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HOUSE SPECIAL COMMITTEE ON OIL AND GAS

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EXECUTIVE ORDER MR. MILTON

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QUESTIONS

FISCAL NOTE

Bill Version: EO 92
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STATE OF ALASKA 1996 LEGISLATIVE SESSION

Revision Date: Original
Title: Consolidation of DNR Divisions
Dept Affected: Natural Resources
BRU: Resource Development
Component: Oil & Gas Development
Sponsor: Rules Committee
Requestor: Governor Knowles
Component Serial No. 439/1031

Expenditures/Revenues	(Thousands of Dollars)					
OPERATING EXPENDITURES	FY97	FY98	FY99	FY00	FY01	FY02
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0
CAPITAL EXPENDITURES	0.0	0.0	0.0	0.0	0.0	0.0
CHANGE IN REVENUES ()	0.0	0.0	0.0	0.0	0.0	0.0

FUND SOURCE	(Thousands of Dollars)					
1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts						
1006 GF/MHTIA						
Other						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY96) cost: \$ none

POSITIONS

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

ANALYSIS: (Attach a separate page if necessary)

Anticipated fiscal savings through consolidation of the Division of Oil & Gas with the Division of Geological and Geophysical Surveys has been included in the Governor's FY97 operating budget. The Oil & Gas Development component shows an anticipated savings of \$25.0 in general fund, and the Geological Development component shows an anticipated savings of \$25.0 in general fund/program receipts.

Prepared by: Nico Bus
Division: Support Services
Approved by Commissioner: *Nico Bus*
Agency: Natural Resources
Phone: 465-2406
Date: 4-Jan-96
Date: 4-Jan-96

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Page 1 of 1

FINDINGS AND RECOMMENDATIONS ON THE ROLE AND STRUCTURE OF THE ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS BY THE COMMITTEE ON PUBLIC GEOLOGY

*by the Committee on Public Geology: Chairman David Hite,
Marty Rutherford, John Eichelberger, Teresa Imm, Sue Karl, Al Clough, Chuck Hawley, and Dan Young¹*

EXECUTIVE SUMMARY

At the request of the Commissioner of the Department of Natural Resources (DNR), the Alaska Geologic Mapping Advisory Board established a committee to assess the role and function of the Division of Geological and Geophysical Surveys (DGGS) and the Director/State Geologist. Upon completion of the review the committee was to prepare a report for the Board and Commissioner. The report would provide recommendations regarding responsibilities, staffing, and type and interaction with partners and clients.

The committee met twice a month, commencing on March 10, 1995 and continuing to May 26, 1995. These meetings served to clarify issues, develop priorities, and gather input from the scientific community. External commentary was solicited from Alaskan geoscientists and a sampling of geological survey directors from other states. The committee recessed for the summer to prepare the final report. The final draft was approved by the committee on September 15, 1995.

The report's principal findings and recommendations are:

- ◆ The existence of a strong and committed geological survey is essential to a state as dependent on natural resources and as subject to recurring geological hazards as is Alaska. The mission and functions of the survey are those prescribed in the statutes which established the Alaska Division of Geological & Geophysical Surveys and the position of Director/State Geologist. To fulfill the mission of the Survey, the basin analysis and hydrogeology functions should be reassigned to the Survey.
- ◆ To maintain the activities of the Survey at a level that fulfills the charges put forth in the statutes, the state must sustain the Survey by providing adequate core funding, for which the current level is inadequate. This funding will provide for permanent staff salaries, facilities, and critical long-term programs and services. The committee recommends that the Survey be strongly encouraged to seek out external funding and support for expanded and additional high priority programs.
- ◆ The Survey should actively pursue and develop partnerships with those working toward a common goal—federal and state agencies, the Geophysical Institute, Native corporations, etc. The Survey is also encouraged to solicit clients who will provide funding for programs that are mutually beneficial and provide a specific product.
- ◆ The committee concludes that the Survey should remain within the Department of Natural Resources, where it can most effectively interact with its primary clients and be most responsive to its partners.
- ◆ The committee recommends that the Director/State Geologist should, at the discretion of the Commissioner, be located in Anchorage, with a minimum five year term. The committee further recommends

¹ The statewide committee is composed of the Deputy Commissioner of DNR, geologists and geophysicists representing the Geophysical Institute (UAF), Arctic Slope Regional Corporation, U.S. Geological Survey, Department of Commerce, private hydrology/geohazards/environmental companies, mining industry, and petroleum industry. These individuals also participate in local governments, the Alaska Geological Society, the Alaska Miners Association, and various national organizations such as the American Institute of Professional Geologists, Geologic Society of America, and the American Geophysical Union.

that the position be filled through a national recruitment effort, with a screening panel, appointed by the Geologic Mapping Advisory Board, to identify the best qualified candidates for final selection by the Commissioner.

- ♦ The staffing level of the Survey should reflect the responsibilities put forth in the statutes. Appropriate staff additions should be reinstated in the areas of basin analysis (oil and gas related function) and hydrogeology. These staffing moves can be accomplished by filling recently and soon to be vacant positions or by transfer of full-time employees from other divisions within DNR. A core staffing level should be determined, subject to change with changing needs. The Survey should have the option to employ contract or temporary personnel, when necessary for specific programs.
- ♦ The committee recommends that, at the discretion of the Commissioner, the Survey locate a second office in Anchorage, to enhance communications and working relationships within DNR, with other state and federal agencies, and with key Anchorage-based client groups. These needs will be best served if the Director/State Geologist, basin analysis function, hydrogeologic function, and appropriate support are located in the Anchorage office.

These recommendations are intended to increase the Survey's efficiency, provide greater access to clients and the public, improve communication with state agencies and legislators, and broaden and strengthen the Survey's ability to meet its mission and serve the state of Alaska.

INTRODUCTION

Alaska's immense size and limited infrastructure have been serious impediments to the development and completion of detailed basic mapping/data acquisition programs. Currently only about seven percent (41,000 square miles) of the state have been mapped in sufficient detail (1 inch to 1 mile or 1:62,500) to allow useful resource evaluation and adequate assessment of potential geohazards. Reliance on other agencies, industry, and the federal government will not satisfy the need for unbiased, basic geological/geophysical data upon which the state and other DGGs clients can initiate activities.

Some other state agencies that work with geological data are largely regulatory in nature. These data are frequently gathered to support a specific position or objective and may not have adequate regional context. Thus, while much of the data is of good quality, it is too focused to be useful in a wider range of applications.

Federal agencies, such as the U.S. Geological Survey and Minerals Management Service, are currently being downsized with a proposed transfer of many functions to the states. Federal priorities are frequently quite different than those of the state of Alaska.

Private industry has a narrow focus when doing geological and geophysical work and does not have the resources or incentive to collect and inventory much of the data that the state would require for long-range resource and land-use planning. Also, industry, having spent their dollars, will keep any data acquired in proprietary status for as long as possible or until it no longer provides a competitive advantage. Data in the public domain will promote economic development of the state's resources.

The role of the survey and/or the proportion of its staff and budget dedicated to a particular endeavor may change significantly with time. Engineering geology, environmental geology, and hydrogeology are all areas that will grow significantly in the coming years. In addition, a greater emphasis on high-tech approaches to old problems and the emergence of new fields of expertise will cause pressure on the existing staffing profile. Growth in or emergence of these or other areas cause inevitable funding and staffing conflicts. The combination of stringent state rules on hiring and termination of employees and declining budgets make it difficult for DGGs to evolve at the pace required.

The long-term role and impact of the DGGS, on Alaska and its citizens, is profound and should be recognized. Virtually every aspect of life in Alaska is, in one way or another, influenced by natural geologic processes and/or resources. **A strong state survey is one of the best long-term investments that a resource-rich state like Alaska can make.**

With increased pressure on the state budget, due to a decline in revenues, the functions and needs of the DGGS have come under scrutiny on a number of fronts. As a result, funding for both staff and programs have been curtailed. In light of the critical role DGGS performs within the state, the need to address alternative sources of revenue, the changing technologic environment, and efforts to reduce or eliminate the DGGS, a committee was formed to review the role of public geology, especially DGGS, in Alaska and submit recommendations to the Commissioner of DNR. The committee was established through the auspices of the Alaska Geologic Mapping Advisory Board² at the request of the Commissioner of DNR. The findings of this committee are to be submitted to the Commissioner in October 1995. The committee was developed and constituted to provide a wide range of input from potential clients and partners.

