locations. Then your central programming staff may be able to write a single application program that will run on all of them.

And think what it means if you're looking ahead to adding applications that require more storage than your present applications require. You won't have to install the additional storage before getting started. Your programming staff can design the program, test it, and debug it before you add more storage or go to a larger processor.

Another new operating system

DOS/VS is an extension of DOS especially developed for use in a virtual storage environment. It provides many of the virtual storage advantages described earlier.

DOS/VS also offers a Relocating Loader which permits library storage of a program and its later execution in any available location of real or virtual storage. This feature along with the five partitions now available permits advancement to multiprogramming without costly reprogramming and simplifies entry into teleprocessing applications.

From one computer, many

System/370 Model 158 is also supported by the Virtual Machine Facility/370 (VM/370). This is a control program that simulates a number of computers, each one of which is the functional equivalent of System/370 Model 158.

VM/370, in effect, turns Model 158 into an array of computers. Three. Five. Even more.

These "virtual machines" are operated concurrently from remote terminals under multiprogramming techniques. The programs being executed in any particular virtual machine, however, seldom utilize the full resources of the Model 158, so this concurrent use results in increased real computing system utilization. And as far as individual users are concerned, each appears to have at his disposal all the facilities of the high-response, multiaccessed Model 158.

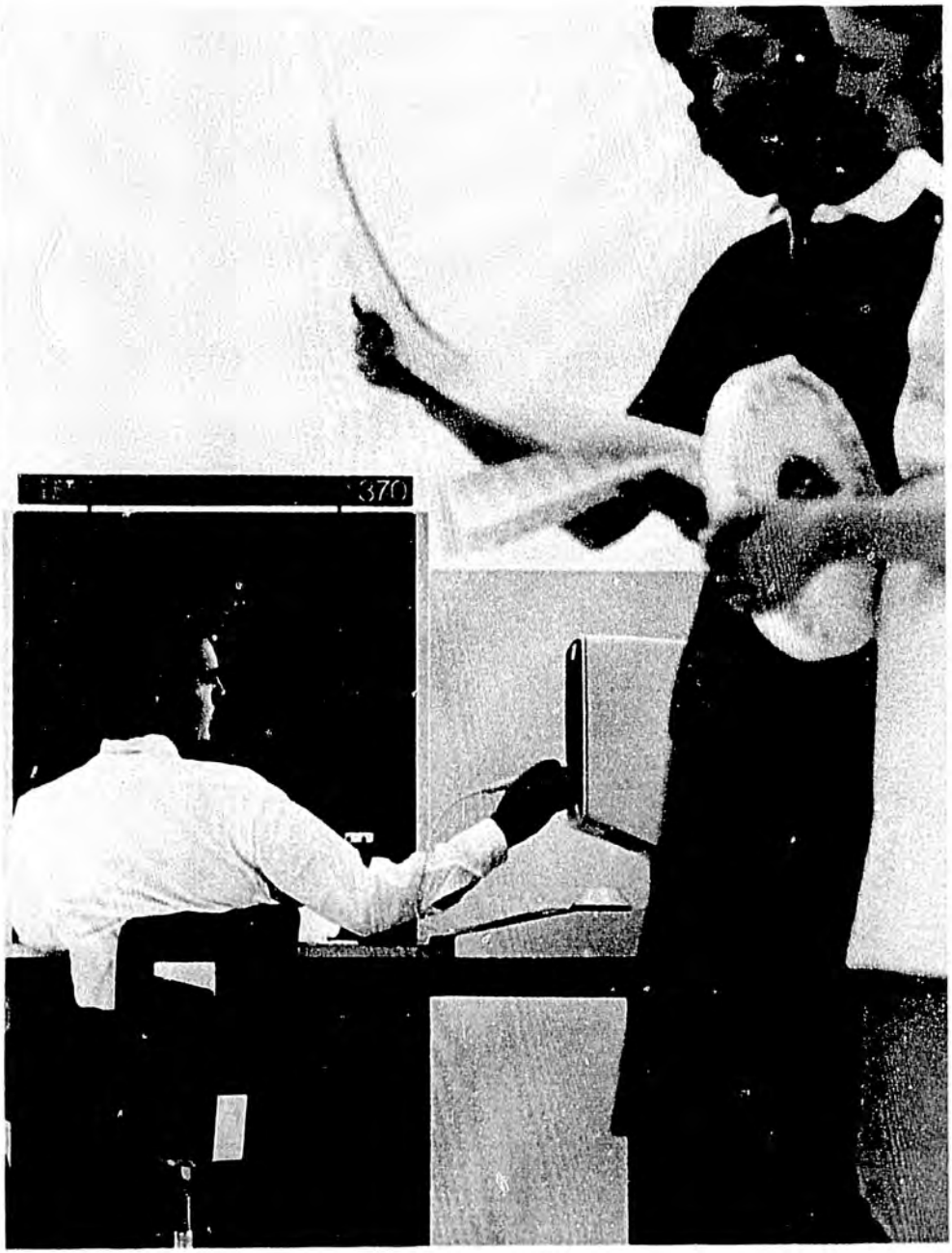
Get ready for the years ahead

If you're going to need more function than your present computing system can deliver, it's time to take a hard look at System/370 Model 158. Although we have covered many of its salient features in these pages, there's much more to tell.

Let your IBM representative fill you in on the details of how the Model 158 can help you reduce new application startup costs and program rework . . . simplify maintenance, program additions and corrections . . . use smaller, slower processors with similar I/O to back up a larger system, yet provide the same functions.

It's all part of IBM's commitment to help make your computer one of your most valuable assets.

Photographs show design models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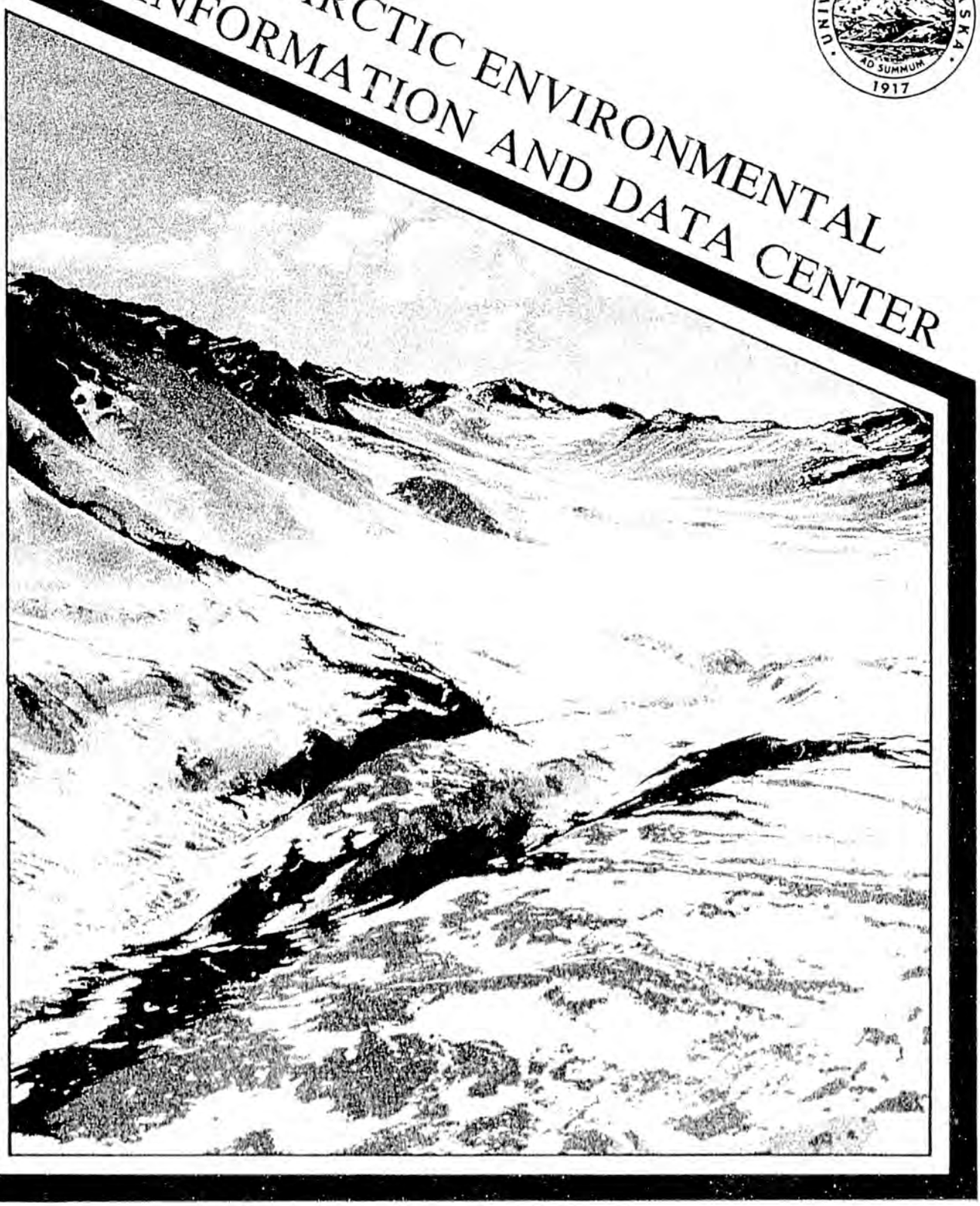
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER



1976

PURPOSE

In the early 1970s the demand for knowledge of Alaska's land and resources grew rapidly in response to oil development in the Arctic and the passage of the Alaska Native Claims Settlement Act (ANCSA). The Arctic Environmental Information and Data Center (AEIDC) was established in 1972 by the Alaska Legislature (H.B. 370) as a central source of statewide resource and environmental knowledge. The goals of the center are to provide facts about Alaska's environment and, if requested, to translate technical material into a comprehensive and comprehensible overview of environmental facts and issues without decision advocacy. Toward this end the multidisciplinary staff works together to find information, synthesize it for application to particular problems under investigation, and disseminate the results in various formats requested by government, industry, academia, Native corporations, and the general public. A corollary objective is to continue to efficiently provide services to the people of Alaska by adding current knowledge to our data base and making such information available to those who need it.

DESCRIPTION

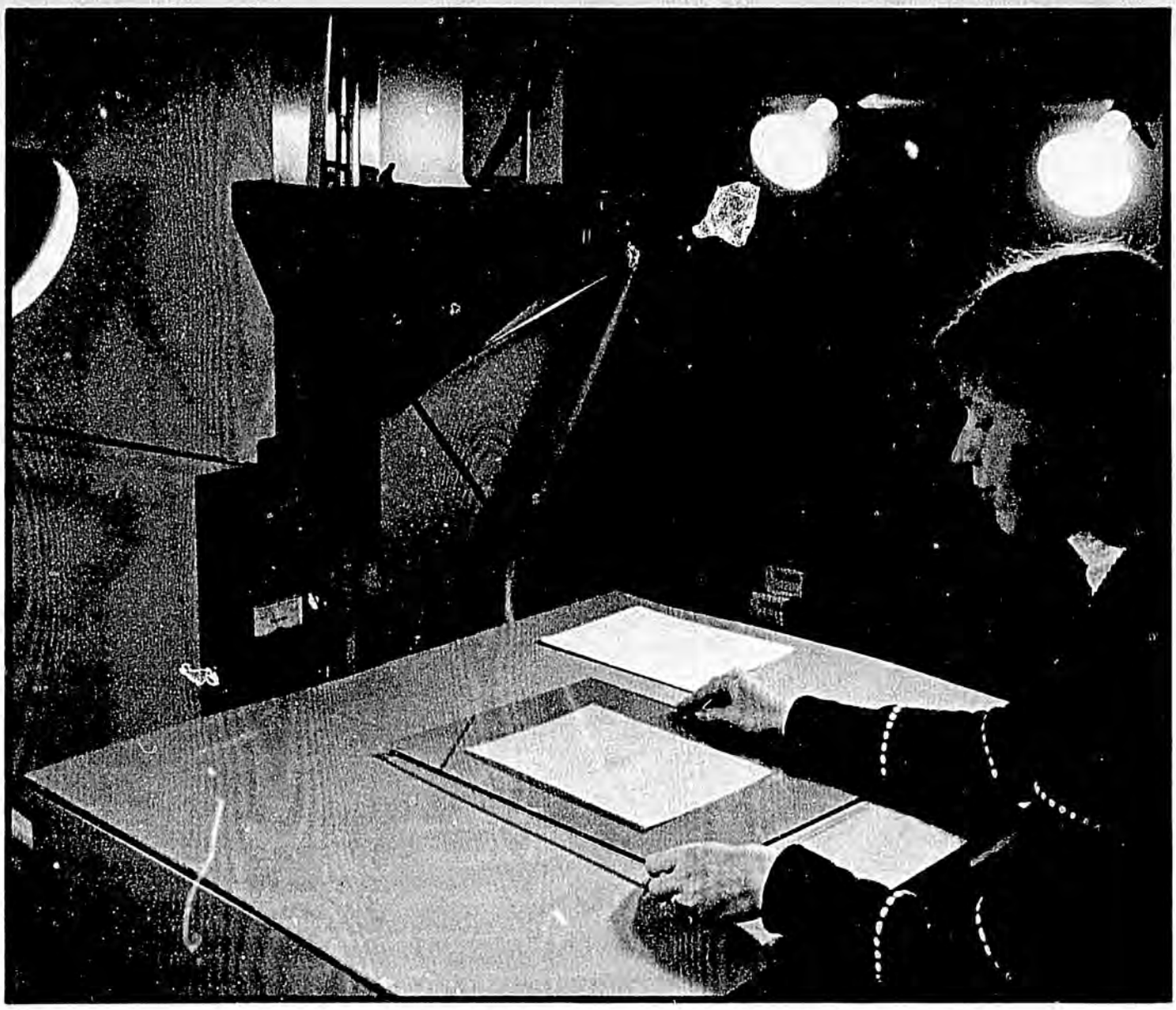
AEIDC, located at 707 "A" Street in the center of Anchorage, is close to the offices of many of the agencies and companies that use our services. However, the center operates statewide, conducting applied research investigations from the Arctic coast to the Panhandle.

