

# **State of Alaska FY2002 Governor's Operating Budget**

Department of Natural Resources  
Geological Development  
Component

## **Component: Geological Development**

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### **Component Mission**

"...determine the potential of Alaskan land for production of metals, minerals, fuel, and geothermal resources; the location and supplies of groundwater and construction materials; the potential geologic hazards to buildings, roads, bridges, and other installations and structures..." (AS 41.08)

### **Component Services Provided**

DGGS is the state's leading source and repository of Alaska geologic information and the primary source of information concerning Alaska's mineral resources and geologic hazards.

DGGS provides the geologic information needed for economic diversification, revenue generation, public safety, infrastructure development, and resource management in the state of Alaska.

DGGS has a strategic role in the generation and maintenance of Alaska's economy and public safety with respect to natural geologic hazard mitigation.

DGGS geologists locate or stimulate the discovery of minerals, coal, oil, gas, geothermal energy, construction-quality sand and gravel, and water.

DGGS provides geologic data and assessments used by other DNR agencies (Mining, Land & Water, Oil and Gas, Parks, Agriculture, and Forestry) state departments (e.g. Community and Economic Development, Transportation & Public Facilities, Military and Veteran Affairs), and municipalities. Information provided to non-DNR agencies has been used to plan natural hazard mitigation in urban cities and remote villages, select transportation-corridor lands for Alaska, to provide information needed to better design roads and other infrastructure, and catalyze private sector investment.

DGGS maintains a reference archive of geologic materials from across the state including oil- and gas-related samples, as well as mineral-related and coal property samples donated by industry and numerous Federal agencies. These samples represent millions of dollars of acquisition cost. The samples provide a valuable reference set of materials used by the petroleum and mineral industry to guide new exploration ventures.

To focus attention on Alaska's subsurface resources, DGGS conducts field-based geological and geophysical surveys of State lands and publishes professional and popular reports, maps, and circulars to disseminate the information gathered to its customers.

### **Component Goals and Strategies**

The goals of DGGS are closely aligned with those of the Governor, AS 41.08, and the philosophy reflected in DNR's five major goals:

DGGS seeks the following outcomes:

1. Encourage private sector investment in ventures that will develop Alaska's mineral, oil and gas, coal, and construction materials.
2. Mitigate the adverse effects of naturally occurring geologic hazards on the economy of Alaska and the safety of Alaskans.

Major Goals and Strategies

DGGS pursues these outcomes through the products and services provided from five major programs. In order to implement these programs, DGGS pools funds from the Division's annual General Fund base-budget, Federal Receipts, Legislatively designated Program Receipts, and Capitol Improvement projects. Federal Funds and Program Receipts funds are sought only for program activities that are closely aligned with the mission specified in AS 41.08 and the Division's Mission and Measures statement. Likewise, CIP funds address geologic resource problems or goals that DGGS has been specifically asked to pursue. Currently, one half to three-fifths of Alaska's geological and geophysical program is financed from non-baselevel budget funding sources. Securing the complementary funds required to implement the mandates of AS 41.08 and our Mission statement on an annual basis is never assured.

The following tasks within our five major programs constitute the Division's strategy for meeting the goals of the DGGS Mission Statement.

#### 1. Statewide Mineral Appraisal Program

Contingent on FY02 CIP funds, geophysically survey 1000 sq. miles (640,000 acres) of high-potential mineral tracts per year to provide the geophysical data needed to sustain Alaska's mineral industry investments and create jobs throughout Alaska.

Funded by FY02 General Fund base-budget, Federal grants applied for, and committed airborne geophysical/geological mineral inventory CIP funds, complete ground-truth geologic mapping of the Eagle A-1 quadrangle. This map will provide ground-truth geologic data needed to more effectively interpret the geophysical data previously generated for the Fortymile mining district airborne geophysical tract. Ground-truth geologic mapping on this area will lead to a much greater understanding of the mineral prospects in the region, and will thus help the mineral industry in Alaska and aid planning by State and Federal agencies. A geologic map, sample location map, and tables of analytical data will be produced.

Funded by FY02 General Fund base-budget and committed airborne geophysical/geological mineral inventory CIP funds conduct ground-truth geologic mapping and release an interim geologic map of the Big Delta C-3 quadrangle within the Salcha River - Pogo airborne geophysical tract. This map will provide ground-truth geologic data needed to more effectively interpret the geophysical data previously generated for the Salcha River -Pogo mining district. The mapping area is a key to understanding regional geology near the Pogo mineral deposit and newly discovered Caribou prospect. Conducting investigations and releasing geologic data on this area will help the mineral industry and policy makers make informed decisions. A preliminary geologic map, sample location map, and tables of analytical data will be produced.

Gather, verify, and collate pertinent statistics and summary observations about the status of Alaska's mineral industry to document the industry's annual achievements and encourage others to participate. This document is widely circulated and is recognized as the best source of summary statistical data on Alaska's mineral industry.

Provide authoritative briefings about the status of Alaska's mineral industry, State support for mineral ventures, and recently acquired geophysical and geological data at professional mineral industry conventions and trade shows, and in professional journals. These presentations are an effective means of bringing the favorable mineral development potential of Alaska to the attention of corporate exploration managers and others who make mineral industry investment decisions.

Produce a ground-truth geologic map of the Delta mining belt from data contributed to us by the private sector. Several different companies collected geologic and geochemical data over many years of investigation. Synthesizing and releasing the data to the public at large will add to a better understanding of the geologic framework of Interior Alaska and encourage mineral investment in the region.