The committee met regularly to identify and evaluate those issues related to the role of DGGS. The committee membership polled many professionals and DGGS clients within Alaska, seeking a broad base of opinion and concern regarding the current status of the DGGS and its future direction and emphasis. To further broaden the input, State Geologists and survey directors from nearly 20 states were interviewed. Most of these State Geologists were from western states with resource-based economies. Their input strongly supported views that the State Geologist should have a key role in state resource planning, an independent non-regulatory role for the survey, a fixed term of office for the director, an expanded partnering and external funding effort, and the maintenance of a strong and flexible core staff with the ability to expand by hiring contract or temporary personnel in times of increased activity.

The committee membership identified seven items of consideration critical to the present and future of DGGS in Alaska:

1. Mission and functions of DGGS

- Mapping
- Mineral occurrence databases
- Geochemical databases
- Geophysical databases
- Volcanic hazards databases
- Seismic hazards databases
- Hydrologic databases
- Basin analysis

2. Funding sources for DGGS

- Core funding
- Other state agencies (information for land planning or regulation)
- Federal agencies (information for land use; mineral or energy resources)
- Native corporations (mineral and energy resources; mapping; geochemical and geophysical databases)
- Mining consortiums (mapping; mineral, geochemical, and geophysical databases)

² The Advisory Board was established to aid the Alaska Division of Geological & Geophysical Surveys in its goal of providing earth science information to the Alaskan public. A number of prominent leaders in the geological community with a variety of backgrounds and a broad spectrum of experience in Alaska have agreed to serve on the board. These members include: Chairman Gerald G. Booth (Cook Inlet Region, Inc.); Vice Chairman Dr. John Sims (Usibelli Coal Mine, Inc.); Secretary Mr. James Rooney (R & M Consultants); Dr. Harry Noyes (Doyon Ltd.); Dr. David Hite (Hite Consultants); and Dr. Keith Crowder (University of Alaska Fairbanks, Department of Geology and Geophysics).

Energy consortiums (mapping, mineral, geochemical, and geophysical databases)
Communities (hydrologic databases; geologic hazards)
Infrastructure (geologic and geomorphic hazards)
Environmental consortiums (hydrogeologic and geochemical databases)

3. Partnering potential for DGGS

State agencies (DOG, DMWM, DEC, DOT)
University of Alaska, Geophysical Institute
Federal agencies (USGS, DOE, BLM, NPS, EPA, DOD)
Oil, gas, coal, geothermal companies
Mining companies
Hydrology, environmental, engineering firms
Native corporations

4. Administrative location of DGGS

DNR
University system
Independent state commission

5. Responsibilities and location of State Geologist

Acquisition of funds
Partnering arrangements
Prioritization of projects
Products and completion dates
Staffing for projects
Accessibility to partners and clients

6. Staffing of DGGS

Core staffing and staff support
Critical mass problems
Staff flexibility
Evolution of staff expertise
Staff expansion and contraction capabilities

7. Physical location of DGGS

Fairbanks, Anchorage, and/or Juneau
University campus, state office buildings, and/or independent
Isolation versus insulation

These items have been examined in light of DGGS' past, present, and anticipated future roles; results and demonstrable impact/influence on state resource and safety issues. The committee's recommendations are presented in the following sections of this report and represent virtually unanimous agreement on each element of the proposed action.

MISSION AND FUNCTIONS OF DGGS

The statutes establishing the DGGS clearly define the function and role of the DGGS and its director. By statute, the DGGS is to perform "systematic collection, recording, evaluation, and distribution of data on the quantity, location, and quality of water of the state...to the orderly domestic and industrial development of the state." Additionally, the DGGS is to collect, evaluate, archive, and distribute geologic data on earthquakes, volcanic eruptions, engineering geology, and other geologic hazards throughout the state that are of public interest and necessary to orderly, safe, and cost-effective development in the state. The

statutes also state "the State Geologist shall conduct geological and geophysical surveys to determine the potential of Alaskan land for production of metals, minerals, fuels, geothermal resources...and shall conduct such other surveys and investigations as will advance knowledge of the geology of Alaska."

OIL AND GAS ACTIVITIES

Background

Oil and gas related data acquisition and distribution is an under-valued and probably under-utilized aspect of DGGs activities. Large, well established companies like ARCO and others with long histories in the state, possess extensive proprietary geological and geophysical databases. These databases have been developed over a period of 40 to 50 years but tend to be concentrated in geographic areas that have long and successful exploration histories. These databases have served these companies well and tend to give them a distinct advantage over competitors that are relatively late arrivals on the Alaska exploration scene. Companies that may want to enter the Alaskan exploration arena are, or would be, at a distinct disadvantage if there did not exist a volume of publicly available data upon which to plan their own data acquisition and develop a general understanding of the geological and hydrocarbon framework of a specific area. Even the established companies must access the public databases to expedite exploration efforts in the frontier basins.

Justification

Where long-time Alaskan exploration companies do possess an extensive database, they maintain the proprietary nature of the data and do not share it with the state. Even when working with a partner who may lack comparable data, these companies share only the minimum level of interpretation and not the critical basic data sets.

The clients requiring these databases are varied and represent a surprisingly large segment of the potential beneficiaries of energy exploration activities. Clients include:

- ◆ Industry: both established industry and newcomers to Alaska
- ◆ State Agencies: DEC (regulation of resources) and DOG (development of resources)
- ◆ Native Corporations
- ◆ Public, as beneficiaries of good development strategies

Even the largest and most well-established companies still do not have comprehensive databases in the little-explored interior basins and in the peripheral areas of the North Slope and Cook Inlet. It is in the state's best long-term interest to establish readily accessible resource assessments and to encourage exploration and development.

Recommendation

If the state plans to offer large tracts of acreage (block leasing) to a group of contending companies, it must have data approximating that held by the companies vying for the acreage. Without such a database, it will be impossible for the state to realistically evaluate the economics of the bids. Similarly, when tract leasing is intended to occur in areas outside the principal producing regions of the North Slope and upper Cook Inlet, many companies may lack data and hence, without a publicly available database, find themselves unable and unwilling to effectively compete in sales with short lead times. This reduces competition and return to the state. Thus, an ongoing effort to acquire and distribute oil and gas related data to appropriate state agencies and the petroleum industry is in the best long-term financial interest of the state. To best serve a diverse client base and assure credibility, it is important that data be acquired and maintained by a non-regulatory agency without an espoused economic objective.

Currently the DGGs and Division of Oil and Gas (DOG) have overlapping functions that can reasonably be considered to involve the acquisition, evaluation, archival, and distribution of basic geological/geophysical data pertinent to oil and gas exploration. Both DGGs and DOG have vital but separate roles in the generation/acquisition and handling of geological and geophysical data pertaining to oil and gas exploration. There is a need for DOG to have and work exclusively with certain confidential information pertaining to lease sales and related operations, without giving local well-established companies or individuals an advantage. DGGs should be acquiring, evaluating, archiving, and distributing information that needs to be available to everyone in the public domain. DOG should be doing specific tracts, as those being reviewed for pending lease sales, and DGGs should be working with and analyzing data on the regional scale, well in advance of any lease sale or tract offering.

There is a basin analysis function within DOG that duplicated the charges of DGGs. Basin analysis is the fundamental stage in the exploration process. It requires a wide range of data types, the integration of which provides a regional as well as prospect-specific understanding or interpretation of the geologic risk and hydrocarbon potential.

To remove this function from an agency which has a largely regulatory role and relocate it in DGGs is appropriate for purposes of objectivity. The transfer of the function to DGGs would involve at least one full-time employee associated with basin analysis from DOG with funding. The committee recommends that the position be located in Anchorage. The current oil and gas effort in Fairbanks is recommended to be transferred to Anchorage as soon as feasible because that is where a majority of the clients reside.

Expected Results

This reallocation of effort will not only enhance the credibility of the state's oil and gas data efforts but will also increase their utilization by placing these activities in one agency and making them more readily available to the Anchorage-based industry.

HYDROGEOLOGIC ACTIVITIES

Background

Alaska statutes state that the "systematic collection, recording, evaluation and distribution of data on the quality, location and quantity of water of the state in the ground, on the surface of the ground or along the coasts, are in the public interest and necessary to the orderly domestic and industrial development of the state." The DGGs no longer has a hydrogeology group performing these vital functions.

Since Alaska derives the majority of its revenues from its resources, the lack of a hydrology group is detrimental to the economy of the State.

What major industries require fresh water? Every major industry in Alaska: oil and gas, commercial and sport fishing, timber, mining, agriculture and dairy, manufacturing and commercial. Understanding Alaska's water resources is paramount to enabling industry to thrive in our state. Industry needs fresh water and growing human populations need growing water supplies. Rural communities in Alaska do not have adequate water to support their populations. Many communities are living in third world conditions. Neither do these communities have adequate water to support industrial development that would encourage self-sustained economic development. Establishment of local economies in rural Alaska will relieve the pressure on government support. Alaska needs to increase its available water supplies to ensure economic and all other growth. The state needs to understand our water resources--water may be the most valuable resource in Alaska.