AEIDC offers three complementary services—information, resources and science, and graphics and production. The staff gathers pertinent background material and bibliographic references, conducts field investigations, refines and synthesizes information into reports illustrated with graphics and maps. Final products can answer almost any need for information on the environment and resources of Alaska.

Information Services

Information Services performs four basic functions: 1) general information retrieval, referral, and interpretation; 2) public information dissemination; 3) weather and climatic record-keeping; and 4) remote sensing imagery file maintenance. The staff consists of a supervisor, two librarians, a library assistant, a micrographics-darkroom technician, and a secretary. The almost constant interaction between the scientific staff and the information services group is a unique feature of AEIDC compared to similar environmental and resource centers.

In the past year, more than 12,000 individual requests have been made by federal, state, and local agencies, universities and other schools, consulting firms, industry, Native organizations, libraries, journalists, lawyers, bankers, and the public. Referral and in-house files have been developed to answer information requests.

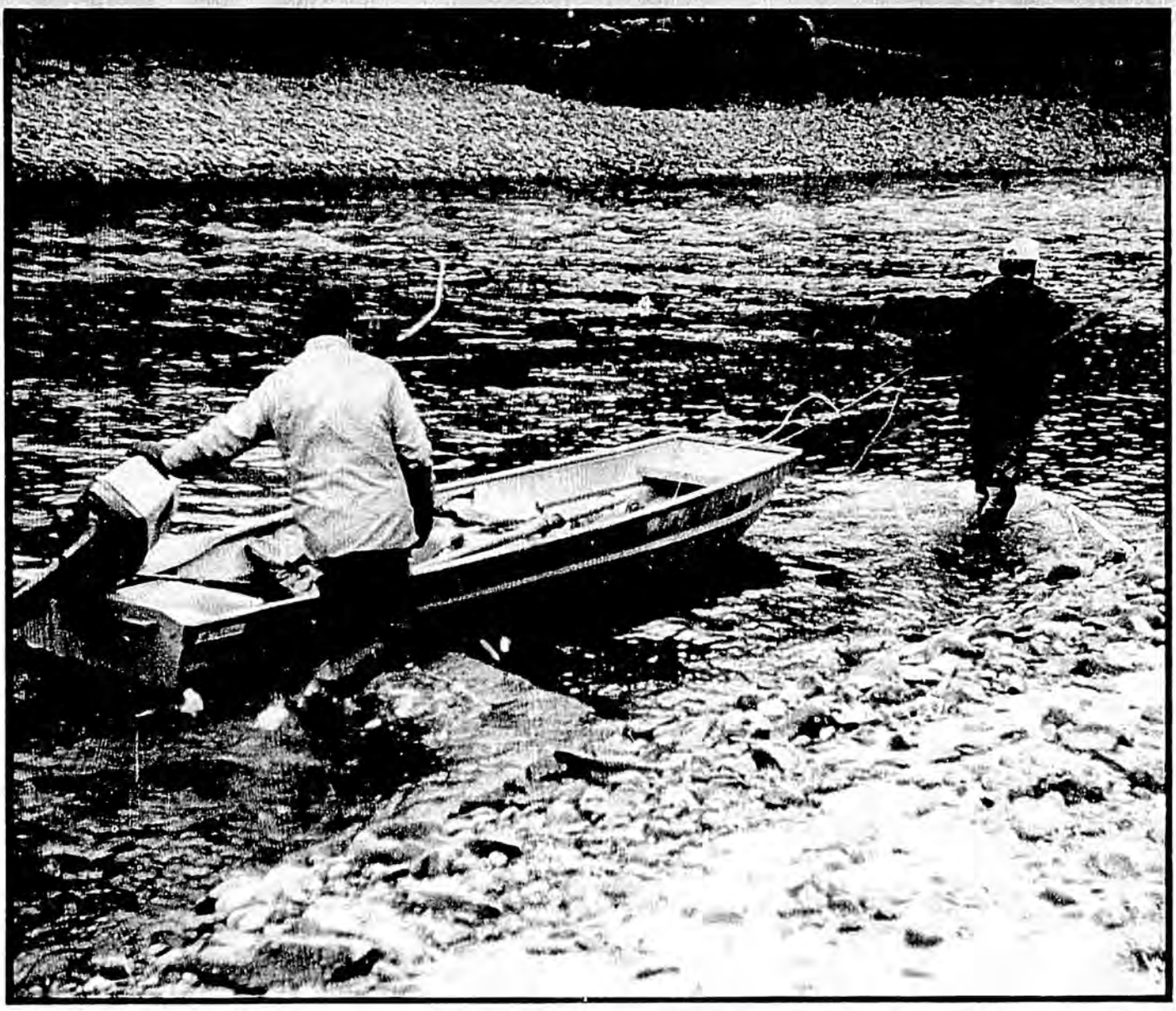


AEIDC's microfiche collection of unpublished Alaskan knowledge is constantly augmented.

A major objective is to share resources rather than duplicate what is available elsewhere in Alaska. AEIDC librarians maintain a list of "special" libraries throughout the state containing unique resources. A referral file of approximately 800 Alaskan investigators has been compiled and cross-indexed by areas of expertise. When information requests are received, individuals can quickly be referred to particular collections or people as the best sources of knowledge in the state.

In-house information is largely unpublished, out-of-print, or generally unavailable elsewhere in Alaska. The Library of Congress classification system is used along with author, subject, title, and geographic indexes. Many requests for information are by geographic area, so AEIDC librarians have cataloged all materials by Alaska's major hydrologic regions and subregions. In the past two years, 4,000 entries have been cataloged; 900 are publications, 600 are reprints, and 2,500 are on microfiche. AEIDC has a complete system for microfilming, processing microfilm, editing and preparing microfiche, and fiche duplication.

Special services include demonstration workshops on microfiche, ERTS/LANDSAT usage, and



. n AEIDC biologist joined personnel from four government agencies for an independent appraisal of the vironmental setting for proposed molydenum development near Ketchikan.

data organization. AEIDC librarians have assisted several state and federal agencies in organizing their data files and have prepared bibliographies on specific subjects or geographic areas. The staff also maintains a photo file by region and subject.

Resource and Science Services

The core of the AEIDC staff is a group of scientists and resource experts with lengthy and broad experience in Alaska. They respond to a variety of requests for applied problem solving through research and information analysis. The group consists of scientists and engineers in many specialties within several disciplines: biology, geology, hydrology, glaciology, climatology, geography, and arctic and marine engineering.

In addition to their participation with Information Services on many projects and requests, the science staff also conducts contractual studies for government and industry. Projects range from assisting Native corporations in land selection and management under ANCSA, to the preparation of major publications like the six-volume *Alaska Regional Profiles* series and the summarizing of background knowledge for a host of federal and state resource decisions. These activities generally

The translation and display of scientific knowledge through graphic arts is a cornerstone of AEIDC's dissemination efforts.

require that the science staff direct a literature survey, examine on-site conditions, and write a summary of factual findings. Final reports are reviewed, edited, and illustrated with appropriate graphic and map presentations.

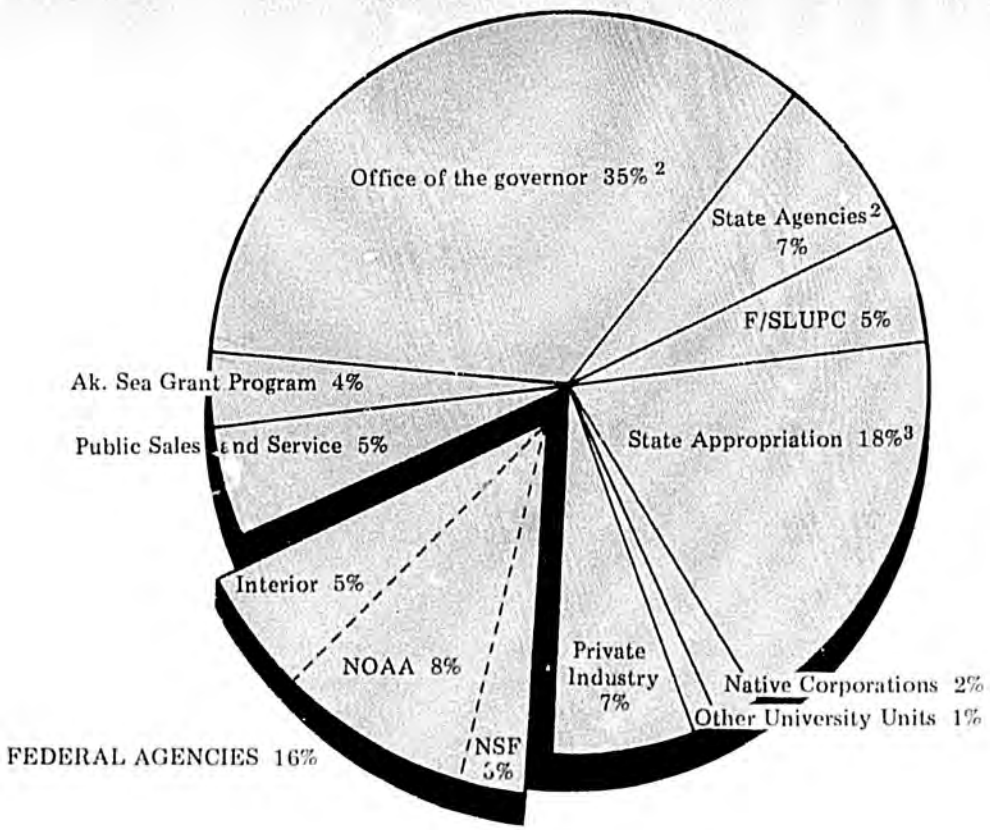
Graphics and Production Arts

Information publication and presentation are the functions of AEIDC's graphics and production staff, which includes a director-designer, an editor, a typographer, and several graphic artists and cartographers. This group supports the others by displaying information in the most appropriate way for its intended use. Presentations range from black-and-white maps to full color text publications. Additionally, AEIDC's graphics art staff provides advisory and contractual services to state and federal agencies and other units of the university system needing assistance on resource and scientific graphics, mapping techniques, and publication options.

AEIDC Within the University Structure

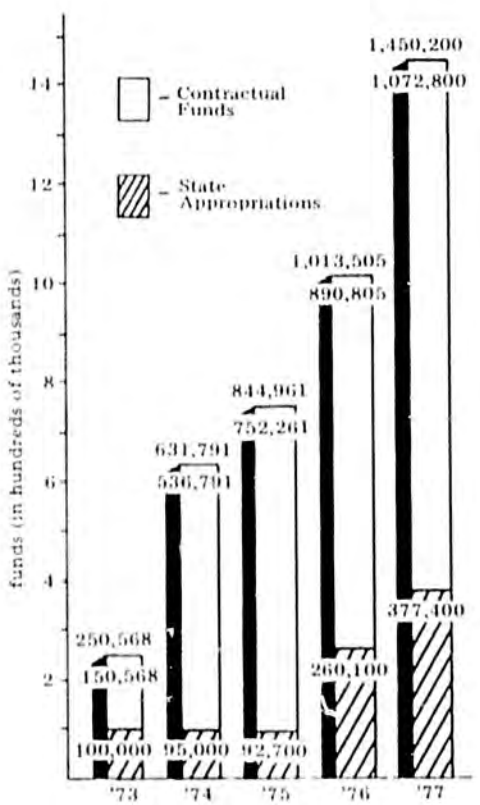
At the beginning of 1976 AEIDC reported directly to the Vice President for Research in the Office of the President. Presently, AEIDC is under the administrative cognizance of the Chancellor of the University of Alaska, Fairbanks. This will continue until a transfer is arranged between the respective Fairbanks and Anchorage campus chancellors.

In conduct of its applied research investigations AEIDC's internal university arrangements include coordination with the Vice Chancellor for Research and Advanced Studies, a permanent Anchorage-based liaison relationship with the Institute of Water Resources, cooperation with the Geophysical Institute on the maintenance of LANDSAT imagery files, project participation with the Alaska Sea Grant Program and Outer Continental Shelf Coordinating Office. Other University research institutes and centers with particular expertise often aid AEIDC research investigations.