Contingent on Federal funding, begin a two-year project to compile a georeferenced database of geochemical data from past DGGS projects and make this information accessible and searchable on the Internet. Analyses of major oxide and trace element geochemical analyses from bedrock samples and geochemical data from stream sediment samples will be screened for quality data. The resulting database will include the analytical technique, laboratory, vintage, degree of reliability, and associated project information.

Contingent on Federal funding, compile a GIS-based georeferenced bibliography of bedrock geologic mapping of Alaska showing what geologic mapping is available for the state, its vintage, and degree of reliability. Make this information accessible on the Internet.

The World Wide Web has become one of the most important avenues for dissemination of information about Alaskan geologic resources. Some of the information that needs to be made available includes mining statistics, status of current geologic field projects, summaries of geophysical survey locations and project information, and an updated GIS-based summary of significant mineral deposits in Alaska. This carefully organized information will be useful to the mineral industry, policy makers, other government agencies, and to the general public.

Respond to verbal and written requests for information from other State agencies, local government, and the general public.

## 2. Statewide Energy Resource Assessment Program

Contingent upon Federal funding, conduct new 1:63,360-scale geologic mapping in the Philip Smith Mountains C-5 and adjacent areas (600 square miles) that contain significant oil and gas reservoir and source rocks; and publish bedrock, interpretive geologic, and geologic materials maps for this area to facilitate oil and gas exploration in the Brooks Range foothills belt.

Contingent upon Legislatively Designated Program Receipts, determine the oil reservoir characteristics of Nanushuk Group and Tuluvak Formation sandstones exposed along 120 miles of the northern Brooks Range foothills in order to provide key geologic framework elements to aid future oil exploration in the central North Slope. Evaluate hydrocarbon source rock potential of selected rock units in the southern Colville Basin and northern flank of the Brooks Range to identify favorable oil or gas exploration plays.

Update and convert to digital format the framework geology encompassed on five conventional paper-based 1:250,000 scale geologic maps (about 30,000 square miles) of the central and western North Slope as an aid to future oil exploration in the National Petroleum Reserve Alaska and adjacent areas of State lands. Release 5 maps in digital format and publish hard-copy 1:125,000-scale geologic maps for 2 quadrangles.

Funded by FY01 CIP funds, complete and publish gas potential assessment for the Holitna basin including coalbed methane evaluation of surface coal exposures, reinterpretation of high-resolution aeromagnetic survey data and reinterpretation of a commercial high-resolution gravity survey to better delineate the deep structure of the Holitna basin.

Contingent upon Federal funding, initiate a three year program to develop lightweight coiled-tubing microborehole drilling technology to test coalbed methane potential and gas producibility at three high-priority rural Alaska sites.

Contingent upon Federal funding, acquire new geochemical data for coal in the Kobuk River Basin in order to classify that coal resource's quality in support of future coal prospecting, leasing, and coalbed methane leasing.

Contingent upon pending Federal funding, conduct a basinwide energy resource assessment of the Yukon Flats to contribute oil, conventional gas and coalbed gas to domestic markets through existing and proposed pipelines.

Produce written evaluations of minable coal potential for lease areas in response to requests from Division of Mining, Land and Water Management.

Respond to verbal requests from other State agencies, Federal agencies, industry, local government, and the public for information on energy-related geologic framework and oil, gas, and coal resource data (estimated 80 responses).

## 3. Statewide Engineering Geology/Construction Materials Program

Contingent on partial Federal funding, complete maps of seismic soil types and earthquake-induced liquefaction susceptibility in the Anchorage area that will be used in conjunction with local building codes for earthquake-resistant planning, design, and construction

Contingent on partial Federal funding and in cooperation with the Division of Emergency Services, University of Alaska Geophysical Institute, and coastal communities, publish tsunami-inundation maps for one or two coastal communities (maps for Kodiak will be completed in FY 2001)

Supported by Federal funding through the Coastal Management Enhancement Grants Program, publish generalized earthquake ground-shaking hazard maps for southwestern and southcentral coastal districts

Produce written evaluations of potential hazards in areas of oil exploration leases, land disposals, permit applications, coastal management reviews, etc., and respond to verbal requests for information from other State agencies, local government, and the general public (estimated 60-70 responses).

Conduct post-event hazard evaluations in response to unexpected major geologic events (e.g., earthquakes, volcanic eruptions, and landslides), providing timely information dispersal to the public via electronic as well as traditional methods, and providing event and continuing hazard information to appropriate emergency management agencies.

Contingent on continued Federal funding, publish a geologic map of Mt. Douglas volcano.

Contingent on continued Federal funding, publish an interim geologic and geologic hazards map of Mt. Veniaminof volcano - Alaska's biggest volcano, and one of the most poorly known. This will be the first year of a planned two-year project.

Contingent on continued Federal funding, maintain and enhance the AVO web site. With as many as 400 visitors per day, the AVO web site is one of our most important information dissemination activities

Publish a CD-ROM disk containing geographical, geophysical, geological, geochemical and land management data for the entire Aleutian volcanic arc in a georeferenced database format.

Provide final oversight, coordination, and helicopter contracting for multi-team field work to conduct geologic-hazards studies and seismic monitoring of active volcanoes in the Cook Inlet, Alaska Peninsula, and Aleutian Islands regions.

Participate in volcano eruption response and hazard mitigation as needed to provide timely and accurate warnings and eruption information to emergency-response agencies and air-traffic controllers.

In support of the Statewide Mineral Appraisal Program, publish ground truth surficial-geologic and engineering-geologic mapping of up to 500 sq. miles (320,000 acres) of high-potential mineral tracts to produce the geologic data needed to assess the placer-mineral resources, construction-materials resources, and potential geologic hazards that may affect development of Alaska's mineral industry in selected areas.

Maintain and update the digital, GIS-based directory of construction-materials producers in Alaska, including location, commodity, and production data.