Needs of the State

Industry, the public, legislators, universities and regulatory agencies all need access to data on surface and ground water quality, stream flow measurements, meteorologic data, ground water levels, trace element distribution, well logs and geophysical logs. The State of Alaska must collect and disseminate this data, as well as maintain and expand existing databases. A brief outline of water information needs follows:

- ◆ Many of our rural communities lack the most basic of water needs (i.e., flush toilets). Hepatitis and other sanitation-related diseases are all too common in Alaska. Residents of many of these communities are frequently forced to live in poverty. Alaska needs to protect existing known water supplies and develop new sources of water for its more than 320 communities. With adequate water supplies, communities could develop industries like fish processing, creating local jobs and economic independence. Communities need technical data on ground water, surface water, and water quality plus technical assistance to develop water supplies. Public concerns about water quality and environmental impacts need to be addressed.
- ◆ The public needs to know when landfill leachate or coal mine drainage may affect their water supply and they cannot always get sufficient information from the Department of Conservation because the data often does not exist.
- ◆ The State of Alaska needs technical expertise to evaluate impacts from hazardous waste releases on state property to assist regulatory compliance actions, to evaluate enforcement actions, or to provide detailed risk analysis.
- ◆ Alaska's fisheries are dependent on water flow and water quality. Water quality data and in-stream flow measurements does not exist for much of the state. Alaska's fisheries need this data.
- ◆ The Department of Natural Resources is responsible for managing water rights. The department needs to know who has water rights, who has water wells, how the wells are being used and how proposed uses will impact existing water resources. This requires databases of wells and water quality, geology and hydrogeology. Technical studies of entire areas may be required to allocate water rights. The Department of Natural Resources needs hydrogeologists and chemists to conduct these studies and to provide technical assistance.
- ◆ Most of the water well database is inadequate and inaccessible for state and public needs. Alaska needs to update and maintain this database. Existing well logs should be scanned and distributed on CD-ROM to satisfy public needs.
- ◆ Collecting information about in-stream flow is critical to many industries. Alaska has vast numbers of streams in many diverse regions. This information is necessary for fisheries management, erosion control, hydroelectric projects and mining. Although data collection can be shared with federal agencies like the U.S. Geological Survey, Alaska needs to be responsible for this data on state lands.
- ◆ Mining, mine impacts, mineral exploration and mine regulation all depend on water quality, watershed analysis and water supply. The mining industry needs inventories, stream flow data, water quality data, ground water levels and quality, and watershed mapping.
- ◆ River erosion regularly impacts pipelines, roads, homes, railroads, residences, indeed rural communities. Maps showing potential hazards would reduce risk, allow for intervention and planning. The state needs river erosion data and prediction expertise. The state could produce the maps for less than we now pay for erosion prevention after damage occurs.
- ◆ The state needs to evaluate special flood hazards from glacier-fed lakes and rivers such as the Kenai and Beluga systems. Long-term monitoring will lead to understanding and prediction of "outbreaks" such as Lake George events or Yakutat glacier surges.

- ♦ Decision makers when evaluating hydroelectric projects, ADOT/PF when protecting roads from erosion, the Alaska Railroad when designing for erosion, Fish and Game when managing resources, and the public when exploring for water all need basin flow analyses, watershed mapping, and the technical assistance.
- ♦ The interaction of meteorologic impacts with stream flow is unknown in most of the state yet it is very important for resource management and development.

Client Funding Requirements/Budget Impacts

Many state agencies use ground water information and require expertise and thus represent potential funding sources. The DNR is responsible for allocating water rights and managing many of the state's water resources. Division of Mining and Water Management now has some of the hydrologists that formerly worked for DGGs. Other state entities that may be able to help fund hydrology studies include the Alaska Department of Fish and Game, Department of Community and Regional Affairs, and Alaska Industrial Development and Export Authority. The public is another source of revenues, from purchases of publications and maps. A strong potential also exists for DGGs to partner with the petroleum and mining industries.

Recommendations

In order to attract sufficient industry to help develop Alaska's vast resources the state needs to invest in cataloging its own water resources. Continued lack of development will likely result in additional decline of revenues into the next century. Alaska is more than 20 years behind other states in mapping its water resources. We must catch up.

The committee recommends that a hydrogeologic unit be reinstated within the DGGs.

STATE SEISMOLOGIST

Background

DGGs is charged by state statute with the responsibility of identifying, monitoring, and mitigating earthquake hazards. For more than a decade, the scientific focal point of this effort has been the Office of the State Seismologist, now at the University of Alaska Fairbanks Geophysical Institute (UAFGI) rather than DGGs. The State Seismologist and his or her deputy(s) operate the state seismic network and communicate information on earthquake likelihood, occurrence, magnitude, location, and effects from the net and related studies to appropriate state officials and agencies. The office, which was established by statute in 1984, has an interesting history that highlights some of the challenges to assigning a physical and administrative home to mission-oriented geoscience.

The state seismic network was first established in the 1960s with the U.S. Air Force funding and operated from the UAFGI. The primary motivation of the sponsor was monitoring of Soviet nuclear tests. Network operations remain at UAFGI today, and the net has grown to about 150 remote, self-contained stations dispersed around the state but concentrated in more populous regions. Funding has shifted from the military and, later, the Atomic Energy Commission and its successors, to the U.S. Geological Survey and State of Alaska. Support from the USGS is through the National Earthquake Hazard Reduction Program (NEHRP). The USGS contributes \$250 K/year and also assigns its own staff to the laboratory. State support is through base funding for UAFGI and totals about \$650 K/year. The university does not apply an overhead charge to the state funds, but 50 percent overhead is charged on federal expenditures. The overall strength of the Seismology Laboratory effort is greatly augmented by \$550 K/year from the Volcano Hazards Program of the USGS for volcano seismology.

It seems appropriate for the state with the largest earthquakes and the greatest challenges in monitoring them. Of necessity, the State Seismologist has, from inception of the position, been physically co-located with net operations at UAFGI. However, the first incumbent was employed by DGGS as a consequence of DGGS's natural hazard responsibility. This caused some strain, as the State Seismologist was not available for informal discussions among DGGS staff and, for his part, felt that the strongly geologically oriented DGGS placed a low priority on seismic work. One of the disadvantages of partnering with other organizations is that the DGGS participant may be seen as "doing his/her own thing" by DGGS, particularly if the work is done off-site, however beneficial the work may be.

In 1986, there were substantial layoffs from state government due to a precipitous decline in oil revenue. Because positions within DGGS do not distinguish among types of geoscientists, the State Seismologist would have been "bumped" by more senior non-seismologists, eliminating seismology with DGGS even though both state and federal support for the seismic network continued. To accommodate this situation, funding was transferred to UAFGI and the State Seismologist was employed there in a non-tenure track, research faculty position. This change was formalized by modification of the relevant statute in 1987. The current State Seismologist is a Research Professor at UAFGI, and has an office in the UAFGI's Seismology Laboratory. This is logical from the standpoint of network operations, but has diminished DGGS' role in earthquake issues. A staff member of DGGS did serve on the UAFGI search committee when the current State Seismologist was sought and hired.

Justification

Alaska has experienced the second and third largest earthquakes on Earth this century, and will continue to be subject to violent and damaging seismic events. Although the Good Friday 1964 quake of south-central Alaska is famous, the fact that the Fairbanks region has had three magnitude 7 earthquakes in the past half century is less well known. Earthquakes affect all aspects of human activity in Alaska, and even relatively small events could have severe consequences in winter. Unique conditions in Alaska, such as extreme cold in winter and ice and glacial silt in soils, make the presence of local expertise especially important. Damaging consequences can be mitigated by planning growth and construction in a way that takes seismic risks into account. Monitoring of earthquakes, though not yet predictive in capability, permits rapid focusing of relief efforts. As a hazard that affects all of society, knowledge of the occurrence and mitigation of seismic hazards is clearly within the purview of DGGS.

Clients

The most important clients of the State Seismologist are the Office of the Governor and the Alaska Division of Emergency Services, who must be informed immediately of the occurrence, severity, and geographic extent of an earthquake disaster. In a crisis, delivery of medical services, shelter, food, and water, and maintenance of energy supplies are immediate concerns. In normal times, information on the location of active faults and unstable soils in earthquake-prone areas is very important to both public and private sector planners. The State Seismologist must coordinate his/her efforts with those of other networks operated under the national monitoring program, NEHRP, of the USGS. Finally, the network represents an extremely important research tool. Data from it must be readily available to the university community and to the scientific community outside the state. The data contain information on crustal and mantle structure and large-scale (tectonic) crustal plate motion that is of global significance.