SOURCES OF AEIDC OPERATING FUNDS DURING CALENDAR YEAR 1976[1]

1) Based on an estimated total of $1,030,300 for the calendar year
2) Presumed to be federal grant funds available to the state and used for contractual purposes and excluding funds provided for external printing contracts
3) State appropriation for CY 1976 derived from mean of FY 1975 and 1976 appropriations



HISTORICAL FY RELATIONSHIPS BETWEEN AEIDC STATE APPROPRIATIONS AND OTHER OPERATING FUNDS

Sources of Funds

AEIDC, as a function of the Organized Research Budget Reporting Unit of the university system, receives an annual appropriation from the Alaska State Legislature. The relationship of this annual appropriation to the total of center operating funds channeled through grants, contracts, and other sources of income by fiscal years is shown in the accompanying graph. For the calendar year, January 1, through December 31, 1976, the sources of center funds are shown graphically by percent.

HIGHLIGHTS AND SIGNIFICANCE OF 1976 ACTIVITIES

AEIDC's mission to provide information and conduct research on resource and environmental issues in Alaska makes all activities of the center of great significance to the State and people of Alaska. There is, of course, a scale of relative importance in our activities over any particular period of time, and opinions undoubtedly differ as to how this scale should be organized, depending on the point of view. Nevertheless, by any measure three accomplishments of the year's work are of major consequence: the completion of the *Alaska Regional Profiles*; a great broadening of our information services generally; and assistance to the Arctic Slope Regional Corporation in land selection and management matters which has helped the corporation achieve the first major agreement with the Department of Interior for land conveyances under ANCSA.

Beyond these three major highlights of center activity, the AEIDC staff has aided others and participated in outer continental shelf and coastal zone research and analysis, investigations pertinent to exploration and land use planning for Naval Petroleum Reserve No. 4, the dialogue and study of proposed land tenure and use changes throughout the state, and a variety of biological and geological research problems which collectively provide basic factual information for governmental decision processes. Some of these are further discussed here, while other activities are cited in the project abstract section at the end of this report.

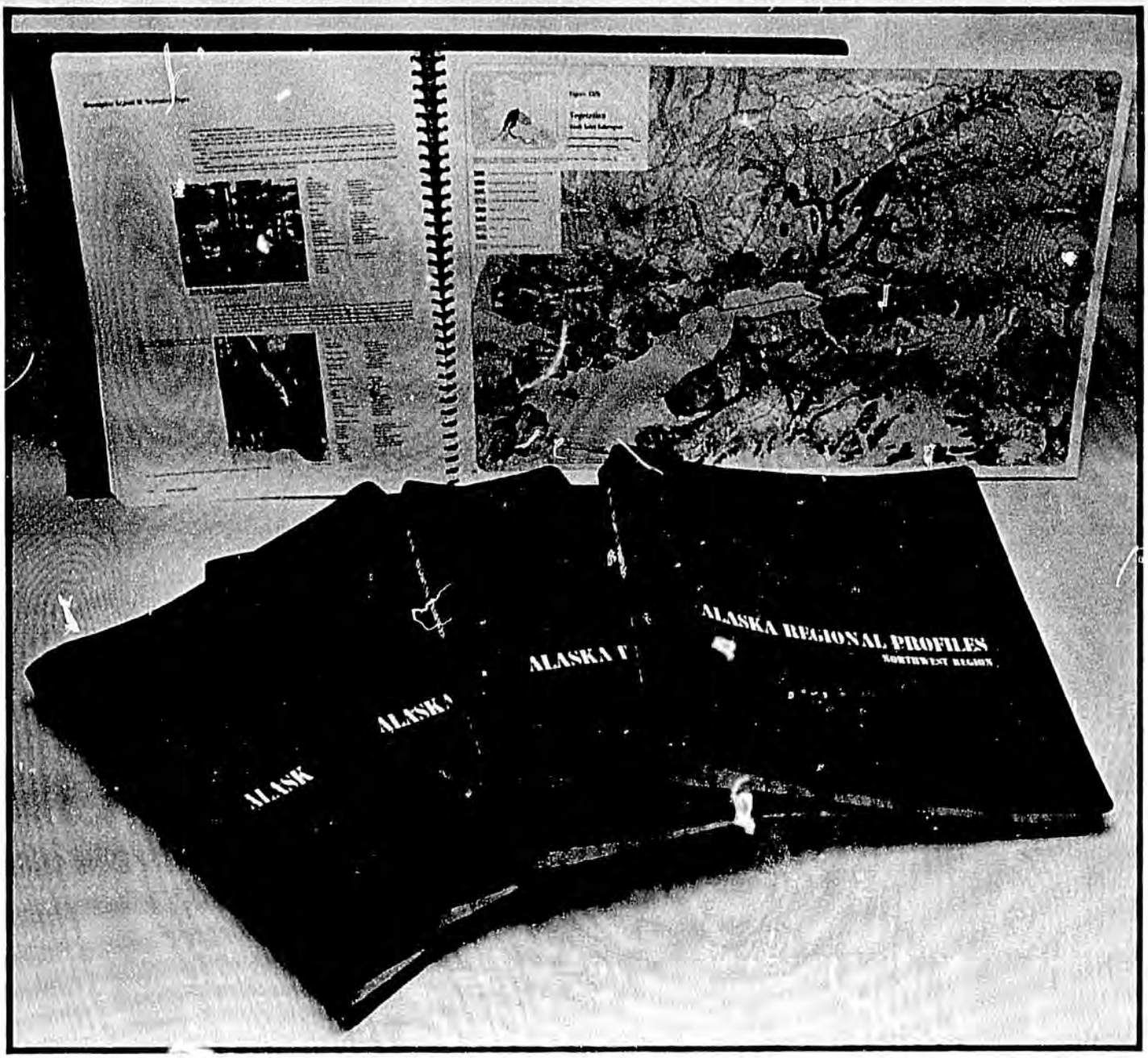
Completion of Alaska Regional Profile Series

The publication of the last four volumes of the six-volume *Alaska Regional Profiles* series was completed in 1976. These atlas-type books cover the physical, biological, and human resources of the southcentral, arctic, southwest, southeast, northwest, and Yukon regions of Alaska. Included are sections on climate, topography, marine environment, geology, minerals, water, soil, plants and animals as well as the man-made environment.

The simple text, descriptive graphics, and consistent map scale of the Profiles make knowledge of Alaska's natural and man-made environment accessible to everyone for the first time. The maps alone provide invaluable information for land management. Each region is divided into subregions shown at a 1:1,000,000 scale. There are 13 separate subject categories of maps in each Profile, ranging from topography to existing land status. With a complete set of Profiles these maps can be put together to show any specific resource or environmental feature of the entire state or overlays made to plot several different factors at once.

The Profiles have attracted national and international attention as a unique planning tool. Other states are using the Profiles as examples of how these kinds of data can best be presented in their own areas. Scientists throughout the world have been introduced to the Profiles at international conferences and by personal contact with AEIDC personnel or professional colleagues. Their comments indicate that this kind of comprehensive presentation of the resources and environment of a specific geographic area may be used as a prototype for planning in many other countries.

The Profiles as well as a variety of more geographically or topically specific AEIDC reports have been used for a variety of purposes by



The Alaska Regional Profile series, sponsored by the Office of the Governor and the Federal/State Land Use Planning Commission, are the most comprehensive atlas works ever produced for any state in the Nation.

many local, state, and federal agencies, private consultants, Native corporations, and other groups. The Capital Site Selection Committee used the Southcentral Profile to assist them in choosing the final three areas to be presented to the voters and in a brochure discussing each site individually. Southcentral was also used by the Kenai Peninsula Borough to prepare their economic development and planning grant applications and annual reports. Native corporations have used the Profiles to assist in land selections mandated by the Alaska Native Claims Settlement Act. Federal agencies constantly use AEIDC publications for planning purposes and preparation of environmental impact statements, such as for oil and gas leasing, Pet 4 exploration, and the Devil's Canyon Dam

development. Many high schools and community colleges throughout the state use the Profiles as teaching tools, text books, and sources of information for research projects.

The Profiles and other AEIDC reports have already been used extensively by members of Congress as they gather the facts needed to determine policy for management, tenure, and use of Alaska's land and resources. Even greater use can be expected when Congress reconvenes with new members to consider these issues. The importance of providing these data to those who will make these determinations cannot be overemphasized, particularly since Alaska is so little known and understood by many congressional members. The detailed maps in the Profiles graphically illustrate the complexities and variety in the natural and man-made systems in Alaska, and they provide a concrete, factual framework on which to base the critical decisions concerning Alaska's future.

Assistance to Native Corporations

AEIDC has assisted Native regional and village corporations with resource inventory and land selection management matters since its inception. During this period of several years we have provided information to 10 of the 12 regional corporations and numerous villages. Much of this activity terminated with the completion of regional land selections on December 18, 1975, but management advisory services continued during 1976 for AHTNA, Inc., Koniag, Inc., and the Arctic Slope Regional Corporation.

Our contributions to these corporations, have been generally significant in the development of environmental and resource knowledge for corporate planning and deliberations with federal and state agencies. In the case of ASRC, which will own and manage the largest cohesive block of land of any Native corporation in the state, AEIDC has advised and participated with them in their efforts to break through bureaucratic review procedures to achieve agreements for land conveyances. This achievement by ASRC, with the assistance of AEIDC and others, is of great significance to the state in setting the stage for the balanced development of valuable resource lands which will contribute to the economic, environmental, and social stability of Alaska.

Growth of Public Information Services

AEIDC's role as a repository and distribution center for Alaskan resource and environmental science information broadened considerably during 1976. Since inception, the conduct of contractual studies, analyses, and summation of knowledge reports has aided the step-by-step development of AEIDC's referral service and in-house data base. The collection and organization of data and information required for these projects, has provided a foundation of knowledge that can be used for many purposes. Essentially, during 1976 AEIDC achieved a "critical mass" stage in its collection of environmental and resource materials. With this achievement the use of the center's resources has grown dramatically.

Particularly significant to the state has been consultation with center scientists and the use of AEIDC files and facilities by personnel from state government agencies to compile facts and prepare reports pertinent to outer continental shelf development, coastal habitat appraisal, com-

AEIDC Director Hickok, Arctic Slope Regional Corporation Land Chief Adams and Chief Rexford planning land selections.

Information services on Alaskan resources and environments require eight man years of AEIDC staff time annually.

munity growth and planning, energy source and use evaluation and inventory, natural hazard appraisal, and a variety of other topics. This collaboration between state agency and AEIDC personnel has saved the state considerable time and money and, more importantly, referral services to the most expert sources available has assured greater breadth and accuracy of agency efforts.

Work on the resource and environmental issues of Alaska also involves federal agencies, industry, consultants, conservation groups, Native corporations, local government, and the news media. All of them have utilized AEIDC files and personnel to achieve their particular objective. During 1976 AEIDC responded to approximately 12,500 environmental and natural resource information inquiries requiring the expenditure of 7,426 professional staff hours of effort. Of these about two-thirds were from the governmental sector—a clear indication of relative use and importance. Additionally, the advice and consultation of professional staff members has been requested on the broadest imaginable spectrum of science and resource investigation, program and presentation matters. This advisory activity required the expenditure of another 5,138 professional staff hours of effort.

PROJECT ABSTRACTS

1. Resource Science Applications for Native Corporations
Principal Investigator: D. Hickok, L. Selkregg, E. Buck
Funding Agency: Arctic Slope Regional Corporation, AHTNA Inc., and Koniag Inc.
Description: Provide assistance and services to: (a) supply data regarding identification of land and resource values; (b) train corporation people in land and resource management methods, sciences, and technologies; and (c) analyze environmental land and resource problems.

2. Profiles of the Physical, Biological, and Human Environments of the Alaskan Outer Continental Shelf Lease Areas
Principal Investigator: D. Hickok
Funding Agency: National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program
Description: Prepare a document describing the physical, biological, and human environments of the Alaska OCS lease areas (Beaufort, Chukchi, and north Bering Seas, St. George basin, Bristol Bay, Aleutian coast, lower Cook Inlet, and Gulf of Alaska.)

3. Chukchi Data Gaps Report
Principal Investigator: C. Evans
Funding Agency: National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program
Description: Prepare a report outlining data gaps in the physical and biological information relating to development of the Chukchi Sea outer continental shelf.

4. Marine Mineral Bibliography for Alaska
Principal Investigator: J. Zenan, P. Brommelsiek
Funding Agency: Alaska Sea Grant Program, University of Alaska
Description: Prepare a bibliography documenting the published results of research conducted on marine minerals in order to appraise the state of knowledge of Alaska's marine waters.

5. Bibliography of Coal Resources in Arctic Alaska
Principal Investigator: E. Buck
Funding Agency: Kaiser Engineers
Description: Provide bibliographic support of U.S. Bureau of Mines contractor's job for coal resources evaluation of Arctic Alaska regarding climate, oceanography, topography, geology, minerals, water, soils, erosion, permafrost, vegetation, animals, transportation, and communication.

6. Environmental Assessment of the Proposed Gas Pipeline from Prudhoe Bay to the U.S.-Canadian Border
Principal Investigator: D. Hickok
Funding Agency: Gulf Interstate Engineering Co.
Description: Prepare a report covering an environmental description of the proposed gas pipeline route from Prudhoe Bay to the U.S.-Canadian border along the Alaska Highway in accordance with Federal Power Commission guidelines.