Update and expand the existing bibliography and index of surficial-geologic mapping in Alaska, convert it into digital form using GIS, and publish the data digitally via internet and CD-ROM in order to document the extent of mapping in Alaska, including scale, dates, and bibliographic information, and make the information available to the public.

#### 4. Geologic Maps and Reports Program

Assemble and edit the technical and educational maps and reports of DGGs in both conventional and digital format.

Contingent upon continued Federal funding, design and construct a Division-wide digital geologic database management system so that DGGs can improve its cycle time for responding to geologic resource and engineering geology queries and for completing its mineral and energy inventory studies in frontier areas.

Assemble, edit, and publish the Annual Mineral Industry 2000 report. This report preserves the definitive statistics for Alaska's mineral industry.

Maintain the DGGs information management micro-computer network infrastructure.

#### 5. Geologic Materials Center Program

Maintain the state's interagency archive of geologic materials (voucher samples of rocks, oil and gas well processed samples, core, rock, thin-sections, ore samples, and hard-rock mineral core) acquired from private companies and State and Federal agencies.

Acquire and archive new geologic material pertinent to Alaska's energy and mineral resource development as they are donated to the Geologic Materials Center.

Contingent upon Federal funding, install an updated GMC sample database on the World Wide Web so that the catalog of the Center's holdings is accessible to mineral and energy explorationists and other interested parties via the Internet.

### **Key Component Issues for FY2001 – 2002**

#### Geologic information accessibility:

Private sector enterprises and government decision makers are under increasing pressure to produce results on a shorter time line. DGGs products and services are specifically aimed at supporting statewide economic development and the mitigation of natural geologic hazards. People engaged in those activities can only benefit from DGGs geological and geophysical data, maps, and reports when they are aware that the data exist and are accessible in useful formats. Additionally, since many decision making projects have short time frames, both the information about what type of data are available and the appropriate data need to be provided in a timely manner. DGGs faces a demand for: 1) more widespread and faster access to our geologic database; 2) rapid delivery of special purpose customized presentations of geologic data in response to unique critical needs; and 3) remote delivery of active digital files of the original underlying geologic, geochemical, and geophysical data used to produce our conventional paper-based publications.

The key to meeting these demands is the use of computer technology. During FY01, DGGs secured Federal funding to convert all of its maps and reports to digital format. During FY02, these maps and reports will be made accessible on the Internet. Funded by a Federal grant, we also will contract for the design and construction of a Division-wide geologic database management system. This internal system will serve as a prototype for an Internet accessible system that will allow the public to download active digital data files of original numeric, text, and graphical data.

#### Rural Energy:

The lack of developed sources of local energy in rural Alaska is a continuing problem that DGGs is addressing through its coalbed methane program. First funded through a CIP appropriation in FY97, DGGs conducted an initial survey of the state to identify areas that have potential for supplying local coalbed methane. That work identified three high priority sites and a number of other sites of lower, but significant promise. Subsequent work has been largely funded by soliciting supplemental Federal grants. The work is now at a stage that actual test drilling is needed at the three high priority sites to determine whether coalbed methane gas is present in economically viable quantities in the subsurface. The cost of drilling is high and so too is the risk of not encountering gas. Thus, both the private sector and State and Federal governments are reluctant to support the needed drilling. In an attempt to move beyond this impediment, DGGs has developed a detailed proposal with Los Alamos National Laboratory to seek Federal Department of Energy funds to deploy a new light-weight, and ultimately more economical, micro-drilling technology to test both the technology and the coalbed methane potential at Alaska's three high priority sites. We have no assurance that the proposal will be funded. However, if it is funded, the Los Alamos technology will be used at Chignik, Fort Yukon, and Wainwright, Alaska to test local coalbed methane resources near those villages.

Major pending infrastructure projects and geologic hazard assessments:

Alaska appears to be on the threshold of a major development cycle similar in scale to the construction of the trans-Alaska oil pipeline. There is increasing activity among industry and government to seek ways to expedite the construction of a delivery system to the Lower-48 for North Slope natural gas and an extension of the Alaska Railroad to Canada. A fundamental and prudent first step in undertaking infrastructure development enterprises of this magnitude is a comprehensive geologic hazard assessment of the greater land corridors through which such construction must pass. Such an assessment should be made prior to finalizing detailed alignments and prior to detailed geotechnical engineering assessments of those alignments. By statute AS 41.08 DGGs is charged to determine the potential geologic hazards to buildings, roads, bridges, and other installations and structures. This should be done before such structures are built. Prior knowledge of the kind and extent of geologic hazards is the first step in their mitigation. Such knowledge can be factored into design criteria to improve public safety, decrease long-term maintenance costs, and decrease construction costs resulting from encountering unforeseen obstacles.

If these two mega-projects are initiated in the shortest time possible, there is currently a window of about two to three years in which to conduct a detailed reconnaissance-level geologic-hazards assessment of the probable infrastructure corridors that will host them. Results of this work would provide valuable information for determining an optimal alignment, identifying geologic hazards not previously recognized, alerting design engineers to sections of the alignment that require unique consideration, and identifying sources of construction materials. DGGs knows what needs to be done. The Division, however, does not have the resources to implement an adequate program to accomplish what is needed.

### **Major Component Accomplishments for FY2000**

Published Annual Report 53 (Alaska's Mineral Industry 1998) and Information Circular 46 (Alaska's Mineral Industry 1999, A Summary). These publications provide the state's authoritative statistics and other information about the billion-dollar Alaska mineral industry. The reports are widely circulated and used by many exploration managers as an aid in securing funds for Alaska mineral ventures.