Recommendations

The committee finds that the State Seismologist serves an important role that needs continued support from the state. The issue of the physical and administrative location of the Office resembles in some ways the issue of the location of DGGS as a whole. It should be noted, however, that history here and common practice in other states favors location of seismic net operations at the University. Other universities that

operate state- and federally-funded seismic nets include University of California at Berkeley, California Institute of Technology, University of Nevada at Reno, and the University of Washington. This reflects the importance of a state net as a research, as well as a monitoring tool and is probably a prerequisite for federal support. Given this and the fact that staff who maintain the net work for UAFGI, it seems logical that the State Seismologist position continue to be at UAFGI. Nevertheless, DGGS can still serve as a repository for seismic risk information and in an advisory capacity during earthquake crises. In addition, it should continue its efforts in engineering and geotechnical aspects of mitigating the problem. Ties between the State Seismologist and DGGS should be strengthened, at least by MOU spelling out areas of responsibility and mechanisms for cooperation, and perhaps, if administrative constraints permit, a joint appointment. However, a joint appointment between DGGS and UAFGI for the State Seismologist could be made only under conditions that do not permit a repetition of the "bumping" that occurred in 1986.

Expected Results

Although the office of the State Seismologist will remain at the UAFGI, the relationship between DGGS and the State Seismologist will be formalized in order to coordinate delivery of information on earthquake hazards and to respond collaboratively in an earthquake disaster.

PARTNERS, CLIENTS, AND FUNDING

Background

The issues of partners, clients, and funding are closely interwoven. The terms used in this report are as follows: A **partner** shares staff, funds, facilities, and logistics to attain a common goal and are other agencies or like-minded organizations, (i.e., U.S. Geological Survey, University of Alaska's Geophysical Institute, etc). A **client** is one who expects a product (usually specific). In the current fiscal climate, a client can be expected to pay for services and/or supply logistical support. Clients include other agencies, Native corporations, private industry, boroughs, public, and legislators. It is possible for an entity to be both a client and a partner.

Support may be in the form of money, shared office space, filing, and library systems, computer/telecommunications systems, helicopter and other forms of logistical support, and shared staff. These arrangements, some of which are currently more-or-less informally in place, can result in financial and personnel savings for both the long and short term.

Geological surveys in other states have found that they can significantly augment their direct state funding by pursuing pertinent timely programs with other state departments or divisions, federal agencies, local governments, and all facets of the private sector. These surveys are seeing increased success in raising funds through their clients and/or partners, for projects that address specific needs, save the state money, and supply needed baseline data that can be utilized in future programs. Presently nearly ten percent of the Washington state survey's total budget is derived from a single contract with Spokane County, for a water resources study. More than 90 percent of the Texas Bureau of Economic Geology's budget is derived from sources other than direct support. Other examples of the successful search for external funding include:

- ◆ Colorado--75 percent of total funding is from external sources
- ◆ Kansas--70 percent outside sources
- ◆ Nevada--50 percent of the funding is from external sources
- ◆ Idaho--outside funding constitutes 30-40 percent of the total expenditures
- ◆ Arizona--about 25 percent of total expenditures are non-state funds

Generally, these funds are used for operating expenses and to hire contract experts. The state core funding should cover salaries of permanent staff and facilities. This is something we can develop. The

committee recognizes that this does not happen overnight, for example, Kansas took 50 years to get 70 percent outside funding. To achieve this one must have continuity in planning and leadership, and persistent effort.

Justification

The development of strong and interactive client and partner relationship constitutes the foundation upon which the DGGS can increase its funding base and react in a timely manner to emerging problem areas or issues. In fact, such a cooperative network, with its attendant financial support, should allow the survey to become more proactive and more effectively anticipate the needs of both the public and private sectors.

Recommendations

Based on the examples which demonstrate the success other states have had in securing external funding, with sufficient planning and an entrepreneurial approach the DGGS should be able to raise, from external sources, a significant addition to its state derived expenditures.

One of the possible keys to successful long-term funding opportunities could be through a broad-based, cooperative approach involving several state departments working in concert to secure federal funds. Even with possible decreases in the level of direct federal aid to the states, there appears to be support for some type of block grant to help pay for programs previously financed by the federal government. Some of these grants could be designed for or directed toward long-term integrated projects which take a program from "the cradle to the grave"

The committee's recommendation is to aggressively pursue all viable sources of external funding and use those funds to support operating expenses and the use of contract expertise. The state core funding should be increased to pay salaries of permanent staff and facilities.

Expected Results

Programs that involve two or more state agencies or departments would be long term in nature, and proceed from acquisition of the basic geological and geophysical data, through the determination of the economic viability of the program, to the development and distribution of the final report or product. The program and its funding, which could be proportionately distributed to the various departments, could move from one department to another sequentially or simultaneously. Examples might be programs that (1) demonstrate the existence, quality, economic viability, development and distribution of coalbed methane as a cheaper fuel for an isolated interior village; (2) study of the existence of geohazards, their potential impact, design or monitoring programs, and development and evaluation of regulations concerning activities within the area of interest; or (3) baseline data for the Department of Environmental Conservation.

The committee strongly supports the idea of partnering and shared funding. An example of a highly successful partnering effort, the Alaska Volcano Observatory (AVO), has been included as an appendix to this report.

ADMINISTRATIVE LOCATION OF DGGS

Background

The DGGS was conceived and established to serve the State of Alaska. As discussed earlier in this report, its mission is to collect, evaluate, archive, and distribute geologic data and interpretive information on the state's energy and mineral resources, earthquake and volcanic hazards, and water quantity and quality. This information has historically served other state agencies, land managers, industry, the engineering community, and the general public.

Justification

DGGS is housed in the Department of Natural Resources because energy, minerals, and water are resources fundamental to the state's health and wealth. Geologic hazards profoundly affect the development and maintenance of the state's energy and mineral resources, communities and infrastructure, and the welfare of its people. Its location within DNR most directly connects DGGS with agencies and people who need the information DGGS can provide.

Recommendation

The committee has investigated various alternatives to the administrative location of DGGS within DNR by interviewing other state geological surveys in the United States that have various administrative relationships with their legislative, industrial, engineering, public, and academic communities. The committee considered these examples with special circumstances of Alaska's fundamentally resource-based economy. The viable alternatives are (1) remaining in DNR; (2) restructuring as an independent commission directly responsible to the governor and cabinet; and (3) becoming an adjunct to the university system.

As an independent commission answering to the governor, designation of priorities for the project work assigned to DGGS could swing radically from one administration to the next. Politics could have a very negative influence on the progress of projects, due to radical shifts in administrative policy or the whims of governors. In the long term, a stable environment allows greater efficiency and a faster response time to the great variety of political, economic, and public demands on DGGS for geologic expertise, analysis, and information. In view of a long term, stable environment, the committee concluded that an independent geologic commission would not be adequately insulated from political variations.

Within the university system, DGGS could perhaps retain a smaller core of scientists and still maintain scientific "critical mass" needed to accomplish multidisciplinary projects by drawing more heavily on the university geologic faculty and students. Other potential advantages include shared lab facilities and administrative costs, and enhanced scientific credentials and respect. This is a solution employed by several (15) other state geological surveys. The committee sees two main drawbacks to this solution.

First, within the university system, DGGS could very easily be too isolated from its clients and from a daily dialogue with partner agencies that would keep prioritization of its efforts on a steady course, relevant to the needs of its main clients. The university has not historically been a client of DGGS. Second, the exciting academic research environment of the university, and likely involvement with teaching and student advisory request and opportunities, although stimulating, would compete with the practical geologic project work that define the mission of DGGS. The threat of "academic isolation" is too real, and has traditionally been one of the main complaints about DGGS and other state and federal scientific agencies, even when they are not associated with universities. At present, located less than a mile from the university campus, the DGGS already enjoys the benefits of stimulating geologic interaction, student labor, and shared laboratory facilities.

It is the view of the committee that DGGS already has the best of both worlds: physical proximity to the university and administrative proximity to state government. Remaining within DNR would also protect DGGS from university politics. The university is addressing its own budgetary cutbacks and conserving energies for its teaching mission. Sharing people and resources that are already stretched too thin could strain relations within and between DGGS and the university. In the interest of long-term stability, independence from the university system would best serve DGGS and ultimately its clients.

Expected Results

DGGS should remain as a division within DNR. The Commissioner and state Advisory Board would continue to negotiate priorities and timeframes for projects undertaken by DGGS. The Commissioner, other agency leaders, and the State Geologist should coordinate DGGS project work with that of other agencies within DNR, and any other clients that require the expertise of DGGS.

STATE GEOLOGIST

Background

The State Geologist has a critical role in the scientific affairs of Alaska. The position carries the responsibility of knowledge of natural resources, geologic hazards, and current technologies available to the geoscience community. The position requires an individual that has strong leadership capabilities and the vision to guide the DGGS in its role as a responsible, proactive resource agency in the future.