7. Proposed Study Plan for the National Petroleum Reserve in Alaska
Principal Investigator: D. Hickok
Funding Agency: Secretary of the U.S. Department of Interior
Description: Prepare a proposed study plan, organization, and approach by which the Secretary of the Interior can implement the directives of the Naval Petroleum Reserves Production Act of 1976 to conduct the Task Force study of Sec. 105(c)(1).

8. Environmental Data Base Directory for the State of Alaska
Principal Investigator: L. Dreyer
Funding Agency: National Oceanic and Atmospheric Administration, Environmental Data Service
Description: Collect, reference, and code unpublished environmental data from various sources throughout Alaska not already entered in the NOAA Data Center.

9. Marine Climatology of the Gulf of Alaska and the Bering and Beaufort Seas
Principal Investigator: J. Wise
Funding Agency: National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program
Description: Determine and publish in three atlases the present knowledge of the climatological conditions of that portion of the Alaskan waters and the near coastal areas that are important to the development of the outer continental shelf. This is a joint project with the National Climatic Center, NOAA.

10. Administrative Support for the Environmental Data Service, Outer Continental Shelf Environmental Assessment Program Representative
Principal Investigator: D. Hickok
Funding Agency: National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program

Description: Provide support facilities for the liaison representative of the Environmental Data Service, National Oceanographic Data Center, NOAA, who gathers and programs data from projects in Alaska sponsored by the Outer Continental Shelf Program.

11. Current Research Profile for Alaska
Principal Investigator: L. Dreyer
Funding Agency: National Science Foundation
Description: Continue and up-date a regularly published document listing by investigator, subject, and geographic location all research in progress on the physical and biological environments of Alaska. This reduces duplication in research and provides awareness of related research to scientists and agencies.

12. OCS Assessment Atlas Preparation, Phase I
Principal Investigator: L. Selkregg, E. Buck
Funding Agency: National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program
Description: Develop and design a possible atlas series utilizing 1:1,000,000 scale base maps of the five OCS assessment areas: Gulf of Alaska, Aleutians, Northern Bering, Chukchi, and Beaufort Seas, including an appraisal of the amount and quality of available background information for each of the natural environmental functions of each area. A prerequisite for the production of a proposed OCS Atlas series by AEIDC.

13. Ecological Reserves in Alaska
Principal Investigator: L. Underwood
Funding Agency: Joint Federal-State Land Use Planning Commission for Alaska
Description: Prepare a report summarizing government, academic, and public recommendations with appropriate map exhibits for the designation of Ecological Reserve Areas in Alaska.

14. Fish Overwintering in Arctic Alaska
Principal Investigator: W. Wilson
Funding Agency: U.S. Department of Interior, Fish and Wildlife Service
Description: Assemble and consolidate information related to fish overwintering, winter water conditions, and use conflicts by man and fish or wildlife on the North Slope of Alaska, present known or possible solutions to conflicts, and identify major informational gaps.

15. Village Planning Folio for the NANA Region
Principal Investigator: L. Selkregg
Funding Agency: Alaska Department of Community and Regional Affairs
Description: Develop and print a folio for each of the NANA villages providing a permanent data base for use by villagers, municipal councils, and state and federal government agencies in selection of sites for improvement and development of land use criteria and assisting local people with their goals and objectives for cultural preservation and growth.

16. Village Water Planning in the North Slope Borough
Principal Investigator: L. Dreyer
Funding Agency: Alaska Department of Natural Resources
Description: Provide a background report and recommendations for village water plans in eight arctic villages of the North Slope Borough. This is a joint project with the Institute of Water Resources.

17. Wildlife Refuge Land Replacement Study
Principal Investigator: C. Evans
Funding Agency: U.S. Department of Interior, Fish and Wildlife Service
Description: Provide necessary maps, overlays, resource data, and land status information regarding wildlife habitat for 31 species groups for all of Alaska. This will be used to comply with Section 22 (e) of the Alaska Native Claims Settlement Act.

18. Graphic Arts for F/SLUPC "D-2" Book
Principal Investigator: E. Coté
Funding Agency: Joint Federal-State Land Use Planning Commission for Alaska
Description: Prepare camera-ready maps for four color printing in the Commission's forthcoming "D-2" book.

19. Alaska Regional Profile Series
Principal Investigator: L. Selkregg
Funding Agency: Office of the Governor, Division of Policy Development & Planning
Description: Continuation of preparation and printing of six regional profiles consisting of an inventory and description of natural resources and systems throughout Alaska to provide a factual basis for planning the allocation and development of Alaskan resources.

20. Slide and Narrative Preparation on Fisheries Information for Proposed National Wildlife Refuges
Principal Investigator: E. Buck
Funding Agency: U.S. Department of Interior, Fish and Wildlife Service
Description: Prepare 35 mm slides of maps of nine proposed national wildlife refuges in Alaska showing fisheries data; prepare microfiche of small prints of overlays showing fisheries data and narrative reports.

21. Environmental Assessment of Fisheries Impact of U.S. Borax Road Construction
Principal Investigator: E. Buck
Funding Agency: Alaska Resource Sciences Corporation
Description: Compile data and conduct an independent appraisal of alternative systems proposed by the U.S. Borax Company relative to the Quartz Hill mining project's impact on fisheries.

22. Outline for Resource Summary of Alaska Regional Profile Series
Principal Investigator: L. Selkregg
Funding Agency: Joint Federal-State Land Use Planning Commission for Alaska
Description: Prepare an outline for a proposed document on natural resource occurrence relationships and knowledge on a statewide basis.

23. Resource Areas Computation
Principal Investigator: E. Buck
Funding Agency: Joint Federal-State Land Use Planning Commission for Alaska
Description: Prepare an acreage aggregation by resource categories for various land classifications in Alaska.

24. Pet 4 Bibliography
Principal Investigator: L. Dreyer
Funding Agency: U.S. Department of Interior, Fish and Wildlife Service
Description: Compile and prepare an annotated bibliography of physical, biological, social, economic, and cultural data on the Naval Petroleum Reserve No. 4 in addendum to bibliography provided with report to Secretary of Interior on the proposed study plan for NPR No. 4.

25. Life Cycle Posters
Principal Investigator: E. Cote
Funding Agency: Alaska Sea Grant Program, University of Alaska
Description: Produce and print five posters illustrating marine species life cycles.

26. Arctic Slope Bird Distribution Maps
Principal Investigator: C. Evans
Funding Agency: U.S. Department of Interior, Fish and Wildlife Service
Description: Redraft 13 previously prepared (by AEIDC) Arctic Slope bird distribution maps onto mylar reproducible black-and-white plates for printing.

27. Base Maps for OCS Research Compilation
Principal Investigator: E. Buck, E. Coté
Funding Agency: National Oceanic and Atmospheric Administration, Outer Continental Shelf Environmental Assessment Program
Description: Prepare base maps of five OCS lease areas for the compilation of scientific research results.

28. Alaska Seas and Coasts
Principal Investigator: N. Munro
Funding Agency: Alaska Sea Grant Program, University of Alaska
Description: Write, produce, and disseminate the Alaska Sea Grant Program periodical *Alaska Seas and Coasts.*

29. Capital Relocation—Development of Land Evaluation System
Principal Investigators: L. Selkregg and W. Searby
Funding Agency: Capitol Site Selection Commission
Description: Assist in development of criteria for capitol land evaluation and selection. Establish coordination among State and Federal agencies with applicable data and expertise.

Arctic Environmental Information and Data Center
David M. Hickok, Director
707 A Street
Anchorage, Alaska 99501

Cover photo by C.D. Evans, AEIDC

The West Coast Show

The Western Art Directors Club Eleventh Annual Exhibition of Communicating Arts

For the past decade, the Western Art Directors Club has been hosting a communicating arts competition unlike any other on the West Coast. . . .

Nominal Entry Fees.
So your decision to enter a piece can be based on how good your work is, rather than how thick your wallet is.

Judging by super-peers.
No one just superficially linked to the creative process. Rather, judges who do just what you do—create, produce, and approve work that communicates. One designer. One art director. One copywriter. And one client. All of whom have earned national reputations for their abilities.

A top-notch annual.
Every piece that gets into the show gets into the book. Professionally reproduced on a page by itself. With a complete list of credits.

Awards that are more than just awards.
Gold, Silver, and Bronze medals in each category, and certificates of merit for all pieces accepted in the show. Unique certificates, showing the piece you won the award for.

An awards evening to remember.
A one night stand. Complete with a hanging of all the accepted pieces. Annuals hot off the press. And a presentation of the medal award winners.

. . . Until now, the only limitation was that the work entered had to be created in Northern California.

As the competition enters its second decade, it is evident that the need exists for a show such as this on a much broader scale. An open, fair, complete competition encompassing the entire West Coast—a single competition that establishes the criteria by which all endeavors in the communicating arts in California, Oregon, Washington, British Columbia, and Alaska can be judged.

A competition unlike any other on the West Coast.

The West Coast Show.

Entry Deadline
September 5, 1975

Qualifications
Work must have been created on the West Coast—California, Oregon, Washington, British Columbia, or Alaska—and must have been published or aired for the first time between August 1974 and August 1975.

Preparation of Entries
Print: All pieces entered must be of exhibition quality. Accepted pieces will be photographed for inclusion in the annual immediately after judging. Submit unmounted proofs, tear sheets, printed pieces, or 35mm slides with completed entry form affixed to the back of each entry.

TV Commercials: Submit each single 16mm film entry on a separate reel. Film campaigns should be spliced together onto one reel with 3" of leader between each spot. Tape entries may be submitted in 2" videotape or 3/4" videotape cassette.

Radio: Submit 1/4" tape 7-1/2 ips. Individual entries for the same company may be spliced onto the same reel. Put 3" of leader between each spot. (Clearly specify number and title of spots and affix entry form to box.)

With the exception of transparencies, film, and videotape, no entries will be returned.

Entry Fees
First single piece: $16.00 (this includes 1 annual).
All subsequent single pieces: $6.00 each.
Campaigns (three or more pieces in same category):
$12.00 per campaign.
TV Entries: $10.00 (includes $4.00 for handling and return).
TV Campaigns: $16.00 per campaign.

Send check or money order for full amount of all fees payable to:

THE WESTERN ART DIRECTORS CLUB
P. O. Box 7532
Stanford, CA 94305

Notification of Acceptance
All notifications of acceptance will be made by October 1, 1975. Upon notification, a $35.00 fee for each single entry or campaign accepted will be due and payable to the Western Art Directors Club. These fees help defray costs for photography, exhibition, and publication. In addition, complete credits for each accepted piece will be requested.

The Show—A Night To Remember
An evening in December in San Francisco. The show will be hung in its entirety for all to see. A looking, talking, listening, and drinking experience. Hors d'oeuvres in such a quantity and variety you'll think it's a multi-course meal. Annuals hot off the press. And topping off the night—the presentation of awards.

The exact date and place will be announced later this fall.

The Jury
Sam Scali, V.P. Creative Director
Scali, McCabe, Sloves Inc., New York

Teresa Woodward, Designer
Tom and Teresa Woodward Design, Los Angeles

Milton C. Gravatt, Marketing Manager
Volvo of America Corporation, Rockleigh, New Jersey

Mike Koekler, Associate Creative Director
FCB/Honig, San Francisco

Categories

1. Magazine Advertising
   a. Consumer
   b. Trade

2. Newspaper Advertising
   a. Consumer
   b. Trade

3. Broadcast
   a. TV
   b. Radio

4. Company Literature (complete unit, page, cover, or spread)
   a. Annual Reports
   b. Product/Service
   c. Catalog
   d. House Organ/Trade Periodical
   e. Other company literature

5. Books
   a. Complete Unit
   b. Cover or Jacket

6. Corporate Identity
   a. Business Paper/ Letterheads, etc.
   b. Trademarks/Logotypes/ Symbols

7. Direct Mail

8. Illustration/Photography
   a. Photography
   b. Illustration

9. Packaging

10. Poster/Exhibits/Point of Purchase
    a. Outdoor Posters/Boards/ Signs*
    b. Institutional/Consumer Posters
    c. Point-of-Purchase/ Exhibits*

11. Miscellaneous
    a. Self-promotion
    b. Signage, interiors, architectural graphics
    c. Calendars and Menus
    d. Anything not covered in previous categories

Information

For additional information about any aspect of this exhibition, please contact Shirley Goodin, at (415) 321-4196.

*Submit Color Photographs or transparencies.

The West Coast Show
P. O. Box 7532
Stanford, CA 94305

Gene Cote
University of Alaska
Resource & Science Svc Ctr
707 "A" St/
Anchorage, Ak 99501

Form 1
This form and your remittance must accompany entries to:
The West Coast Show
P. O. Box 7532
Stanford, CA 94305

Name____________________

Phone____________________

Company____________________

Address____________________

City__________State_____Zip______

First Single Entry (includes 1 annual) $16.00

____ Add'l entries . . . . . . @ $6.00 each ______

____ Campaigns** . . . . . @ $12.00 each ______

____ TV Single entries . . . @ $10.00 each ______

____ TV Campaigns** . . @ $16.00 each ______

Total $________

**If you only enter one campaign add $10.00 for the cost of one annual (mandatory).

Form 2
Tape this form or facsimile to the back of each piece entered.