Completed a detailed airborne geophysical survey of 1032 square miles in the Salcha River- Pogo mining area. Thirty geophysical maps and digital data products were released to the public. In response to public request, air radiometric data in addition to aeromagnetic and airborne electromagnetic data were acquired in this survey. These new geophysical data are encouraging private-sector investment in mineral exploration and development in rural mining districts.

Completed the 415 square-mile geologic mapping project in the Talkeetna Quadrangle. The project was a one-year field study that provided geologic ground-truth for the FY97 airborne geophysical survey conducted in a portion of the Yentna mining district. A final geologic map was released in FY00.

Released an interim geologic map of a portion of the Fortymile geophysical tract. This interim map summarizes the ground-truth observations made during the first year of a planned three-year geologic ground-truth mapping inventory of the 1100 square-mile geophysical tract. This map is already being used by exploration companies working in the area.

Completed four mineral deposit data files for the Alaska Resource Data File (ARDF) project, a cooperative program administered by the U.S. Geological Survey. Initiated in the 1999, the ARDF project is calling upon Alaska's entire community of mineral resource experts to build a digital database of all known Alaska mineral occurrences grouped by 1:250,000-scale quadrangle (153 total). DGGs will provide between nine and fifteen completed ARDF quadrangle updates under this multi-year agreement.

Published an interim geologic map for a portion of the Iron Creek geophysical tract located in the Talkeetna Mountains. This map summarizes ground-truth geologic observations needed to effectively interpret the airborne geophysical data acquired for this area in FY98. The map covers the southeast quarter of the Talkeetna B5 quadrangle.

Published a page-sized generalized geologic map of Alaska in both digital and paper formats. This concept map is very popular and has been in great demand at mineral and energy professional meetings, by the Association of American State Geologists, and on the DGGs web site.

DGGs mineral specialist delivered information about Alaska's mineral potential through oral presentations at eight state, provincial, and international mineral industry and other professional conventions, professional journal articles, newsletters, and by organizing special Alaska mineral deposit theme sessions at Alaska's two primary mining conventions.

Completed a cooperative DGGs - U.S. Geological Survey State Map geologic framework study of the Sagavanirktok B-1 Quadrangle in the North Slope oil province. The resulting geologic map extends from the Arctic coastal plain to the Brooks Range foothills. The area comprises surface exposures of rocks that form a link between the geology of the National Petroleum Reserve (NPRa) to the west and the Alaska National Wildlife Refuge (ANWR) to the east. The project area contains part of the Colville Basin wherein rock units in the subsurface form reservoir and source rocks for Prudhoe Bay and satellite fields.

Initiated a five-year project to evaluate the oil and gas reservoir and source potential of Cretaceous-age rocks exposed in the northern foothills belt of the Brooks Range from the Dalton Highway on the east to the Bering sea coast on the west. FY00 accomplishments include the publication of a technical report on the petroleum geology of this belt of rocks, and two summaries presented as posters at professional meetings. Knowledge of the framework geology along the foothills belt is catalyzing increased interest in the gas potential of this area.

Succeeded in soliciting \$125 thousand to fund the FY01 field inventory phase of the NPRa - Brooks Range Foothills Project. Program receipt funds are required to finance the operational costs of this project. This project supports corporate oil exploration by constructing a regional geologic framework needed to guide more detailed corporate site-specific evaluations.

Conducted a field trip for industry representatives to key geologic features in the Brooks Range foothills belt. Continuous turnover within corporations, new participants attracted to the North Slope, and a change in the companies involved in North Slope oil and gas exploration results in corporate knowledge attrition and the need for ongoing education of many of the state's new oil explorationists.

Concluded the Western Arctic Energy (Tingmerkpuk) project with the publication of a geologic map of the DeLong Mountains D-2 and D-3 quadrangles and four reports on the energy potential in the foothills belt of the Western Arctic Slope.

Published the results of a survey which identified three areas within Alaska coal basins that have sufficient favorable geologic information to justify further geophysical testing and exploratory drilling for coalbed methane. This is part of a DGGs effort to identify sources of coalbed methane to meet rural Alaska energy needs for heat and power. Wainwright, Fort Yukon, and Chignik all have good potential for developing a local coalbed methane energy source.

Published a report summarizing the petroleum potential of the Holitna Basin in southwest Alaska and compiled a detailed bedrock geologic map of the Sleetmute A-2 Quadrangle that will not be released until FY01.

Conducted a coalbed methane workshop "Opportunities in Alaska Coalbed Methane." The workshop was co-sponsored by the national Petroleum Technology Transfer Council and the U.S. Geological Survey. Attendees included coalbed methane exploration companies from the Lower-48. There were 110 participants. During the three-day workshop, attendees were given a thorough introduction to the status of coalbed methane development in Alaska and the state's potential for this industry.

In order to catalyze private sector interest in Alaska's energy resources, DGGs staff presented new geologic mapping and other geologic framework interpretations at the national American Association of Petroleum Geologists meeting, the Alaska Geological Society Technical Conference, a U.S. Department of Energy (DOE) annual coalbed methane meeting in Washington, PA, and a DOE Gas-to-Liquids meeting in Anchorage.

Published a preliminary geologic map and cross sections of central and east Anchorage (PIR 1999-1), based on previous mapping and a newly compiled GIS database of geotechnical borehole logs and water-well data. The map and cross sections provide important information for evaluating earthquake hazards and for better understanding

aquifers. The data are being used to develop maps of ground-shaking amplification, seismic soil types, and liquefaction susceptibility.

Finished compilation of geotechnical-borehole and well-log data for western Anchorage. Although data will continue to be added to the database, this completes the initial compilation and will allow the east-Anchorage geologic map and cross sections to be extended across the entire city, as well as aid in development of new earthquake hazard maps.