One of the primary roles of the State Geologist is to secure adequate budgets for DGGS to preserve existing programs. As a result of recent budgetary degradation the DGGS is only able to provide low-level maintenance of high profile programs. However, opportunities do exist to obtain funding from non-traditional public and private sources.

Justification

Alaska is a significant repository of petroleum and mineral reserves, and coal and water resources and the state economy is strongly resource-based. The vast size and resource potential of the state combined with the extreme potential for geologic hazards dictates the need for a strong state geological survey. Due to the conditions presented the survey must be a very multi-faceted agency, likewise the individual filling the State Geologist position must have a very diverse background and be conversant in all aspects of the geology of Alaska.

Recommendations

The committee recommends that the position of State Geologist be filled without delay with a nationally recognized earth scientist noted for exceptional public vision and real knowledge of private resource industries. It is highly recommended the individual selected for the State Geologist has understanding of both state-level and federal political processes.

Because of the nature of the professionals within an agency such as DGGS, the State Geologist must have strong leadership qualities. The State Geologist must have the ability to be a strong manager and consensus builder for programs which may be unpopular from a strict scientific perspective. The individual selected for the State Geologist will be required to move the DGGS from traditional survey programs, such as regional mapping, toward projects that reflect new and changing public needs. The State Geologist should have the experience to predict shifts in resource industry requirements and public attitudes and awareness towards hazards and development and be one step ahead.

The new State Geologist must address new areas of funding potential such as partnering and cooperative agreements with both public agencies and private industry. Working with private industry and public agencies will be a primary function of the position.

Through the Geologic Mapping Advisory Board, the State Geologist should prioritize projects and staff them accordingly to assure quality products completed in a timely manner.

Candidates for State Geologist should be identified by a panel of scientists and citizens named by the Geologic Mapping Advisory Board. The constituent panel should forward their nominations to the Commissioner for final selection.

We recommend that the basic term be staggered across election year boundaries to provide continuity to DGGS. The position must also have sufficient tenure to be attractive to high quality individuals. Therefore, the committee proposes a five-year renewable term for the position.

Expected Results

The selection of a well-recognized, multidisciplinary earth scientist as State Geologist will provide DGGS with strong leadership to carry the agency forward into the next century. Results of this selection should conclude with the identification and appointment of an individual with capabilities to effectively address

- ◆ local legislature during budgetary hearings;
- ◆ other state agencies for cost-sharing programs;
- ◆ federal agencies for cost-sharing and cooperative agreement programs;
- ◆ and private industry for cooperative agreements.

STAFFING

Background

DGGS mission requires maintaining expertise in a variety of geologic disciplines to meet the state's needs with respect to identification and development of resources, monitoring, mitigation of hazards, land use, and regulation.

Justification

To accomplish the various missions of DGGS, there are several key staffing needs that must be provided for and maintained. These include:

- ◆ A variety of regional and topical expertise to identify, prioritize, propose, and execute projects through the Advisory Board and other agencies. The State Geologist will need input, support, and ideas from staff.
- ◆ The breadth and flexibility to evolve with changing scientific needs into the 21st century.
- ◆ The regional background and depth to identify the needed expertise for contracting on special projects (this includes both expertise in a discipline to recognize, for example, the need to contract an expert in magnetics or seismic interpretation for a specific data set *and* enough background in the field to know who are the experts to call).
- ◆ A sufficient number of professional scientists to cover:
 - main Alaska regions (north, central, south, southwest, and southeast);
 - main functions of DGGS (mapping, geochemistry, geophysics, mineral deposits, basin analysis, hydrology, seismic hazards, volcanic hazards, and environmental)
 - basic disciplines (igneous petrologist, metamorphic petrologist, sedimentary geologist/stratigrapher, structural geologist, surficial geologist, economic geologist, geochemist, and geophysicist).

The committee recognizes that a number of these specialties overlap.

Recommendations

The core staff size should remain relatively constant over at least the near term, roughly five years. Short-term changes in staffing can be accommodated by using temporary or contract employees, or involving

employees from other agencies in partnering arrangements. Proposed staffing levels and disciplines, based on the concept of two DGGS offices, in Fairbanks and Anchorage, are presented below.

Suggested staff allocation assigned to Anchorage would include the State Geologist, hydrologist(s), sedimentologist/stratigrapher, structural geologist/seismic geophysicist, GIS expert, and necessary administrative support staff. The remaining staff would be located in the Fairbanks office.

Over time, it would be highly desirable to reallocate personnel between the two offices on the basis of need and proximity to the principal client(s). As an example, it would be an advantage to ultimately have hydrogeologic capability in Fairbanks and mining geologists and an engineering geologist in Anchorage. Given a demonstrated need and additional sources of funding for DGGS these staffing changes could also be met by carefully managed additions to staff.

Expected Results

The location of the State Geologist and a small regional staff in Anchorage should greatly enhance the working relationships with both clients and partners. The level of financial support from both partners and clients should significantly increase, and new sources of revenue will eventually open up to the DGGS.

PHYSICAL LOCATION OF DGGS

Background

The main office of DGGS has been located in Fairbanks for most of its existence. At various times DGGS has also maintained offices in Anchorage and Juneau. Presently all DGGS employees are located in Fairbanks, except for the curator of the Geologic Materials Center in Eagle River. In the 1970s, the Fairbanks offices of DGGS were located in the O'Neill Building on the University of Alaska campus. An off-campus location was subsequently obtained at the university's request and to save costs. During the 1980s, several DGGS employees had offices in the DNR complex in Fairbanks. Currently all employees are located in office space about a half mile from campus and in Alaska Volcano Observatory office space at the Geophysical Institute.

This committee has weighed the benefits and disadvantages of the various past locations of DGGS offices and employees, and considered the effectiveness of DGGS in each situation. The most important factors relating to the effectiveness of DGGS in meeting its responsibilities to clients include communication and cooperation between DGGS, the Commissioner, and other state and federal agencies, communication and cooperation between DGGS and university faculty and students, access to university lab facilities and part-time student help, and access clients such as industry, engineers, Native corporations, and the public have to DGGS.

Justification

The Fairbanks location of DGGS has distinct advantages because of the Fairbanks' location of a large component of the state's mining community, access to the university, and a geographically central location. It has drawbacks with respect to interagency communication, although the State Geologist frequently travels to Anchorage and Juneau to meet with the Commissioner and other agency leaders, and also with respect to accessibility to the energy industry and the bulk of Alaska's population.

Clients

The main disadvantage of the Fairbanks location of DGGS is its inaccessibility to a range of clients. These clients are found within the energy industry, the remaining contingent of the mining industry, the

engineering community, and the hydrologic/environmental industry. These clients have significant geologic needs in southern Alaska.

One major user of geologic information is the energy industry, which is based in Anchorage. The Division of Oil and Gas, whose mission is predominantly regulatory, is located in Anchorage and for practical reasons acquires its own geological baseline information needed for energy-related regulatory decisions. DOG has competent geologists capable of meeting these needs. If this responsibility is removed from the purview of DGGS, there are dangers in that (1) DOG information is confidential and unavailable to other clients, and (2) data collection and analysis by a regulatory agency could have the appearance of being self-serving.

Another need for geologic expertise in southern Alaska arises from some of Alaska's most salient geologic hazards, earthquakes, and volcanoes, which are concentrated in the general vicinity of Anchorage. Much of the data collected for monitoring these hazards is processed at the Geophysical Institute on the University campus in Fairbanks, and the USGS maintains an observatory headquarters in Anchorage that works closely with UAF, USGS, and DGGS volcanologists in Fairbanks. The two parts of the Alaska Volcano Observatory coordinate a rapid response to eruptions. But emergencies aside, there is a larger need for geologists to provide information with respect to earthquake hazards that will affect structures and transportation systems in southern Alaska, for the engineering community and for public safety in general.

A growing concern in Alaska is water quantity and quality. Increasing population pressure, and long-ignored problems with disposal of hazardous materials on military bases have resulted in a dynamic hydrologic and environmental geologic industry that has a pressing need for baseline geologic and hydrologic information. In the 1980s, the water program was removed from DGGS and transferred to the Division of Mines and Water in DNR. However, this is primarily a regulatory agency, and as with DOG, there is always the problem of credibility when a regulatory agency collects and maintains its own baseline data. In another section of this report, the committee recommends that water information functions should be returned to the mission of DGGS. A large component of the hydrologic/environmental industry and the mining and water regulatory agency are located in Anchorage, and expertise in Fairbanks at DGGS is not adequately accessible to Anchorage-based clients of DGGS. In addition, the USGS Water Resources Division has its main offices in Anchorage, and coordination would be mutually beneficial.