For campaigns or series only:
This is No._____ of _____

Category________ number ________ letter

Submitted by____________________

Company____________________

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Submitted by____________________

Company____________________

Design:
Bergthold, Fillhardt & Wright, Inc.

Typography:
Body copy—Atherton's Advertising Typography
Heads—Reprotype Typographers

Printing:
Peninsula Press

Paper:
Simpson Lee Paper Company

Institute of Water Resources

University of Alaska
Institute of Water Resources

Annual Report 1976

University of Alaska

Robert W. Hiatt	President
Howard A. Cutler	Chancellor, University of Alaska, Fairbanks
Keith B. Mather	Vice Chancellor for Research and Advanced Studies
James V. Drew	Director, Agricultural Experiment Station, and Acting Dean, School of Agriculture and Land Resources Management

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From the Director

Water, in its many phases, comprises an integral part of virtually all Alaskan life and the Alaskan environment. Snowclad peaks, rivers teeming with spawning salmon, domestic and industrial water supplies, the recreational diversion found at beach, stream, ski slope, or lake—these are a few of the aspects of the universal, vital role that water plays in the daily lives of the people of Alaska.

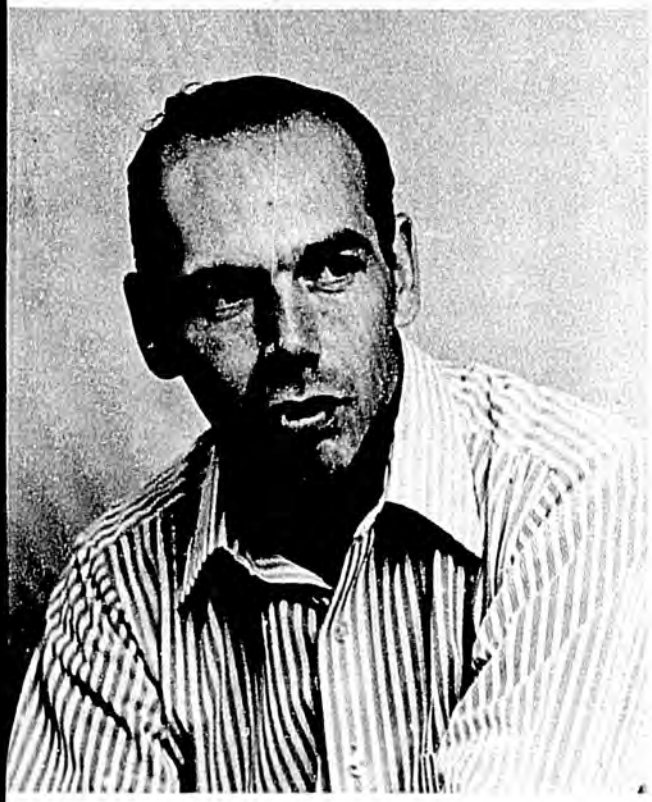
The Institute of Water Resources provides a focal point within the statewide University of Alaska for research concerning water, related environmental factors, and man's effective utilization and protection of this resource. The diversity of current research projects at IWR—ranging from historical analysis of water utilization in Cook Inlet to the dynamics of moisture in permafrost soils, from planning for water-based recreation to a pioneering study of arsenic in groundwater supplies, from computer modeling of snowmelt processes to consideration of water quality and the mining industry—provides at least a hint of the wide-ranging capabilities and interests of the IWR staff and associates.

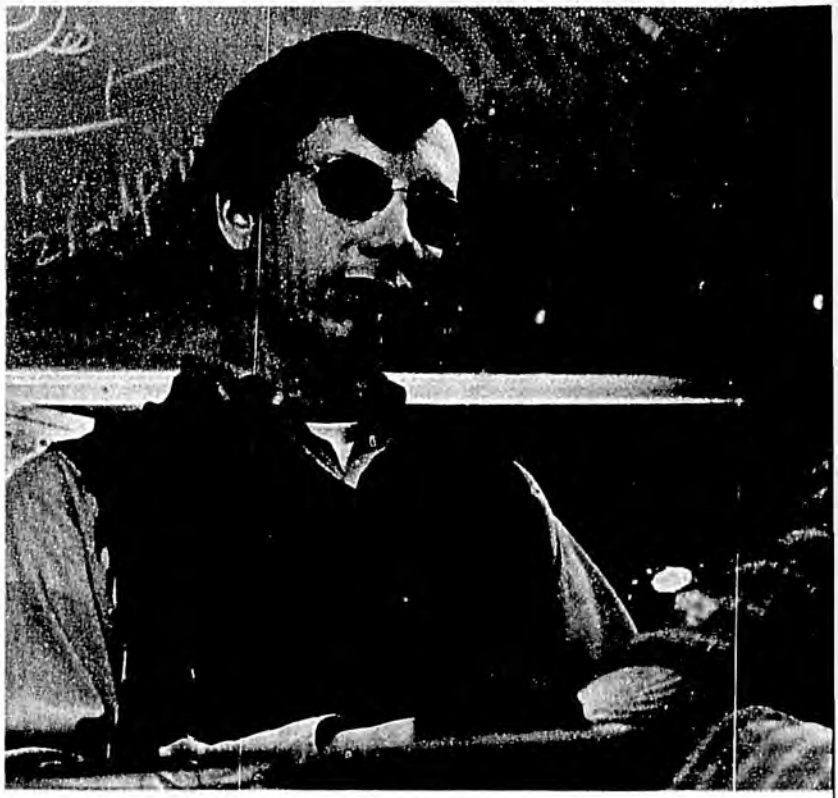
A primary goal of this institute is to provide service to the citizens of Alaska. While fundamental research is requisite to a complete understanding of our water resources, of equal importance is directly relevant, applied study to assist with the state's development, resource management, and concurrent maintenance of the qualities of living that brought many of us to Alaska. The direction which IWR takes must address and emphasize these concerns. In order to effectively meet this challenge, advice and input from you, the ultimate "consumer" of our product, is indispensable. We welcome your questions, your suggestions, your help, and your criticisms. Both the main IWR office at the Fairbanks campus and our Anchorage office at the Arctic Environmental Information and Data Center provide contact points for reports and data, and for receipt of your inquiries or suggestions.

Alaska is changing, and IWR intends to continue playing a positive role in the water-related questions associated with change. This annual report provides a current assessment of our capabilities and results. Please read it, use it, and communicate with us.

Charles W. Slaughter
Acting Director

The Institute of Water Resources





Background

The Institute of Water Resources was established at the University of Alaska as a result of the Federal Water Resources Research Act of July 17, 1964. The federal legislation created a new agency, the Office of Water Resources Research, now Office of Water Research and Technology (OWRT), to administer and fund research programs and maintain a water resources research institute in each state. Since 1964, the Institute of Water Resources has grown to a staff of sixteen principal investigators and about twenty additional professionals, research assistants, technicians, and support staff.

Objectives

The objectives of the Institute of Water Resources are to conduct competent research and training in water resources. The institute provides research and training opportunities in cooperation with other branches of the university. An active program of information dissemination is conducted on several levels through newsletters, report distribution, and seminars. The program also encourages feedback from interested parties on state water resources problems and research needs. Finally, as a state institute, the Institute of Water Resources has the responsibility of bringing state and regional problems to the national level.

Left to right:

Dr. Charles Slaughter, acting director and investigator with the U.S. Forest Service's Institute of Northern Forestry. Researchers with several federal agencies are affiliated with the institute.

Charles Hartman, IWR executive officer, is in charge of most of the institute's day-to-day operations.

Linda Dwight Dreyer, the institute's representative in Anchorage, answers public inquiries and participates in research projects.

IWR and the University of Alaska

The Institute of Water Resources is composed of an interdisciplinary staff, most of whom hold teaching and research positions. The primary function is research, but graduate student training and information dissemination are also important. Approximately 50% of professional staff time is devoted to coordinating course work and directing thesis research.

Through joint appointments and projects, Institute of Water Resources staff members are involved in a variety of departments including Geoscience, Engineering, Chemistry, Wildlife and Fisheries, Land Resources, and History. Institute of Water Resources staff members are also involved in activities with other research units such as the Institutes of Marine Science, Geophysics, Social and Economic Research, and the Arctic Environmental Information and Data Center. Researchers with federal agencies and other schools are also affiliated with the institute.

Information dissemination is accomplished by responding to public inquiries,

both general and technical, and through distribution of a quarterly newsletter, NORTHWATER, and published reports and journal articles. The newsletter and all institute reports are distributed to twelve University of Alaska libraries and seventeen state and federal libraries. The institute also sponsors conferences and symposiums to bring people together in the northern community for purposes of examining and seeking solutions to water resources problems.

The Institute of Water Resources has offices, a limnology laboratory, a chemistry laboratory, and an analytical instrument room in the Duckering Building on the Fairbanks campus at the University of Alaska. Some institute projects also use portions of the Chemistry and Geoscience Department facilities. The institute has a field station at Harding Lake and research sites at the Caribou-Poker Creeks Research Watershed and the Washington Creek Fire Study Area.

IWR and AEIDC

Since July 1975 the Institute of Water Resources has had an office in Anchorage at the university's Arctic Environmental Information and Data Center (AEIDC). Linda Dwight Dreyer, a research analyst in water resources and supervisor of AEIDC's Information Services, represents the institute in Anchorage and southcentral Alaska. She participates in ongoing IWR research projects and maintains IWR publications and reprints. She also assists agencies in the Anchorage area in planning research projects with the institute and by informing them of available research funding.

The Arctic Environmental Information and Data Center was established in 1972 by the Alaska State Legislature to provide a center for arctic resource and science information services. Resources include a referral file of Alaskan investigators cross-indexed by areas of expertise and in-house information that is largely unpublished, out-of-print, or generally unobtainable elsewhere in Alaska. Other special files include Alaskan weather records, ERTS/LANDSAT imagery, and photographic files. The scientific staff is responsible for information analysis, including the preparation of material for a regional profile series on Alaska, background environmental reports, and advisory services to Native groups regarding resource information for land selection authorized by the Alaska Native Claims Settlement Act of 1971.

In the past year, numerous requests for water resources information have been received from individuals throughout Alaska, from other parts of the United States, and from Canada and other countries. The requests are from federal, state and local agencies, universities and schools, consulting firms and industry, Native organizations, libraries, and public interest groups. Information is transferred via consultation, report and microfiche distribution, and referral to institute researchers actively engaged in a particular problem area.

IWR and Alaska

Since its establishment in 1964, the Institute of Water Resources has attempted to identify and evaluate Alaskan water resources problems and the research needed to understand and alleviate these problems. This process has become extremely important due to the current pace of development in Alaska and the rapid changes in land owner-

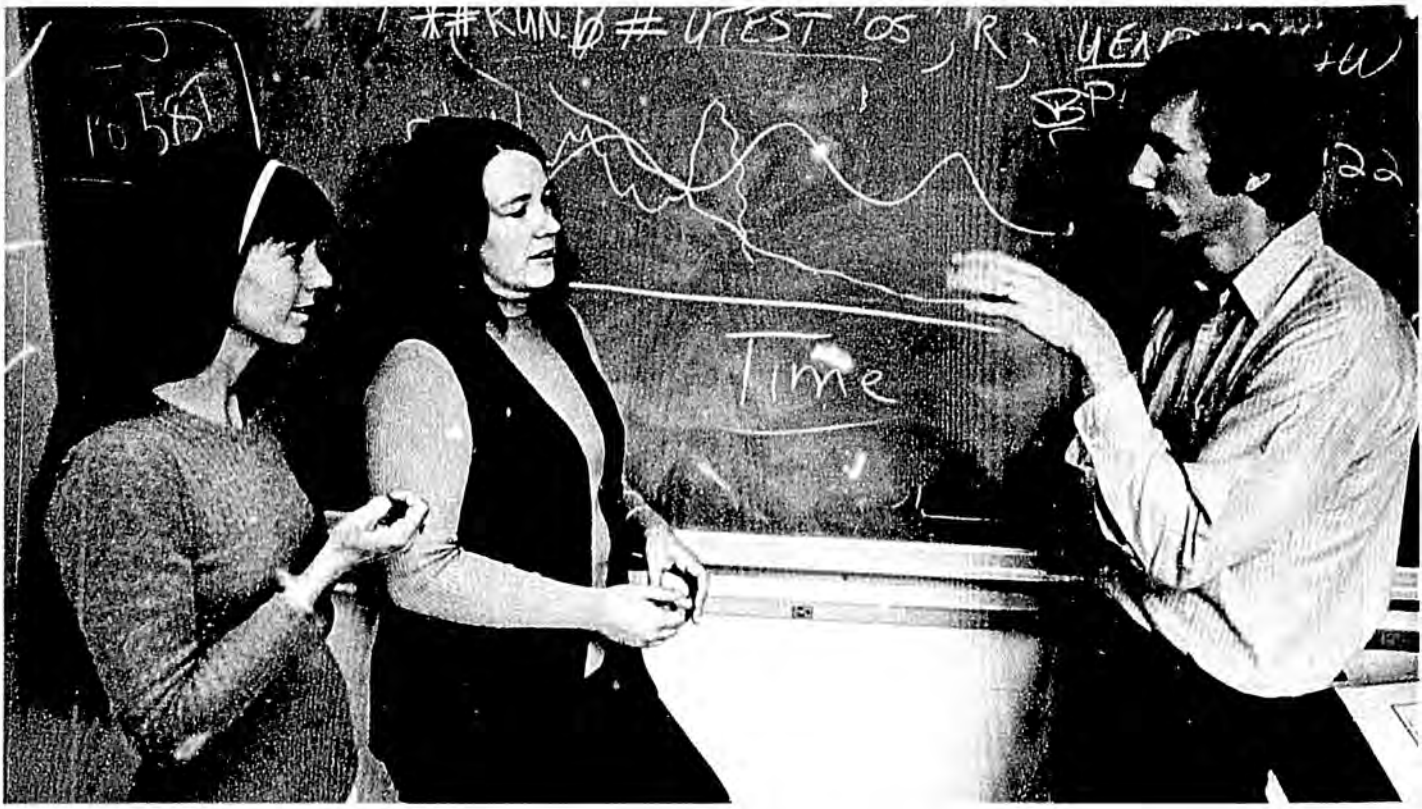
ship. Problem identification and research development is a continual process. A questionnaire was distributed in two issues of NORTHWATER this year to encourage input from all interests. The results confirmed that urban and village water supply and waste treatment management are high priorities. Coastal zone management and lake and stream management, especially minimum flow maintenance, are other priorities for water resources research in Alaska.