Provided geologic background for an earthquake-response exercise conducted jointly by the Municipality of Anchorage and the U.S. Army Corps of Engineers. DGGs produced maps and ground-shaking estimates for two hypothetical scenario earthquakes on which this exercise was based. One was a deep magnitude 8 subduction earthquake beneath the city of Anchorage, the other was a shallow crustal earthquake on the Border Ranges fault, which passes through east Anchorage at the base of the Chugach Mountains.

In cooperation with the Division of Emergency Services and the UAF Geophysical Institute DGGs initiated a project to develop tsunami hazard maps of communities along the Pacific Ocean coast, starting with Kodiak. Partial funding for the project comes from the National Oceanic and Atmospheric Administration. These maps, to be published by DGGs in FY2001, will depict probable run-up limits of tsunami waves and appropriate evacuation routes so that the people of these communities will know what to expect and be prepared to respond when a tsunami warning is issued.

Initiated a project to compile all published information on Quaternary-age faults and folds in Alaska (those active in the past 2 million years). The project, which is partially funded by the U.S. Geological Survey, will result in an atlas of these active and potentially active faults and folds, a printed map showing their locations and ages, and a CD-ROM of registered 1:250,000-scale quadrangle maps. The DGGs Report of Investigations will be a useful tool for geoscientists, engineers, emergency managers, government and industry planners, researchers and educators.

As part of Anchorage area earthquake-hazards studies, DGGs participated with personnel from the University of Durham (England) to obtain detailed sedimentologic data on land-level changes during the 1964 earthquake and several similar prehistoric earthquakes. Data from this and previous DGGs work has revealed evidence of small pre-earthquake land adjustments that could become a basis for forecasting these major events several months to several years in advance.

Represented Alaska on the Western States Seismic Policy Council, which provides a forum for communication between geoscience and emergency management professionals and develops policy recommendations for states and local governments to consider in reducing earthquake risks. These policy recommendations may include public education programs, hazard mapping, zoning regulations, building codes, insurance, or emergency-response planning, and are left to the discretion of state and local lawmakers to consider, modify, and implement or disregard as appropriate.

Participated in the Region III Stream Classification Committee (SCC), an interdisciplinary/interagency group charged by the Board of Forestry to develop a regional waterbody classification system for forest practices purposes in the interior boreal forest. At the request of the Board, compiled an annotated bibliography of literature dealing with the effects of permafrost and silty soils in the context of potential deleterious effects of tree-harvest practices on fish-bearing streams, including an introductory section summarizing the results of the research.

Published "Reconnaissance surficial-geologic map of the Sagavanirktok B-1 Quadrangle, eastern North Slope, Alaska" (Report of Investigations 2000-1c) and "Reconnaissance engineering-geologic map of the Sagavanirktok B-1 Quadrangle, eastern North Slope, Alaska" (Report of Investigations 2000-1d). These are surficial-geologic and derivative engineering-geologic maps for the Sagavanirktok B-1 Quadrangle, an area of approximately 267 square miles (685 square kilometers) that is crossed by the Trans-Alaska Pipeline. These maps accompany the general geologic map and will be beneficial for locating construction materials and evaluating engineering constraints for future development in the area.

Published "Reconnaissance surficial-geologic map of the Petersville (Yentna) mining district, Alaska" (Report of Investigations 99-7). This surficial-geologic map of the Petersville mining district covers an area of approximately 428 square miles (1,097 square kilometers) and includes portions of the Talkeetna B-2, B-3, B-4, C-2, and C-3 quadrangles.

At the request of the Division of Oil and Gas, prepared a geologic-hazards assessment of a proposed oil and gas lease sale in the North Slope Foothills. The report was released as DGGGS Miscellaneous Publication 39, "Geologic hazards in and near proposed State of Alaska oil and gas sale, North Slope Foothills".

Completed three weeks of fieldwork in the Fortymile mining district in support of a three-year project to provide ground-truthing for airborne geophysical surveys flown in the area. Our present working hypothesis is that many of the known placer gold deposits in the Fortymile mining district have been created by modern streams reworking ancient high-level terrace gravels that flank many of the major drainages.

Provided overall logistical coordination and management for major expansion of Alaska Volcano Observatory (AVO) volcano monitoring capabilities in the eastern Aleutian Islands and on the Alaska Peninsula. Expanded monitoring of active Aleutian volcanoes will ensure accurate and timely reporting of volcanic activity along this major airline and air cargo route. By the end of FY2000, twenty-two of Alaska's historically active volcanoes (about half of them) were monitored - compared to four that were monitored in FY96.

Continued maintenance and construction of the public AVO World Wide Web pages. These pages were visited by up to 400 people per day during the Pavlof and Okmok eruptions. The purpose of these web pages is to improve public safety by providing access to timely and accurate information for the general public, management agencies, the aviation industry, local communities, and others who may be impacted by the nearby or distant effects of volcanic eruptions.

Continued maintenance and construction of the internal AVO World Wide Web pages. These pages display a wide variety of near-real time seismic and satellite data. These pages have become instrumental in daily monitoring of volcanoes. Technologically, they are at the cutting edge worldwide.

Responded to 320 requests for technical assistance or information on engineering-geology issues and geologic hazards in Alaska. About one-third of these requests came from State agencies. The remainder came from Federal agencies, local government, private businesses, academia, and individuals.

Funded by the Federal Alaska Minerals Data and Information Rescue project, DGGGS converted all of the agency's reports and about half of DGGGS geologic maps to digital format. These reports and maps will become available via the Internet in FY01.

DGGGS maintained information booths at three in-state and three out-of-state professional conferences to highlight opportunities in Alaska for geologic resource investment and to demonstrate the kinds of information that the Division has available to help people establish geologic resource ventures in Alaska.