Recommendation

The committee recognizes clear advantages to the location of DGGS in Fairbanks near the university campus. These advantages include accessibility to DGGS for the large Fairbanks-based mining industry, access to university facilities and scientists for DGGS, and a location geographically centered in the state. There is also a demonstrated need for geologic expertise in DGGS in Fairbanks to address hydrologic and environmental problems in northern Alaska, particularly now with the recent development of mineral properties in the Fairbanks and Circle mining districts.

The committee also recognizes an unfulfilled need for DGGS to have a presence in Anchorage to deal with a larger, and growing client base in southern Alaska. A presence in Juneau for southeastern Alaska is also warranted, but is seen to be a luxury in the present fiscal climate. The committee recommends that DGGS maintain offices in both Anchorage and Fairbanks.

There are obvious budgetary concerns with this recommendation. The Fairbanks office is perceived to be understaffed to meet its project responsibilities and can not afford to lose scientists by transfer to Anchorage. In addition, DNR can not afford a major staff increase in this time of diminishing funds. An attractive possibility is to move a few geologists from the Division of Mining and Water Management and the Division of Oil and Gas who are already located in Anchorage over to DGGS and to replace the few recently retired geologists from Fairbanks with new hires in Anchorage. To minimize the understaffing

problem, it would be most efficient to split along disciplinary lines with energy and water focused in Anchorage.

Because the Commissioner, most other state and federal agency leaders, and the greater proportion of DGGs clients in industry, transportation, and the public are in Anchorage, we have already recommended that the most logical and efficient residence for the State Geologist is Anchorage. It is anticipated that the State Geologist will need to meet with, generate proposals to, and respond to this large and diverse group of partners and clients on a daily basis. The State Geologist will obviously need a strong deputy in Fairbanks, and will need to visit Fairbanks on a regular basis.

The location of the DGGs office in Fairbanks has risen as a subject of debate. There is an opportunity for DGGs to move to a planned new wing of the Geophysical Institute on the university campus. There are clear scientific advantages to being housed with other geologists and in the same building with lab facilities. This location would also somewhat alleviate the feeling of isolation within DGGs because they would be surrounded with university scientists. However, DGGs has had offices on campus several times in the past, and there have been problems that ultimately resulted in moving back off campus. The present location, less than a mile from campus allows proximity to university scientists and insulation from university politics, including unpredictable fee structures developing from university budget variations. Any future space-sharing agreement with UAF should take these past problems into account. Another alternative would be to move DGGs in the DNR complex in Fairbanks. This would be advantageous for cooperation and collaboration with other state agencies, but would probably result in less communication with the university scientists because of the physical separation. Although it is extremely important for the State Geologist to interact with other state agency leaders, that will happen in Anchorage, and the individual scientists will benefit more from proximity to university facilities and student labor. The committee suggests that the present location of the DGGs offices in Fairbanks is a good compromise.

The optimum location of the Anchorage component of DGGs will also be a compromise between scientific advantages and political necessities. The committee concludes that it is essential for the State Geologist to be in close contact with the Commissioner and other state agencies, which translates to finding space near the other DNR agencies in the Frontier Building. This would also maintain accessibility of the regulatory agencies to water and energy scientists. An alternative would be office space adjacent to the USGS offices on the Alaska Pacific University campus, which would facilitate collaboration with USGS hydrologists, surficial geologists working on earthquake hazards, and geologists in the Alaska Volcano Observatory. University politics are less of a threat on the APU campus because it is very small and university politics are consequently smaller scale. APU acts simply as a landlord to the USGS. There is a geology faculty of one, and although USGS scientists occasionally provide a lecture, there have been no students available for help.

Expected Results

With a presence in Anchorage DGGs will more easily interface with other state agencies, will be more accessible to industry and the public in southern Alaska, and will have stronger collaboration with the USGS in building a hydrologic database across the state. The location of the State Geologist in Anchorage is anticipated to increase exposure and access to funding-opportunities both within and outside of state government.

APPENDIX

EXAMPLE OF PARTNERING

Background

The Alaska Volcano Observatory (AVO) is a cooperative organization that uses federal, state, and university resources to monitor Alaska's hazardous volcanoes, predict and record eruptive activity, and implement public safety measures. AVO focuses on volcanoes in the Cook Inlet region, Alaska's most populous area and one important for international air transportation, oil and gas production, commercial fishing and tourism. Eruptions of three volcanoes in this region have significantly impacted human activities in each of the past five decades. The program also monitors other Alaskan volcanic areas because of their potential for catastrophic events or as a guide to Cook Inlet volcanism. AVO is a joint program of the U.S. Geological Survey, Geophysical Institute of the University of Alaska Fairbanks, and the State of Alaska Division of Geological & Geophysical Surveys. Components of the program are:

1. Monitoring, principally with a seismic network but supplemented as needed through geodesy, slow scan TV, satellite, geochemical, hydrologic and spectroscopic observations, to detect eruptive precursors and to track and record ongoing eruptions.
2. Communication to disseminate public safety information. This component involves general education concerning volcanic hazards as well and timely warnings of impending eruptions and the areas these eruptions will impact.
3. Basic geological, geochemical, and geophysical investigations to determine the history, physical characteristics, and eruptive mechanisms of Alaska volcanic systems, as a guide to future activity.

Justification

Alaska's Aleutian volcanic arc contains more than 50 geologically young and potentially explosive volcanic centers. Together, these have erupted once or twice each year since the turn of the century. In addition, more than 20 catastrophic caldera-forming eruptions have occurred in the past 10,000 years. The most recent of these was the great eruption of 1912 near Mt. Katmai on the Alaska Peninsula in what is now Katmai National Park. Approximately 30 km³ of pumice and ash were erupted in 60 hours, filling a large glacial valley with up to 200 m of ignimbrite and dumping 30 cm (when fully compacted) of ash on Kodiak, 160 km down wind. The event was accompanied by floods, mud flows, magnitude 6 earthquakes, and the collapse of Mt. Katmai to form a 3-km-diameter, 1-km-deep caldera. This remains the largest eruption of this century on Earth, but numerous young caldera structures elsewhere in the arc show that its size is not without precedent here. With a record of unnumbered "average" eruptions and several truly world-class events in the Holocene, the Aleutian arc is clearly the most dangerous area in the nation with respect to explosive volcanism, and one of the most important such regions in the world.

Hazards associated with explosive volcanism take many forms. The most direct are the explosions themselves. Eruption clouds most often rise vertically above the vent, but they may be laterally directed as well. Ballistic ejecta pose a hazard to aircraft and buildings within a few kilometers, sometimes farther if the blast is directed. Hot, fast moving pyroclastic flows can reach out along valley floors many kilometers from the eruptive center. Usually more far-reaching are the consequences of ash falls from the eruptive plumes, which can make air and surface travel impossible and, in major eruptions, cause buildings to collapse. Perhaps of equal seriousness in Alaska is the presence of water and ice on and around active volcanoes. Eruptions cause catastrophic melting of glacial ice generating mud flows which can travel tens of kilometers. Volcanic cones, over-steepened by eruptive or intrusive activity, can undergo sector collapse. Debris flows thus generated will, if they enter the sea, cause tsunamis and attendant widespread devastation along shorelines.

Alaska is sparsely populated, and so the potential for near-field damage is low in most cases. There is however, a high potential for repeated disruption of air traffic, oil and gas production, commercial fishing, tourism, and military operations due to ash plumes and falls, and far-reaching mud flows and tsunamis. This threat is most serious in the Cook Inlet region, where Alaska's population is concentrated. Augustine is the most active of the Cook Inlet centers, with 6 explosive eruptions this century. In 1883, a volcanic debris flow shed by Augustine entered the sea, apparently triggering a tsunami that inundated the harbor of English Bay on the lower Kenai Peninsula. This type of activity remains a serious threat to coastal Kenai communities. The most recent of Augustine eruption closed businesses in Anchorage and halted transportation throughout southern Alaska in March and April of 1986. An eruption of Spurr in 1953 caused significant ash falls in Anchorage. In 1989-1990, the explosive eruptions and associated mud flows of Redoubt volcano disrupted air travel, caused nearly \$100 million of damage to aircraft, and required \$20 million of preventive measures at a neighboring oil terminal. Mount Spurr erupted again in 1992, dusting Anchorage with ash and causing the airport to be shut down for a day. These were modest eruptions by Aleutian arc standards, but Cook Inlet has reached the level of development where even a small eruption can have major consequences. Meanwhile, traffic on North Pacific air routes has grown to the point where about 10,000 passengers per day transit the Aleutian Arc. Some 70 percent of cargo between eastern Asia and the United States is landed at Anchorage, which has become the first-ranked freight airport in North America. All that is required for a lethal accident is an ash cloud to reach 30,000 to 40,000 feet above one of these volcanoes undetected.