To expand research capabilities in areas of critical concern, the Institute of Water Resources is affiliated with personnel in federal agencies and other schools. Dr. Ronald C. Gordon and Dr. Elena B. Sparrow are research microbiologists with the U.S. Environmental Protection Agency's Arctic Environmental Research Station located on the Fairbanks Campus. One of their primary research efforts has been to assess the presence of indicator and disease-causing organisms and their survival rates in northern rivers.

IWR and Regional-National-International Activities

The Institute of Water Resources has an interest in regional and national problems. The institute is a member of the National Association of Water Institute Directors (NAWID) and the Universities Council on Water Resources (UCOWR) which assist OWRT and other federal agencies by defining water resources problems and research needs on state, regional, and national levels. As funded research must comply with regional and national needs, IWR can help ensure that problems within Alaska receive national attention. The institute also exchanges information with water resources centers throughout the United States, Canada, and other northern countries around the world.

Dr. Ronald Gordon testing survival rates of microorganisms in the Tanana River for EPA's Arctic Environmental Research Station.



Above: Charlotte Hok, Patricia Fox, and Dr. John Fox discuss computer applications for sparse data regions.

Right: Richard Seifert testing equipment to monitor ice fog emissions from the University coal-fired power plant.

Above: Dr. Robert Carlson.

IWR Staff and Associates

Kathleen M. Aamodt . . . . . Personal Secretary
Robert F. Carlson . . . . . Director and Prof., Hydrology
Donald J. Cook . . . . . Prof., Mining Engineering
Brent T. Drage . . . . . Graduate Research Assistant
Linda Dwight Dreyer . . . . . Research Analyst, Water Resources
Sheila G. Finch . . . . . Personal Secretary
John D. Fox . . . . . Asst. Prof., Land Resources
Patricia M. Fox . . . . . Statistical Analyst
Ronald C. Gordon . . . . . Affiliate Assoc. Prof., Env. Microbiology
Charles W. Hartman . . . . . Executive Officer and Research Engineer
Daniel B. Hawkins . . . . . Prof., Geology
Mary J. Hayes . . . . . Executive Secretary
Judith Henshaw . . . . . Draftsperson
Charlotte I. Hok . . . . . Laboratory Assistant I
William R. Hunt . . . . . Prof., History
Ronald A. Johnson . . . . . Asst. Prof., Env. Quality Engineering
Roberta L. Jones . . . . . Research Aide II
Douglas L. Kane . . . . . Asst. Prof., Water Resources
Jacqueline D. LaPerriere . . . . . Instructor, Water Resources
Gloria M. Matthews . . . . . Administrative Assistant (Fiscal Clerk)
Brien J. McAuliffe . . . . . Laboratory Helper
Mayo S. Murray . . . . . Technical Editor
Claus-M. Naske . . . . . Assoc. Prof., History
Lalitha N. Rao . . . . . Research Aide III
Kathleen S. Schedler-O'Bryant . . . . . Research Assistant
Marlys E. Schneider . . . . . Laboratory Assistant II
Richard D. Seifert . . . . . Research Hydrologist
Roger C.L. Shum . . . . . Technician I
Charles W. Slaughter . . . . . Acting Director and Prof., Hydrology
G. Warren Smith . . . . . Assoc. Prof., Chemistry
Elena B. Sparrow . . . . . Affiliate Asst. Prof., Env. Microbiology
Timothy Tilsworth . . . . . Assoc. Prof., Env. Quality Engineering
Thomas Weingartner . . . . . Graduate Research Assistant
Dorothy O. Wilcox . . . . . Graduate Research Assistant
Gil M. Zemansky . . . . . Environmental Engineer

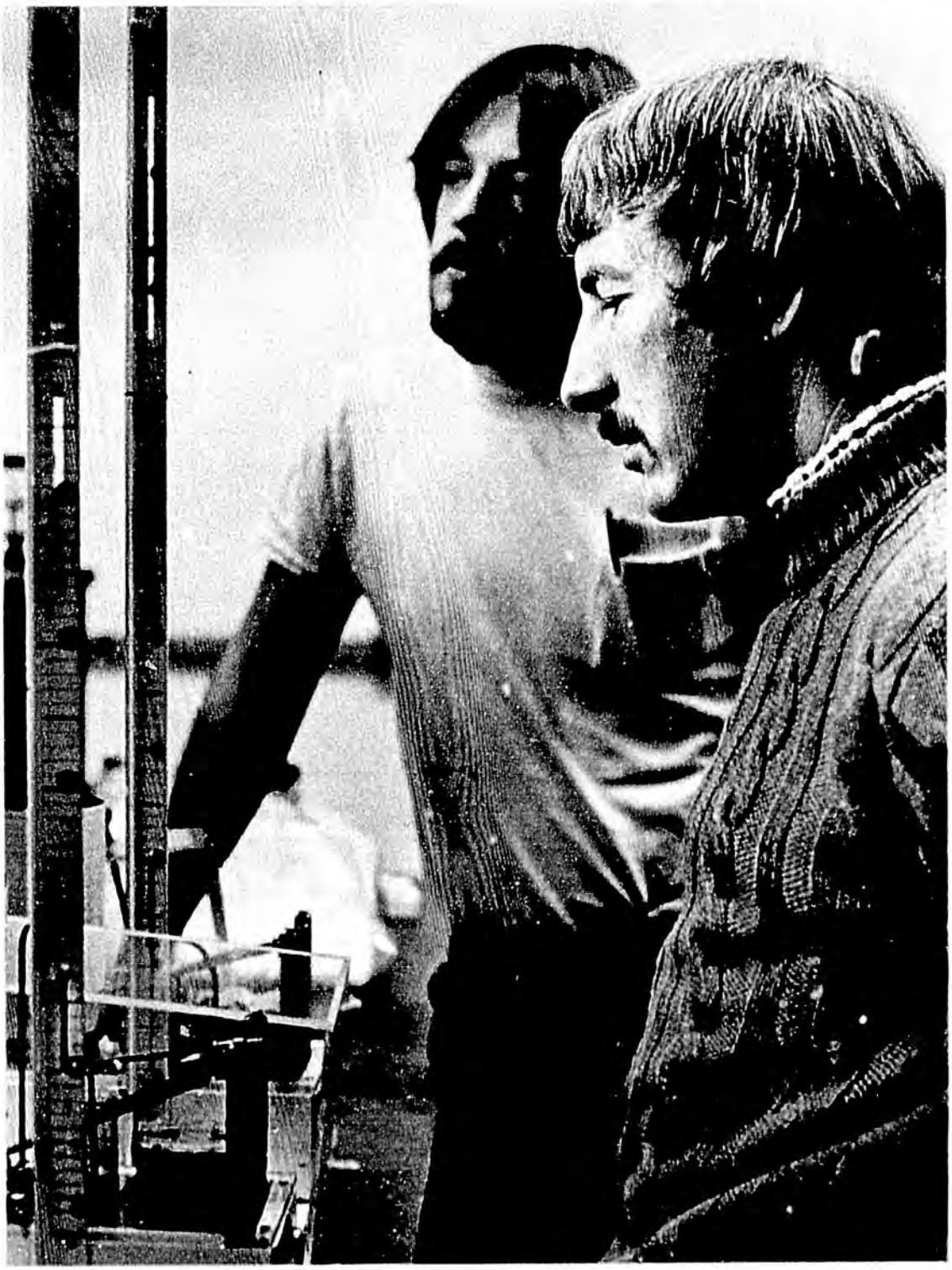
Summary of Research Projects

Investigators	Project	Funding Agency	Duration (Ending Date)
Surface and Groundwater Management			
R. Carlson D. Kane R. Seifert	Effects of Seasonability and Variability of Streamflow on Near-Shore Coastal Areas	NOAA/BLM	21 months (12-31-76)
R. Carlson P. Fox	Assessment of Snowmelt Prediction Models for Northern Watersheds	NOAA/US Weather Service	23 months (9-30-76)
R. Carlson P. Fox	Flood Frequency Design in Sparse Data Regions	OWRT/Univ of Alaska	36 months (6-30-77)
D. Kane R. Carlson	Hydraulic Mechanisms of Aufeis Formation	NSF	41 months (4-31-77)
D. Kane J. Fox	Snowmelt-Frozen Soil Interaction in a Subarctic Setting	OWRT	19 months (12-31-76)
D. Kane G. Taylor	Model Application to Urban Groundwater Problems, Fairbanks, Alaska	OWRT	27 months (9-30-78)
D. Kane G. Taylor J. Fox R. Seifert	Characterization of Subarctic Thermal and Moisture Regimes	US Forest Service	12 months (6-1-77)
C. Slaughter	Caribou-Poker Creeks Research Watershed	Interagency Technical Committee for Alaska	continuous since 1969
Environmental Management			
D. Smith T. Tilsworth	Failure and Success of Water and Wastewater Transportation and Treatment Practices in Remote Alaska	OWRT	24 months (6-30-76)
T. Tilsworth D. Cook	Alaska Mining and Water Quality	OWRT	12 months (6-30-76)
R. Johnson	Alaska Wastewater Treatment Technology	OWRT	15 months (9-30-77)
Environmental Water Chemistry			
D. Hawkins	The Environmental Path of Arsenic in Groundwater	OWRT	24 months (6-30-76)

Investigators	Project	Funding Agency	Duration (Ending Date)
G.W. Smith	Aqueous and Atmospheric Photochemical Degradation of Malathion	OWRT	21 months (9-30-77)
D. Hawkins	Hydrogeochemical Exploration of the Fairbanks Quadrangle	Los Alamos Scientific Lab	12 months (9-30-77)
Lake and River Management			
T. Tilsworth J. LaPerriere L. Casper	Nutrient Chemistry of a Large, Deep Lake in Subarctic Alaska	EPA	36 months (4-30-76)
J. LaPerriere	Environmental Planning of Alaskan Water-Oriented Recreation Areas	OWRT/State of Alaska	42 months (12-31-76)
R. Carlson	Examination and Further Development of an Existing Aquatic Ecosystem Model as a Useful Tool for Lake Management in Subarctic Regions	OWRT	36 months (6-30-77)
Air Quality Management			
R. Carlson	Development of an Operational Carbon Monoxide Transport Model for the Fairbanks Area	Fairbanks North Star Borough	24 months (6-30-76)
L. Leonard R. Siefert R. Johnson J. Zarling	Ice Fog Abatement and Pollution Reduction at a Subarctic Coal-Fired Heating Plant (with Geophysical Institute)	EPA	13 months (6-30-77)
General Water Planning and Control			
W. Hunt C.M. Naske	Beaufort Sea Historical Baseline Ice Study	NOAA	25 months (6-30-77)
W. Hunt	A Historical Survey of Water Utilization in the Cook Inlet-Susitna Basin	OWRT	12 months (12-31-76)
W. Hunt C.M. Naske	Hydroelectric Power Projects in the Cook Inlet-Susitna Basin, Alaska —A Case Study	OWRT	12 months (9-30-77)
L.D. Dreyer D. Kane	A Review of Alaska's Water Law and Administration	OWRT	12 months (9-30-77)
R. Johnson L.D. Dreyer	North Slope Water Planning Study (with AEIDC)	State of Alaska	12 months (6-15-77)

Research Abstracts

Dr. Douglas Kane and Brien McAuliffe calibrating tensiometers for subarctic soil moisture studies.



Surface and Groundwater Management

Effects of Seasonability and Variability of Streamflow on Near-Shore Coastal Areas

The freshwater flow from Alaska's many coastal streams is an important factor in understanding the local circulation and transport problems of the outer continental shelf and near-shore zone. This completed study was concerned with seasonability and year-to-year streamflow variability. Important seasonal characteristics of streamflow including breakup data, freezeup data, and flow variation throughout the year were examined. The way in which streamflow varies from year to year was characterized. Indices of seasonability and variability were related to areal basin characteristics. Sediment variations within a year and among years were also studied in relation to streamflow quantity. The overall objective was to determine and assess the characteristics of coastal streams important to offshore development activities.