DGGGS published the third in a series of scenic calendars for 2000 featuring photos of the Hubbard Glacier in Disenchantment Bay. The calendar includes contact information for DGGGS and the address of the Division's web-site. The calendars are widely distributed and help a wide audience of interested persons, companies, and agencies gain access to information about Alaska's geologic resources and engineering geology information.

DGGGS geologists participated in a wide variety of education and outreach activities throughout the year. Our staff served as judges at science fairs both locally and at the statewide High School Science Symposium, prepared mineral collections and activity stations for children participating in Earth Days, participated in elementary school science nights, taught Boy Scouts about geology, gave seminars for University of Alaska geology courses, and served as advisors on University of Alaska graduate student research committees.

Project accomplishments that were not planned at the outset of FY00 but represent achievements made in response to opportunities encountered during the year include the following:

Contract implementation, scientific oversight, and release to the public of airborne geophysical data for 605 square-miles of prospective mineral terrain on Prince of Wales Island near Ketchikan, Alaska. This cooperative project was funded by the U.S. Bureau of Land Management, the Ketchikan Gateway Borough, SeaAlaska Corporation, the cities of Thorne Bay and Coffman Cove, and the Alaska Mental Health Trust Land Office. In FY00 60 maps and digital products from this survey were released to the public.

Contract implementation and scientific oversight for the acquisition of airborne geophysical data for about 1000 square miles of prospective mineral terrain in the Iditarod-Sleetmute-Aniak region of southwest Alaska. This cooperative project was funded by the U.S. Bureau of Land Management and managed by DGGs. This project was undertaken to encourage mineral exploration in an area that would benefit from new employment opportunities. Early in FY01, 23 maps and digital products were released from this survey to the public.

Negotiated for a bedrock geologic map of part of the Delta mining district, a region of volcanogenic massive sulfide and prospective plutonic gold deposits in Interior Alaska. Over the past 15 years, private companies spent many millions of dollars in this area on drilling, airborne geophysical surveys, geologic mapping, and geochemical analyses. The result of this work as it pertains to the framework geology of the district is being contributed to the state. These data will be compiled in conformance to DGGs review and publication standards and released to the public in the fall of 2001.

In response to a request by the Geological Survey of Canada (GSC), DGGs entered into a cooperative agreement to share information and potential field work in the Mt. Hayes Quadrangle of Central Alaska. The purpose of this agreement is to increase public understanding of the nickel-copper-platinum group element (Ni-Cu-PGE) potential of central Alaska. The GSC is actively investigating a zone of Ni-Cu-PGE mineralization that extends into Alaska from the Kluane ultramafic belt of Yukon and northern British Columbia. This cooperative agreement will supply Alaska with a detailed geologic map of the belt's most promising mineral potential in the vicinity of Broxson Gulch, Alaska.

## **Statutory and Regulatory Authority**

AS 41.08

## **Key Performance Measures for FY2002**

**Measure: Maintain the total value of Alaska's mineral industry at greater than \$1.0 billion dollars**  
*(Developed jointly with Legislature in FY2000.)*

### **Benchmark:**

Maintaining the total value of Alaska's mineral industry at greater than \$1.0 billion dollars is an important benchmark for Alaska. This benchmark is expected to rise as newly discovered deposits move from initial development to full production. It is significant that in spite of two very difficult years for the worldwide mining industry, the value of Alaska's mineral industry has remained above the benchmark. In Calendar year 2000, the annual value of Alaska's mineral industry was \$1.2 billion.

### **Background and Strategies:**

The strength of the Alaska mining industry is the result of a working partnership involving the Administration, State Legislature, and the private sector. Many programs in DNR compliment one another to support active exploration for and development of Alaska's mineral resources. DGGs contributes to this effort by generating the fundamental geophysical and geologic data needed to effectively explore highly prospective tracts of mineral terrain. We have also shortened cycle times for getting new geologic and geophysical information into the public domain. Through cooperative programs with federal agencies we are moving massive amounts of geologic data onto the Internet where it is more readily available to catalyze Alaska mineral resource ventures. Good geologic and geophysical data combined with a welcoming business environment have been effective inducements for major capitol investment in Alaska's mineral industry. DGGs intends to continue to seek ways of effectively producing the geologic information needed to maintain this investment in Alaska.

**Measure: Acres of ground under private-sector mineral exploration**  
*(Developed jointly with Legislature in FY2000.)*

### **Benchmark:**

Based upon the trend of claim data from 1993 to 1998, it was expected that by the end of calendar-year 1999 there would be about 3.8 million acres of ground subject to active private-sector exploration in Alaska. This corresponds to about 1% of the state's land area. In calendar year 1999, 3,053,800 acres of ground were being held in active state

and federal mining claims and state prospecting sites. Mineral exploration was also occurring on an additional unknown number of acres not recorded under any form of land tenure system. Thus we believe that between 3.1 and 3.8 million acres of ground are now under active exploration.

**Background and Strategies:**

The growth of the mining industry in Alaska has resulted from the complementary actions of the Administration, State Legislature, and the private sector. Annual funding of airborne geophysical/geological mineral inventories of prospective mineral tracts, in combination with Alaska's mine development tax incentive and outreach from the Governor's office, has been a significant catalyzing factor. There are many remaining high mineral potential tracts throughout rural Alaska that offer the opportunity for successful mineral exploration, mine development and employment opportunity if the fundamental geological and geophysical data needed to guide exploration are generated and made available. DGGS plans to continue concentrating its mineral appraisal resources on these highly prospective areas to generate the needed data. In previous years the announcement of the pending geophysical survey has stimulated considerable new private-sector exploration activity. In FY 2000 the CIP appropriation for airborne geophysical surveys of state lands during FY01 did not reach the threshold needed to conduct a cost effective survey. Thus no new geophysical data for a state-owned mineral tract was acquired. We believe this disruption of the annual geophysical survey program will be reflected in a decline in Alaska exploration expenditures for calendar year 2000.