History of Development of AVO

Volcanology in Alaska can be regarded as beginning with the great eruption of 1912. The burial of the village of Kodiak under a thick blanket of ash, all the more disturbing to the inhabitants because they did not regard themselves as being near a volcano, triggered a four-year search for the eruptive vent on the remote Alaska Peninsula. That search, funded by the National Geographic Society and led by Robert Griggs, discovered the Valley of Ten Thousand Smokes and initiated debates and inquiries that have become themes in modern volcanology. However, volcanology was not extensively practiced by Alaskans until modern-style investigations of the Aleutian Arc were begun in the 1960s and 70s by UAFGI, the branch of Alaskan Geology of the USGS, and DGGs. Motivations for all three organizations included basic research, volcano hazards, and geothermal energy. The UAFGI and USGS work had a substantial basic research component, whereas DGGs efforts emphasized a statewide survey of geothermal resources. DGGs conducted detailed studies of Redoubt, Makushin, Geyser Bight, Akutan, and Spurr magma/hydrothermal systems and undertook monitoring of the fumaroles at Cook Inlet volcanoes. Much of the DGGs effort was funded by the U.S. Department of Energy. UAFGI and USGS established limited volcano seismic networks for monitoring purposes. In 1982, the Workshop on Alaskan Seismology organized by DGGs formally called for the establishment of a research consortium to coordinate and strengthen these activities for the Cook Inlet region. Although Alaskan scientists worked toward this goal, it remained for Augustine Volcano to bring their efforts to fruition. In response to the disruption of commerce caused by the 1986 Augustine eruption and in consultation with Alaskan scientific leaders, members of the Alaskan congressional delegation asked the USGS to outline requirements for a volcano observatory, incorporating existing USGS, UAF, and DGGs facilities and expertise. As a result, the Alaska Volcano Observatory (AVO) was established in 1988 as a joint program of the USGS, UAFGI, and DGGs, under a Memorandum of Understanding signed by the Chief Geologist of the USGS, the Director of UAFGI, and the State Geologist. The \$500K/year federal contribution was an annual Congressional add-on to the USGS budget and was adequate only for minimal geophysical monitoring of the Cook Inlet volcanoes.

The original concept was to monitor Augustine, however the mission was soon broadened to include Augustine's neighbors. This was fortunate, because Redoubt Volcano burst into eruption on December 14, 1989, only two months after Redoubt's seismic network was placed on line. The precursor seismic activity, which preceded the eruption by only 24 hours, was successfully detected, with appropriate warnings issued.

Under these emergency conditions, AVO's level of effort was rapidly expanded from its modest base to encompass monitoring of gas, tephra, eruption-caused lightning, and floods as well as visual monitoring by slow-scan TV and satellite. Warnings were issued prior to the major eruptive events of January 2, March 23, and April 6. Of special note was the use of meteorological data to predict plume trajectories and the timely evacuation of personnel from the Drift River Oil Terminal prior to a major debris flow.

The number and severity of explosive eruptions at Redoubt required a labor-intensive response, for which several million dollars in federal funds were made available. Two AVO centers evolved. One in Anchorage was staffed by the USGS, directed most field operations, and interfaced with federal agencies and concerned commercial enterprises (aviation, oil and gas). The center in Fairbanks, located at the Seismology Laboratory of UAFGI, was staffed by UAFGI, USGS, and DGGS personnel. It focused on real-time acquisition and interpretation of seismic data, and interfaced with state agencies. Two DGGS personnel were "drafted" early in the crisis, one to provide volcanological expertise and the other to help run the then-overloaded computer system. Their time was covered through a combination of state supplemental and emergency federal funds. Following the eruption, federal funding of AVO dropped from a peak of \$6 million/year to \$3 million/year. State support of communications, volcano work within the Seismology Laboratory, and part of the time of DGGS personnel totaled about \$500K/year.

The next crisis, the Mount Spurr eruptions of 1992, was also successfully predicted by AVO. Because of fewer explosions and consequently less disruption than Redoubt, Spurr activity brought no new federal dollars, but did help AVO to become a permanent, USGS-budgeted part of the Volcano Hazards Program. The state provided \$300 k in emergency funds through the Division of Emergency Services to UAFGI to defray the cost of replacing eruption-damaged equipment, greatly increased helicopter time, and maintaining 24 hour/day operation. At this writing, the approximate funding levels of \$3 M from USGS and \$0.5 M from the state continue. Federal support may increase to accommodate monitoring of Alaska Peninsula and Aleutian Islands volcanoes. DGGS now contributes 18 person-months per year to AVO, for which it is reimbursed for 13 months by the USGS.

Discussion

AVO exemplifies the type of partnering that can enhance the effectiveness of a government program and eliminate wasteful duplication. This approach respects the historical role that the USGS, UAF, and DGGS have played in volcanological studies, and combines the perspectives, missions, and strengths of these organizations. The USGS is the federal agency with primary responsibility for warning of volcanic and hydrologic hazards in the US (Disaster Relief Act of 1974). The USGS has extensive experience in volcano monitoring and the management of observatories, and in times of crisis can draw on its substantial resources of expertise outside the state, including scientists from its Cascades of Hawaiian observatories and its center at Menlo Park, California. The DGGS has a similar mandate for hazard mitigation within the state and possesses important expertise in acquisition and management of state geologic and geophysical data. More than the other organizations, it provides the Alaskan perspective within AVO. As an educational and research institution, UAFGI brings a tradition of productive research and also provides a route for student involvement in AVO. This is cost-effective for AVO operations and represents an exceptional scientific opportunity for students. This partnership is also important from a political standpoint. It is a matter of significance to legislators in Juneau that support for DGGS and UAF augments a significant federal effort within the state, and it is of importance to Congress that the State of Alaska takes volcano hazards seriously and contributes to the monitoring effort. The appropriate proportions of state and federal support are difficult to quantify. More important is that both entities acknowledge through their support that volcano hazards in Alaska have an impact at both the local and national levels.

Although the need for partnering in the form of AVO was recognized in 1982, it did not occur until propelled by the dual forces of crisis and new money. The challenge for the future of DGGS will be to

develop partnerships without such forces, but where the only incentive is increased effectiveness in accomplishing the DGGs mission. To do this, partnering must be seen by both employees and management as a good thing. In general, partnering will require some base of state support; it leverages state support rather than replacing it. A special effort must be made to maintain contact between DGGs and DGGs employees who are stationed at partner institutions. Finally, personal initiative in obtaining outside funds should be seen as increasing job security and flexibility, rather than decreasing security by reliance on outside "soft" money.

(7)

HOUSE COMMITTEE REPC...I

Date Referred to Committee: January 8, 1996

FURTHER REFERRALS:

Resources
FinanceDate of Committee Action: 1/25/96The HOUSE SPECIAL COMMITTEE ON OIL AND GAS Committee considered:EO 92

EXECUTIVE ORDER NO. 92

Transferring duties in the Department of Natural Resources to consolidate the division of oil and gas and the division of geological and geophysical surveys into a division of oil, gas, and geology in that department.

recommends it be replaced [] the same title
with the following committee substitute [] a new title

[] additional referral to _____ Committee
[] attached amendment(s)

ADOPTS: _____ Letter of Intent

ATTACHES NEW FISCAL NOTE(S): (Dept)

APPROVES PREVIOUS: (Dept/Date)

☒ fiscal note(s) ONE
☐ fiscal note(s) _____

☐ zero fiscal note(s) _____

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SIGNING WITH RECOMMENDATIONS	DP	DNP	NR	AM
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CHAIR'S SIGNATURE

[Signature]

1-25-96



Official Business

Alaska State Legislature

HOUSE OF REPRESENTATIVES

House Special Committee On Oil & Gas

State Capitol
Juneau, AK 99801-1182

MEMORANDUM

DATE: February 2, 1996

TO: Representative Joe Green, Co-Chairman
Representative Bill Williams, Co-Chairman
House Resources Committee

FROM: Representative Norman Rokeberg, Chairman
House Special Committee on Oil & Gas

SUBJECT: Executive Order No. 92

A handwritten signature in dark ink, appearing to read 'N. Rokeberg'.

Executive Order No. 92 consolidates the Division of Oil and Gas with the Division of Geological and Geophysical Surveys located within the Department of Natural Resources. The testimony before the House Special Committee on Oil & Gas indicated that there is no consensus regarding whether the consolidation outlined in Executive Order No. 92 is the correct configuration of the two divisions.

Remarks during public testimony indicates there are both good and bad consequences if the consolidation goes forward. As a result of committee testimony, the members of the committee voted to introduce a special resolution to oppose the consolidation in order to expedite the process and move the executive order to the appropriate authorized committee.