Assessment of Snowmelt Prediction Models for Northern Watersheds

Runoff models presently used by the U.S. Weather Service were examined to suggest improvements for use in arctic and subarctic drainage basins. The official flow prediction model was used to simulate runoff in the Chena River basin. An examination of available input data, sensitivity of model parameters to subarctic conditions, and overall model simulation results led to recommendations for improving the prediction model.

Flood Frequency Design in Sparse Data Regions

In a continuing effort to improve methods of flood frequency design decisions for northern regions, a technique is being studied which combines failure criteria with demand frequency specifications. The sparseness of data available in northern regions requires additional statistical tools to infer proper design specifications. Bayesian statistical methods incorporating decision functions based on predicted losses and risks associated with the design will be used. Investigators are currently working on a literature survey and developing criteria.

Hydraulic Mechanisms of Aufeis Formation

The overall objective of this research is to gain a better understanding of the forces responsible for aufeis growth along streams and to design models for its control. This study has three segments: collection of basic field data, data analysis and formulation of a mathematical model, and application of the previous results to the engineering design of stream crossings. A thorough understanding of this process requires knowledge of the system boundaries, the stream-groundwater interaction, and the external climatological forces influencing the system. Delineation of the system boundaries in a permafrost setting has been studied over several winters. Pore pressure measurements adjacent to the stream and above the permafrost have also been measured over several winters, enabling determination of the direction of flow. Analysis of relationships between aufeis activity and external forces has been initiated. Considerable work is needed on flow in ice-covered streams, as well as on erosion and deposition of the stream bottom under these ice conditions. Present design methods of conveying water beneath stream crossings are not working and often augment the problems. Modification of existing structures as well as new construction techniques will be required to minimize maintenance made necessary by aufeis.

Snowmelt-Frozen Soil Interaction in a Subarctic Setting

A field, laboratory, and theoretical study of the heat and mass relationship between snowmelt and the underlying soil moisture regime has been completed. Two major water resource issues of concern in Alaska are flooding and groundwater management. However, an adequate understanding of groundwater recharge and flood generation is lacking in areas of discontinuous permafrost. Snowfall with subsequent surface storage over a period of several months typifies Alaskan winters. Rapid ablation of this snowpack with contributions to the groundwater aquifer and surface runoff is presently assumed; however, the exact pathway of snowmelt water in association with frozen terrain is poorly understood at this time. The major objectives of this study were preliminary field assessment of redistribution of the snowpack following the melt period, analysis of the data to predict potential recharge to the groundwater system, and application of the results to improve predictive models of snowmelt runoff.

Model Application to Urban Groundwater Problems, Fairbanks, Alaska

Rapid population growth in the urban fringe of Fairbanks, Alaska is imposing additional stresses on the groundwater system. The severity of these stresses is unknown due to both the lack of long-term data of subsurface conditions and a poor understanding of the role of permafrost in groundwater dynamics. Data on the groundwater activity in this area will be used in available mathematical models to gain an understanding of system dynamics. Two model applications being considered are: a two-dimensional unsteady model applied to typical cross-sectional flow situations to gain insight into recharge and discharge, and an unsteady areal model to evaluate the effect of pumping wells on the groundwater system. The results from this study will be helpful in determining when the level of optimum development of the groundwater system is achieved and when other water supply sources should be sought. This information will be useful for guiding future development.

Characterization of Subarctic Thermal and Moisture Regimes

In an environment where the climate is responsible for sustaining permafrost, surface alteration may be responsible for changing the response rate of the natural system. Since a slight change in the soil thermal regime may bring about a phase change in the water and/or ice present, the hydrologic implications are intensified. This study encompasses both a field and laboratory study of thermal and moisture processes and properties of near-surface soils. A two-dimensional transient flow model will be applied to a typical layered system. An attempt will be made to model the long-term soil temperature trends due to surface modification caused by fire. The overall objective of this study is the development of an understanding of both the thermal and moisture regimes of cold regions near-surface soils.

Caribou-Poker Creeks Research Watershed

The Caribou-Poker Creeks Research Watershed, 45 kilometers north of Fairbanks, was established by the Interagency Technical Committee for Alaska as a site for cooperative long-term investigations of the taiga environment. Research activities have initially been directed at improving the understanding of hydrologic, climatologic, and environmental relationships in an undisturbed, permafrost-dominated setting. With adequate baseline data, catchment-scale experimentation will be undertaken on the effects of resource management activities on these relationships, utilizing selected landscape manipulations

as treatments. The research watershed has been designated as an Experimental Ecological Reserve, and is available for a wide range of environmental and water-related research by university, state, and federal investigators.

Environmental Management

Failure and Success of Water and Wastewater Practices in Remote Alaska

A completed study attempted to identify causes of the failure of Alaskan water and wastewater treatment and transportation facilities and to seek methods for design improvements. A bibliography, *Cold-Climate Water/Wastewater Transportation and Treatment*, containing approximately 1,400 citations with keyword indices is in progress. Originally, this study contemplated an evaluation of systems performance in remote areas in relation to the original conception, planning, design, and construction. Because of the tremendous amount of literature examined, this was not completed.

Alaska Mining and Water Quality

A completed project identified research needs for understanding ways in which Alaska's mining industry can effectively and economically meet proposed federal effluent requirements and existing state water quality standards. Recent increases in the value of gold may lead to increased mining operations in Alaska, principally in placer mining. As very few placer mines operate elsewhere in the United States, little information related to water quality deterioration and environmental damage is available. The energy crisis has resulted in a close examination of resource management and energy alternatives. Alaska has an abundance of known coal reserves and a large deposit of metallurgical grade coal, of which there is a world shortage, in the Bering River Coal Field. Other mineral resources will probably be exploited in the near future. As it is imperative that Alaska take steps to identify problems and solutions related to mineral explorations, mining activities, and environmental degradation, all literature pertinent to water quality deterioration from mining activities was reviewed. A symposium entitled Alaska Mining and Water Quality was held April 9, 1976, in Fairbanks. The symposium included various viewpoints and attempted to foster communication between the agencies involved and the mining concerns.

Alaska Wastewater Treatment Technology

Passage of the 1972 Amendments to the Water Pollution Control Act, PL 92-500, more commonly known as the Zero Discharge Act, has required improved wastewater treatment technology. Determining the requirements for Alaskan villages and urban communities will be difficult. Present use ranges from honeybuckets and pit privies to community septic tanks and package treatment units. Severe climatological conditions in Alaska require further modifications to conventional treatment systems in order to provide the necessary environmental protection. The objectives of this research are to collect and evaluate information on wastewater treatment systems utilized in Alaska. This will include information relative to the state-of-the-art for treatment technology of systems ranging from individual household units to major municipal and industrial operations. Treatment systems will be identified by size and type of treatment provided, and those with available operational data will be evaluated for effectiveness in complying with

environmental regulations. Emphasis will be placed on modifications necessary for cold-climate operations. Much of the project effort will be devoted to a study of household units and units which can be used in villages and remote installations.

Environmental Water Chemistry

The Environmental Path of Arsenic in Ground Water

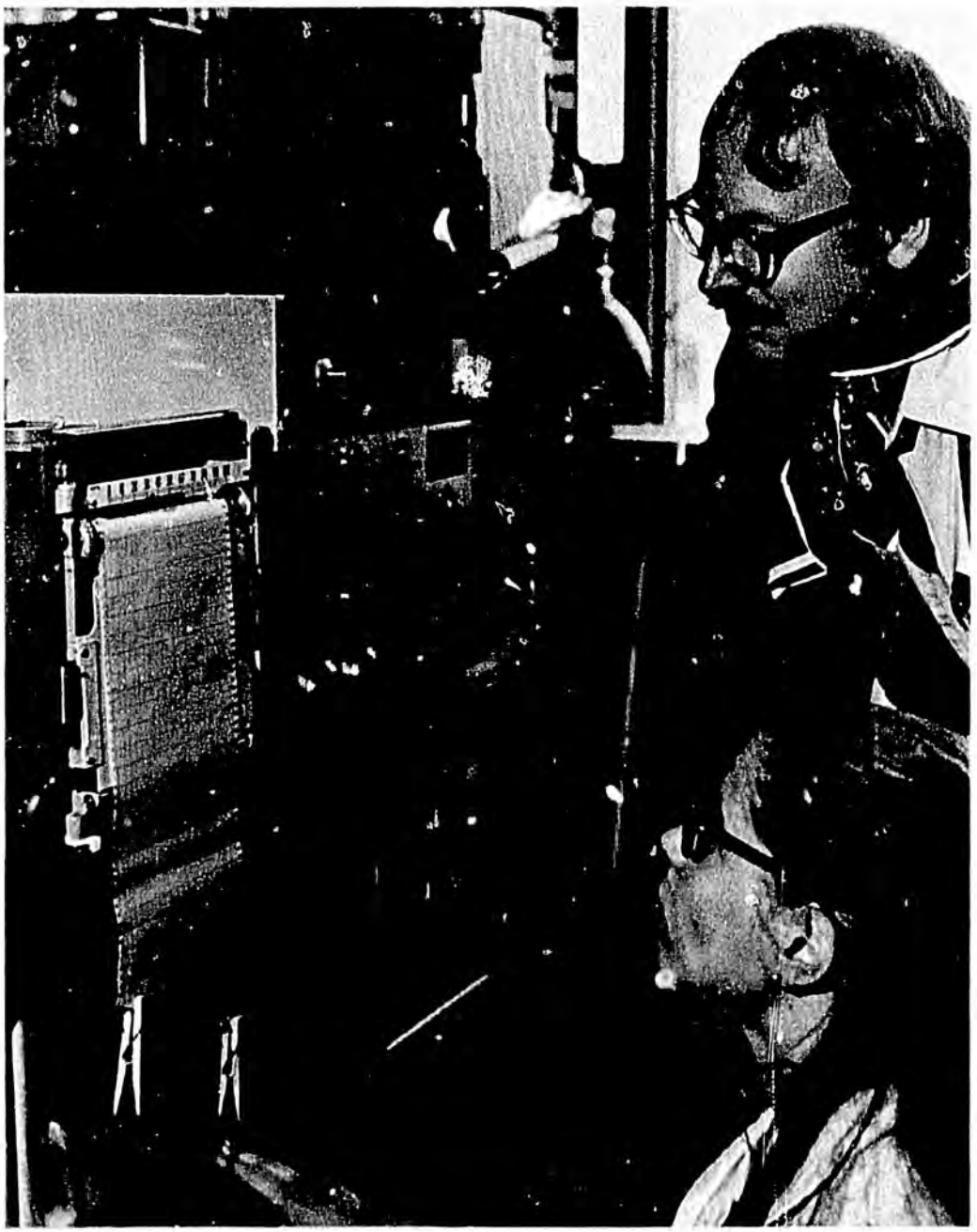
The objective of this recently completed study was to determine the concentration of arsenic in the surface and groundwaters of the Ester Dome area of the Fairbanks Mining District, Alaska. Arsenic occurs as arsenopyrite associated with the gold mineralization of the district. The primary work consisted of sampling the stream and well waters of the Ester Dome area and analyzing these samples for arsenic using the graphite furnace in conjunction with atomic absorption spectrometry. Some 2500 soil samples from the Fairbanks district were available, from which selected samples were analyzed by atomic absorption spectrometry. The arsenic content of these samples was correlated with that of the waters of the area.

Aqueous and Atmospheric Photochemical Degradation of Malathion

The research involves laboratory and field investigations directed at the determination of the photochemical fate of the thiophosphate insecticide, malathion, in the arctic soils as it relates to groundwater contamination. Aqueous and vapor phase solutions of malathion will be irradiated by ultraviolet light at a variety of wavelengths and ambient conditions. Aqueous solutions will be degassed, oxygenated, or mixed with representative interior Alaskan clays. Photoproducts will be separated by gas chromatography and identified by chromatographic and spectrometric methods. Field studies will look for correlation of soil type, rainfall, and drainage with longitudinal soil-sampling results.

Hydrogeochemical Exploration of the Fairbanks Quadrangle

This study is part of the National Uranium Resource Evaluation (NURE) sponsored by the U.S. Energy Research and Development Administration. The purpose of NURE is to carry out a systematic survey for uranium of geologically favorable areas of the United States by 1981. Los Alamos Scientific Laboratory has been given responsibility for the Rocky Mountain states and Alaska. The goal of this study is to determine the reliability of uranium hydrogeochemical samples taken in Alaska at the sampling density established by the Los Alamos Scientific Laboratory of one sample per nine square miles of ground surface. The study area is the Fairbanks 1:250,000 quadrangle and parts of adjoining quadrangles. Sections within this general area will be sampled intensively following a statistical design. Variables to be investigated include: sample density—the number of sample localities per unit area; type of sample collected—stream sediment versus lake sediment; time of sample collection—spring versus fall; and sample treatment—effect of filtration of water samples. A total of 1200 localities will be sampled by means of a float-equipped helicopter. The final report will include recommendations for subsequent uranium hydrogeochemical studies in Alaska.



Dr. G. Warren Smith and Marlys Schneider are investigating the photochemical fate of malathion, an insecticide, in arctic soils.