**Measure: Complete geophysical/geological mineral surveys of at least 1000 square miles of land in the state at target scale of 1 inch=1mile reported by category**  
*(Developed jointly with Legislature in FY2000.)*

**Benchmark:**

The 1000 square mile benchmark is a challenging target given the staff size and funding available to DGGS. In FY2000 DGGS completed 1032 sq. miles of airborne geophysical mapping and 1153 square miles of geological mapping.

**Background and Strategies:**

DGGS intends to maintain this performance measure unchanged for FY2002. We are pursuing complementary federal funding and cooperative agreements with federal agencies in an attempt to acquire resources needed to increase the square miles of geologic mapping that can be completed in a fiscal year. The magnitude of the square miles of airborne geophysical surveys that can be completed in one year is a function of CIP appropriations. A tract of 1000 square miles is in good balance with historic funding, public expectations, and a level of commitment that is effective in catalyzing investment in Alaska's mineral industry. In FY01 the airborne geophysical CIP appropriation was below the threshold needed to conduct a cost efficient survey. Thus no state-owned mineral tract will be surveyed in FY01. DGGS was able to secure a commitment of federal funds to geophysically survey about 1035 square miles of a mixed ownership (federal - Native Corporation - state) land in southwest Alaska. Because of the ownership pattern of this land, however, we do not believe that this airborne geophysical data will have the same impact on exploration investment as would a survey over predominantly state lands where access is more open and right of tenure is more certain.

**Measure: New acres of ground explored for oil and gas resources by the private sector**  
*(Developed jointly with Legislature in FY2000.)*

**Benchmark:**

If competitive lease sales had been held in FY01, DGGS expected that data and information generated by the division's energy resource assessment project would have contributed to 308,000 acres of additional ground being acquired by the private sector for focused oil or gas exploration. Because of the ARCO-BP merger, however, no lease sales were held for North Slope tracts.

**Background and Strategies:**

The DGGS energy resource assessment project is focused on identifying and filling critical data gaps in the geologic framework of highly prospective areas to encourage new private sector exploration ventures and maintain a healthy oil industry in Alaska. Under the area-wide lease process initiated in 1998, companies are developing new exploration strategies and fiscal plans for all state acreage available on the North Slope, Beaufort Sea and Cook Inlet areas. The state's energy resource assessment project provides essential geologic framework information requisite for valuing

their bids for competitive leases upon these lands and to guide subsequent exploration. Geologic information provided by the state for prospective petroleum exploration areas will increase in importance in the years to come if the state is successful in attracting smaller oil companies with less capital to Alaska.

**Measure: Number of users requesting information on the geology of Alaska from the DGGS Web site**  
*(Developed jointly with Legislature in FY2000.)*

**Benchmark:**

The DGGS Web site came on line during FY96. Since that time usage has risen steadily. There is an increasing demand from the users of Alaska geologic data for more DGGS data on the Internet. We expect that demand will continue to rise but we do not know what level to set as a benchmark. As an initial estimate, in mid-FY00 we forecast 20,000 Internet contacts for FY01. By the end of FY00 we had 21,737 users who sought information on the DGGS Web site.

**Background and Strategies:**

The main object of the DGGS Web site is to supply geologic information collected by DGGS to the public at large, including industry, government agencies, and private citizens, as quickly and completely as is feasible. Available at this time is information on publications of DGGS organized by geographic location, downloadable requests for proposals for geophysics contracts, and complete versions of several DGGS publications, including newsletters and annual Minerals reports. While there is a constant demand for more data and faster delivery, additions to the Web site are sporadic. DGGS does not have a full time position dedicated to fulfilling the demands of the public for getting data out to them over the Internet, nor is data ready to be released fast enough in a usable digital form. DGGS is currently involved in a project to provide over the Web scanned copies of all DGGS technical publications; completion of this task is anticipated for mid-FY01 and is about on target. We expect that when these documents are available that the Web site will become a primary avenue for securing Alaska geologic resource and engineering geologic data.

**Measure: Number of responses made by the division to requests for information or assistance relating to engineering geology or hazards issues in the state**  
*(Developed jointly with Legislature in FY2000.)*

**Benchmark:**

Even before DGGS began keeping records of these responses in FY96, it was clear that there was a high demand for this service, which consistently required on the order of 70-80 responses per year. This demand has been increasing and in mid FY00 we estimated that the number of requests would continue to exceed 100 per year. By the end of FY00 the actual recorded responses were 320.

**Background and Strategies:**

A significant component of the workload in DGGS' Engineering Geology section entails providing timely responses to requests for information and technical assistance on hazards like earthquakes, landslides, and permafrost. Additionally, DGGS fields requests regarding engineering characteristics of geologic materials with regard to aggregate resources and foundation conditions. These requests come from other DNR divisions, other state agencies like Transportation & Public Facilities, Emergency Services, and Community & Economic Development, private geotechnical consultants, local governments, schools, and individuals. Nearly all requests require research to locate the area of concern, compile applicable geologic maps and other literature, and formulate a reasoned response. Rather than viewing these requests as troublesome diversions from our scheduled project work, DGGS sees them as an indication of need for better planning and design information and as an opportunity to help reduce long-term costs of responding to and rebuilding unnecessarily from events that can be anticipated and designed for. DGGS intends to improve awareness of the needs for engineering-geologic information and will continue to make these increasing requests a priority while at the same time not sacrificing our commitments to scheduled project work.