In addition we checked with Legislative Legal on the proper procedure for handling a resolution opposing an executive order. The legal memorandum we received stated that under Uniform Rule 21 joint standing committees must consider executive orders.

9-LS1576A ✓
Cook
1/23/96

HOUSE SPECIAL CONCURRENT RESOLUTION NO.
IN THE LEGISLATURE OF THE STATE OF ALASKA
NINETEENTH LEGISLATURE - SECOND SESSION

BY THE HOUSE SPECIAL COMMITTEE ON OIL AND GAS

Introduced:
Referred:

A RESOLUTION

1 **Disapproving Executive Order No. 92.**

2 **BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:**

3 **WHEREAS** the governor, under authority of art. III, sec. 23, Constitution of the State
4 of Alaska, has proposed in Executive Order No. 92 to combine the functions of the division of
5 oil and gas and the division of geological and geophysical surveys into a division of oil, gas,
6 and geology; and

7 **WHEREAS** art. III, sec. 23, Constitution of the State of Alaska, provides that unless
8 disapproved within 60 days of a regular session by resolution concurred in by a majority of the
9 members of the legislature in joint session, an executive order becomes effective at a date
10 designated by the governor;

11 **BE IT RESOLVED** by the Alaska State Legislature that Executive Order No. 92 is
12 disapproved.

LEGAL SERVICES

DIVISION OF LEGAL AND RESEARCH SERVICES LEGISLATIVE AFFAIRS AGENCY STATE OF ALASKA

(907) 465-3867 or 465-2450
FAX (907) 465-2029
Mail Stop 3101

130 Seward Street, Suite 409
Juneau, Alaska 99801-2105

MEMORANDUM

January 23, 1996

SUBJECT: Procedure for Disapproving an Executive Order
(Work Order No. 9-LS1576)

TO: Representative Norman Rokeberg
Chair, House Oil & Gas Committee

FROM: Tamara Brandt Cook
Director

You have asked what the procedure is for the disapproval of an executive order. The state constitution contains the requirement that disapproval of an executive order is accomplished "... by resolution concurred in by a majority of the members in joint session ..." (Article III, Section 23) This must be complied with or any attempt by the legislature to disapprove an executive order will be held invalid by the court.

In addition to the procedure set out in the constitution, Uniform Rule 49(a)(4) provides

A special concurrent resolution is employed to consider disapproval of an executive order of the governor laid before the legislature under provisions of Sec. 23, Art. III, of the State Constitution. This resolution must be considered by a joint committee and may be adopted by a majority vote of the full membership of the legislature in joint session without recourse to three readings.

So, the uniform rule adds the requirement that a joint committee consider each special concurrent resolution before it is adopted in joint session. Clearly, a joint committee could be established under Uniform Rule 21 for the purpose of considering a resolution disapproving an executive order. However, it has been the position of this office since at least 1981 that, because Uniform Rule 49(a)(4) does not specifically require the establishment of a joint committee under Rule 21, two standing committees meeting jointly would fulfill the requirement of consideration by a joint committee. This is what has been done in the past, and I cannot find an example within the past 15 years of the legislature appointing a joint committee to consider a resolution disapproving an executive order.

Any member or committee may, of course, introduce a special concurrent resolution disapproving an executive order. After the resolution and the executive order itself have

Representative Norman Rokeberg

January 23, 1996

Page 2

been reported from committee, a joint session must be either agreed to by the presiding officers or called by a house under Uniform Rule 51 for the purpose of considering the special concurrent resolution disapproving the executive order.

TBC:pl:klb

96-030.plm

WORK ORDER REQUEST FORM

W.O. [19] LS-1576

KEYWORDS: EXECUTIVE ORDER

ASSIGNED: Cook

REQUEST FOR: Resolution

TAKEN BY: Cook

SUBJECT: Disapproving E.O. 92

REQUESTED FOR: HC HO&G

BY: Shirley

PHONE: 465-4968

DELIVER TO: Rep. Rokeberg, Cap. 110

INSTRUCTIONS: Draft resolution disapproving E.O. 92.

OBTAIN

SPECIAL DRAFTING INSTRUCTIONS ATTACHED []
AUTHORIZED TO CONFER WITH _____

RETURN _____

_____ TO REQUESTOR

APPROVED: X DIRECTOR, LEGAL SERVICES

REVIEWED _____

IN 01/22/96 DUE _____

TYPED: Draft _____ Date _____

Final _____ Date _____

PROOFED _____ DELIVERED _____

SPECIAL INSTRUCTIONS to TYPING/PROOFING
Memo explaining procedure for reject-
ing E.O.

Request for DRAFT



HOUSE SPECIAL COMMITTEE ON
OIL AND GAS

DATE: 1/25/96

SIGN - IN

Subject of meeting:

EO 92: Consolidation of the Division of Oil and Gas with the Division of Geological and Geophysical Surveys

PLEASE PRINT!
NAME

ADDRESS (MAILING) & (ZIP)**PHONE**

REPRESENTING

**DO YOU WANT
TO TESTIFY?**

[illegible]

Sec. 41.08.010. Division of geological and geophysical surveys. There is established in the department a division of geological and geophysical surveys under the direction of the state geologist. (§ 1 ch 93 SLA 1972)

Sec. 41.08.015. State geologist. The commissioner shall appoint the state geologist, who must be qualified by education and experience to direct the activities of the division. (§ 1 ch 93 SLA 1972)

Sec. 41.08.017. Hydrological and seismic hazard data declared to be of public interest. (a) Systematic collection, recording, evaluation, and distribution of data on the quantity, location, and quality of water of the state in the ground, on the surface of the ground, or along the coasts, are in the public interest and necessary to the orderly domestic and industrial development of the state.

(b) Systematic collection, evaluation, archival, and distribution of geologic data and information on earthquakes, volcanic eruptions, and engineering geology and identification of potential seismic, volcanic, and other geological hazards throughout the state are in the public interest and necessary to orderly, safely, and cost-effective development in the state. (§ 1 ch 41 SLA 1977; am § 1 ch 101 SLA 1983; am § 3 ch 36 SLA 1987)

Sec. 41.08.020. Powers and duties. (a) The state geologist shall conduct geological and geophysical surveys to determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources; the locations and supplies of groundwater and construction materials; the potential geologic hazards to buildings, roads, bridges, and other installations and structures; and shall conduct such other surveys and investigations as will advance knowledge of the geology of the state. With the approval of the commissioner, the state geologist may acquire, by gift or purchase, geological and geophysical reports, surveys, and similar information.

(b) In addition, the division of geological and geophysical surveys shall:

(1) collect, record, evaluate, and distribute data on the quantity, quality, and location of underground, surface, and coastal water of the state;

(2) publish or have published data on the water of the state;

(3) require the filing with it of the results and findings of surveys of water quality, quantity, and location;

(4) require of water well contractors, the filing with it of basic water and aquifer data normally obtained, including but not limited to well location, estimated elevation, well driller's logs, pumping tests and flow measurements, and water quality determinations;

(5) accept and spend funds for the purposes of this section, AS 41.08.017, and 41.08.035 and enter into agreements with individuals, public or private agencies, communities, private industry, state agencies, and agencies of the federal government;

(6) collect, evaluate, and distribute geologic data on seismic events and engineering geology of the state;

(7) identify potential seismic hazards that might affect development in the state;

(8) inform public officials and industry about potential seismic hazards that might affect development in the state. (§ 1 ch 93 SLA 1972; am § 2 ch 41 SLA 1977; am § 7 ch 175 SLA 1980; am § 2 ch 101 SLA 1983; am § 4 ch 36 SLA 1987)

Cross references. — For declaration of sources, see § 1, ch. 175, SLA 1980, in the legislative policy on geothermal re- Temporary and Special Acts

Sec. 41.08.025. Accounting and disposition of receipts. Repealed, § 28 ch 90 SLA 1991. For current law, see AS 37.05.142 — 37.05.144.]

Sec. 41.08.030. Printing and distribution of reports. The state geologist shall print and publish an annual report and such other special and topical reports and maps as may be desirable for the benefit of the state, including the printing or reprinting of reports and maps made by other persons or agencies, where authorization to do so is obtained. Reports and maps may be sold and all money received from these sales shall be paid into the general fund. (§ 1 ch 93 SLA 1972)

Sec. 41.08.035. Regulations. The department may adopt regulations relating to and providing for the systematic collection, recording, and distribution of data on the water of the state. (§ 3 ch 41 SLA 1977)

Sec. 41.08.040. Cooperation with other agencies. The state geologist, with the consent of the commissioner, may enter into cooperative agreements with federal, state, and local governmental agencies to perform geological and geophysical surveys, studies, investigations, and services. (§ 1 ch 93 SLA 1972)