Lake and River Management

Nutrient Chemistry of a Large, Deep Lake in Subarctic Alaska

This three-year project attempted to predict the limnological future of Harding Lake, a lake used for intensive recreation in the Fairbanks area. The objectives were to collect and compile qualitative and quantitative chemical and physical data obtained through a number of substudies. These included nutrient chemistry, study of the primary productivity of aquatic plants, climatology, land use and recreational planning (density of

development), the bacteriological quality of the lake water, and assessment of the trophic state of the lake. There has been a need for baseline information on comparatively unpolluted lakes in order that the State of Alaska can provide adequte advice on water resources management in subarctic Alaska with respect to planned development of large areas. The study was completed April 1976.

Environmental Planning of Alaskan Water-Oriented Recreation Areas

Recreational use of lakes in Alaska is increasing due to the expansion of the population and extension of transportation facilities. Proper management of recreational lakes is based on estimates of use and of the impact of such use on lake water quality. This recent study was aimed at characterizing the nutrient chemistry of selected Alaskan lakes to provide baseline data for impact assessment. Lakes were intensively sampled during the autumnal and vernal equinoxes and the summer period, with the major focus on algal production and nutrient chemistry. Production estimates were made utilizing radioactive sodium bicarbonate as a tracer while nutrient chemistry parameters were measured using standard methods for low concentrations.

Aquatic Ecosystem Model for Lake Management in Subarctic Regions

A lake ecosystem model of a temperate zone is being revised for use as a lake and reservoir management tool in subarctic regions. The model simulates the physical, chemical, and biological components of lakes. It is currently being modified, using Harding Lake as a test case. The available data from this deep subarctic lake are being compared with simulated results in order to adjust the model for accurate simulation of system interactions. Once modifications are completed, the model will be applied to other lakes in the northern regions and set up on a Honeywell 66/20 computer as a readily available tool for management decision-making.

Jacqueline LaPerriere and Brien McAuliffe preparing to measure light attenuation in Birch Lake.

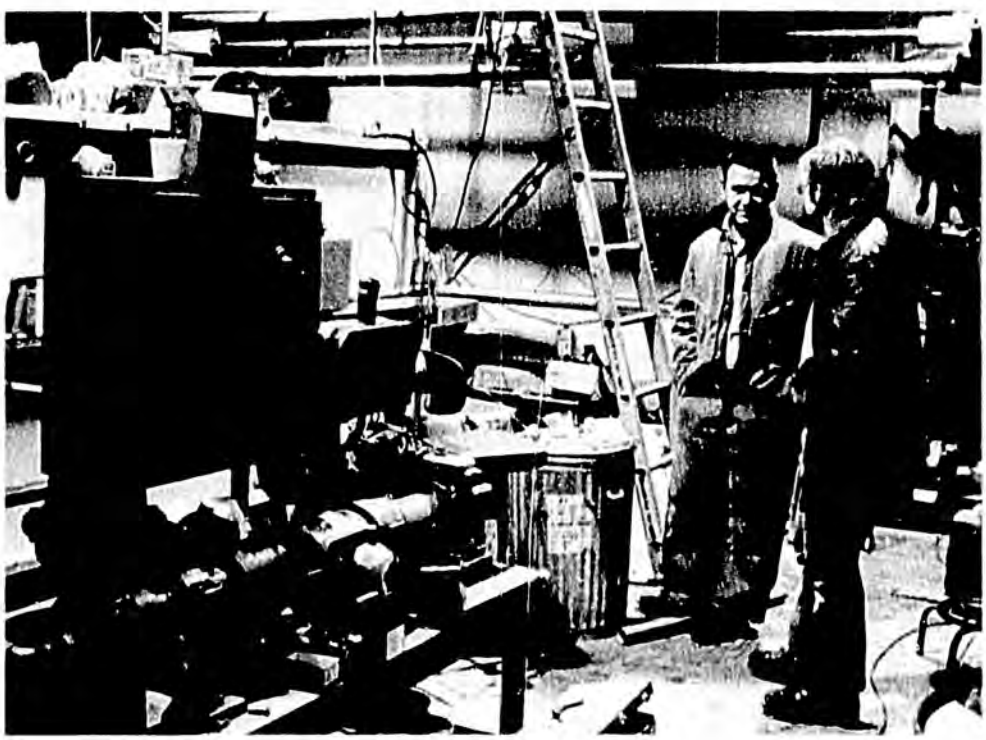
Air Quality Management

Carbon Monoxide Transport Model for the Fairbanks Area

In the winter months, a highly stable temperature inversion often persists in the Fairbanks airshed. Emissions from vehicular traffic and stationary sources cause high levels of carbon monoxide in the cold, near-surface air. The completed study describes the development and testing of a computer-based model for carbon monoxide transport. A user's guide was also prepared. Provisions are included for input of climatic factors, traffic movement, and auto emission coefficient. Output is time histories of carbon monoxide in parts per million. At present, the model is programmed to consider vehicular activity as the major source of carbon monoxide in the Fairbanks airshed.

Ice Fog Abatement and Pollution Reducion at a Subarctic Coal-Fired Heating Plant

Ice fog continues to be a serious environmental problem in many northern communities during winter months. Most of the ice fog troubling Fairbanks is the direct result of man's consumption of energy in the local environment. Ice fog consists of minute ice crystals suspended in the atmosphere at low temperatures when little or no suspended water vapor can be supported. Water required to form ice fog comes from three main sources: evaporation over open water (rivers, streams, and power plant cooling ponds); combustion-produced water vapor present in the exhaust gases of industrial, municipal, and home heating systems, and power plants. This study will undertake the design, construction, and monitoring of a model air pollution control system at the University of Alaska's coal-fired power plant. The system is intended to eliminate ice fog from the exhaust stack during winter operation, remove fly ash and other particulate constituents from the flue-gas, and reduce oxides of sulfur and other noxious components of the flue-gas. A total engineering evaluation of the system will consider its usefulness as an air pollution



Dr. Ronald Johnson, right, observes operations in EPA's water supply and waste treatment plant at Wainwright.

control device and its impact on the environment. The study is being conducted jointly by the Geophysical Institute, the Institute of Water Resources, and the School of Engineering.

Water Planning And Control

Beaufort Sea Historical Baseline Ice Study

Ship logs and other maritime records provide a source of data on ice conditions in the Beaufort and Chukchi Seas, and Bering Strait for the last 100 years. A cartographic representation of this data will improve the possibility of the prediction of ice conditions.

A Historical Survey of Water Utilization

The work consisted of a history of water utilization in the Cook Inlet-Susitna Basin, Alaska. It shows the importance of the various uses made of water over the historic period of the region and thereby create an awareness of this historic use. Popular awareness will be fostered through publication of the results of this historical investigation.

Hydroelectric Power Projects in the Cook Inlet-Susitna Basin, Alaska—A Case Study

Economic developments within the past five years have brought about significant changes in the utilization of various energy resources. In the search for alternative sources of energy, many Alaskans have recognized that Alaska's rivers and lakes are a relatively abundant and environmentally clean source of energy. However, many problems associated with Alaskan resource development have never been adequately documented. At present, no case study of the Eklutna power project exists. The completed four-year project was not able to fill the power needs of the area because the demand had been underestimated. Much could be learned from such a study as federal officials and Alaskans debate the feasibility of constructing a hydroelectric power facility in the Upper Susitna River basin. This case study of the politics of the Eklutna project is expected to clarify the political and economic dynamics of hydroelectric resource development on the local and federal level. A comparison between the politics of Eklutna and the proposed Susitna project will enable planners to determine a rational time table for this as well as future developments.

Review of Alaska's Water Law and Administration

As of July 1, 1976, ten years had passed since the passage of Alaska's Water Use Act. Since the discovery of petroleum reserves at Prudhoe Bay in 1969 and passage of the Alaska Native Claims Settlement Act in 1971, growth of Alaska's population and development of resources has increased very rapidly. There will be extensive water appropriation as land ownership changes from Federal to private control. The need to review the adequacy of existing water laws and administration of the laws is being expressed both by those trying to comply with regulations and by those attempting to enforce standards and permit requirements. This study will examine present laws, administrative organization, and regulatory agencies by reviewing existing statues, publications, and practices. Potential conflicts and gaps in current laws and administration of these laws will be identified in order to recommend legislative and/or regulatory actions pursuant to the resolution of these needs, conflicts, gaps in knowledge, and practices.

North Slope Borough
Water Planning

The need to evaluate present and future water requirements and sources of water has become critical on Alaska's north slope where supplies are seasonally limited. The Planning and Research Section, Alaska Department of Natural Resources, initiated this pilot water-use planning study with the Institute of Water Resources and the Arctic Environmental Information and Data Center. The available options of supplying water to eight North Slope Borough villages—Anaktuvak Pass, Atkasook, Barrow, Kaktovik, Nuiqsut, Point Hope, Point Lay, and Wainwright—and the requirements for water-related traditional use areas are being examined. Guidelines for an on-going village water plan will be developed with the North Slope Borough Planning Department, the Arctic Slope Regional Corporation, and the village corporations.

Dr. Claus-M. Naske and Dr. William Hunt demonstrate prediction of ice conditions from historic records.

Arsenic In Groundwater

An Example Of Applied Research

Dorothy Wilcox, IWR research assistant and graduate student in the Solid Earth Science Program, is completing her master's thesis in geology on a study funded by the institute's basic allotment grant from the Office of Water Research and Technology. Under the direction of IWR principal investigator, Dr. Daniel Hawkins, Ms. Wilcox has been examining the distribution of arsenic in surface and groundwaters and soils in the Ester Dome area of the Fairbanks mining district.

In February 1976, Ms. Wilcox discovered very high concentrations of arsenic in water samples from privately owned wells in the area. Check analyses run on the samples by the U.S. Geological Survey laboratory in Salt Lake City, Utah, verified that about 30% of the waters had concentrations in the range of 500-700 parts per billion (ppb) with several samples up to 3000 ppb. The recommended limit for drinking water estab-

Dorothy Wilcox and Dr. Daniel Hawkins discussing the presence of arsenopyrite in rock samples from the Ester Dome area.

lished by the U.S. Public Health Service is 10 ppb. Data were presented to the Alaska Department of Health and Social Services in the first week of March. Although poisoning did not appear to be an immediate danger, negative health effects can result from long-term consumption of small amounts of arsenic. The Alaska Department of Environmental Conservation ran advertisements in the *Fairbanks Daily News-Miner* outlining the area and recommending that residents submit their well water for analysis.

Previous Studies

In a previous study, Frederick Wilson investigated the Pedro Dome-Cleary Summit areas. Directed by Dr. Hawkins, Mr. Wilson obtained samples from 85 stream and well locations three times in the summer of 1974. Concentrations up to 50 ppb were found in several well waters. Some of these wells, like many in areas near Fairbanks, were drilled through dredge tailings and constructed with uncemented casings, easily permitting movement of arsenic and other compounds into the water supply.

Arsenic occurs as arsenopyrite, which is associated with the gold mineralization of the Fairbanks mining district. It normally reaches water bodies in minute quantities by weathering of arsenic-containing rock. Mr. Wilson found that mining operations augment natural weathering in several ways. In lode-gold mining, particularly during the milling stage, large quantities of previously unweathered rock are exposed. Crushing further increases the surface area exposed to weathering and accelerates dissolution of arsenic. Mill tailings dumped into a stream increase the amount found in bottom sediments. In placer mining sluicing exposes previously sorbed arsenic to suspension and partial re-solution, and increases the suspended sediment load. Once the suspended load resettles, concentrations in the surface water may drop. Dredging has similar effects on water quality—the process removes silt and re-exposes partially weathered rock fragments to further weathering. This produces a more long-term effect than sluicing, as greater depths are penetrated and as dredge tailings may include rocks from weathered lode veins.

Current Progress

However, in the Ester Dome area, Ms. Wilcox found high concentrations of arsenic in the unmined hillside areas as well as in low valley areas which had been subjected to dredging. Many groundwater samples with high concentrations of arsenic occur near known, arsenopyrite-bearing veins, some of which are currently being mined for their gold content. It is difficult to separate arsenic contamination which occurs as a result of mining an arsenic-rich area from that which is due to the arsenic-rich area itself. It seems, however, that arsenic contamination in the Ester Dome area stems from natural causes and mining has had little, if any effect.

The results of the institute's research on arsenic in groundwater have statewide applications, as many groundwater supplies are located in or near mineralized areas. The City of Juneau uses several large-capacity wells for its groundwater supply, and increasing water storage by utilizing abandoned mine shafts has been considered. In the Fairbanks area, the Water Resources Division of the U.S. Geological Survey has expanded its surface and groundwater sampling program. Gordon Nelson, a former IWR research assistant, is directing the studies. While working toward his Ph.D. degree, he assisted Dr. Hawkins on a study of the geology and geochemistry of the Ship Creek and Monashka Creek reservoir sites in southcentral Alaska. Nelson and Hawkins evaluated the potential of heavy metal contamination of reservoir waters by determining the rate at which minerals are leached from bedrock. Wilcox and Hawkins hope to apply similar techniques in investigating geologic and hydrologic factors controlling the distribution of arsenic in water.

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Energy Research and Development Administration (Los Alamos Sci. Lab)	66,700
State:	
University Matching Funds	80,000
Miscellaneous University Funded Research	20,000
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Local:	
Fairbanks North Star Borough	50,000
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