**Status of FY2001 Performance Measures**

	<i>Achieved</i>	<i>On track</i>	<i>Too soon to tell</i>	<i>Not likely to achieve</i>	<i>Needs modification</i>
• Annual value of Alaska's mineral industry		X			
• Acres of ground under private-sector exploration			X		

Component — Geological Development

	<i>Achieved</i>	<i>On track</i>	<i>Too soon to tell</i>	<i>Not likely to achieve</i>	<i>Needs modification</i>
<ul style="list-style-type: none"> <li>• Complete geophysical/geological mineral surveys of 1000 square miles of Alaska lands</li> <li>• Number of users requesting information on the geology of Alaska from the DGGs Web site</li> <li>• New acres of ground explored by the private sector for oil and gas</li> <li>• Number of responses to requests for information or assistance relating to engineering geology or hazards issues in Alaska</li> </ul>		X	X	X	

**Geological Development**  
**Component Financial Summary**

All dollars in thousands

	FY2000 Actuals	FY2001 Authorized	FY2002 Governor
<b>Non-Formula Program:</b>			
<b>Component Expenditures:</b>			
71000 Personal Services	1,857.1	2,156.4	2,220.0
72000 Travel	69.1	145.4	145.4
73000 Contractual	1,032.5	1,481.1	1,488.2
74000 Supplies	299.3	151.1	151.1
75000 Equipment	25.2	31.1	31.1
76000 Land/Buildings	0.0	0.0	0.0
77000 Grants, Claims	0.0	0.0	0.0
78000 Miscellaneous	0.0	0.0	0.0
<b>Expenditure Totals</b>	<b>3,283.2</b>	<b>3,965.1</b>	<b>4,035.8</b>
<b>Funding Sources:</b>			
1002 Federal Receipts	1,086.2	1,500.4	1,501.5
1004 General Fund Receipts	2,032.4	2,056.6	2,073.1
1005 General Fund/Program Receipts	37.4	54.9	55.0
1007 Inter-Agency Receipts	2.4	0.0	63.7
1053 Investment Loss Trust Fund	0.0	8.0	0.0
1061 Capital Improvement Project Receipts	8.0	90.8	91.3
1108 Statutory Designated Program Receipts	116.8	254.4	251.2
<b>Funding Totals</b>	<b>3,283.2</b>	<b>3,965.1</b>	<b>4,035.8</b>

**Estimated Revenue Collections**

Description	Master Revenue Account	FY2000 Actuals	FY2001 Authorized	FY2001 Cash Estimate	FY2002 Governor	FY2003 Forecast
<b>Unrestricted Revenues</b>						
None.		0.0	0.0	0.0	0.0	0.0
<b>Unrestricted Total</b>		<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Restricted Revenues</b>						
Federal Receipts	51010	1,086.2	1,500.4	1,500.4	1,501.5	1,081.6
Interagency Receipts	51015	2.4	0.0	0.0	63.7	25.7
General Fund Program Receipts	51060	37.4	54.9	54.9	55.0	55.0
Statutory Designated Program Receipts	51063	116.8	254.4	97.7	251.2	50.0
Capital Improvement Project Receipts	51200	8.0	90.8	90.8	91.3	91.3
Investment Loss Trust Fund	51393	0.0	8.0	8.0	0.0	0.0
<b>Restricted Total</b>		<b>1,250.8</b>	<b>1,908.5</b>	<b>1,751.8</b>	<b>1,962.7</b>	<b>1,303.6</b>
<b>Total Estimated Revenues</b>		<b>1,250.8</b>	<b>1,908.5</b>	<b>1,751.8</b>	<b>1,962.7</b>	<b>1,303.6</b>

**Geological Development****Proposed Changes in Levels of Service for FY2002**

No changes in service anticipated.

**Summary of Component Budget Changes  
From FY2001 Authorized to FY2002 Governor**

*All dollars in thousands*

	<u>General Funds</u>	<u>Federal Funds</u>	<u>Other Funds</u>	<u>Total Funds</u>
<b>FY2001 Authorized</b>	<b>2,119.5</b>	<b>1,500.4</b>	<b>345.2</b>	<b>3,965.1</b>
<b>Adjustments which will continue current level of service:</b>				
-Convert Special FY2001 Labor Cost Fund Sources to GF	3.1	0.0	-3.1	0.0
-Year 2 Labor Costs - Net Change from FY2001	5.5	1.1	1.4	8.0
<b>Proposed budget increases:</b>				
-Interagency Receipt Authority for Anticipated RSA's	0.0	0.0	62.7	62.7
<b>FY2002 Governor</b>	<b>2,128.1</b>	<b>1,501.5</b>	<b>406.2</b>	<b>4,035.8</b>

**Geological Development**  
**Personal Services Information**

Authorized Positions			Personal Services Costs	
	FY2001 Authorized	FY2002 Governor		
Full-time	27	28	Annual Salaries	1,738,896
Part-time	1	1	COLA	26,656
Nonpermanent	11	9	Premium Pay	3,107
			Annual Benefits	570,867
			<i>Less 5.11% Vacancy Factor</i>	(119,526)
			Lump Sum Premium Pay	0
<b>Totals</b>	<b>39</b>	<b>38</b>	<b>Total Personal Services</b>	<b>2,220,000</b>

**Position Classification Summary**

Job Class Title	Anchorage	Fairbanks	Juneau	Others	Total
Administrative Assistant	0	1	0	0	1
Administrative Clerk III	0	1	0	0	1
Analyst/Programmer III	0	1	0	0	1
Cartographer II	0	2	0	0	2
College Intern I	0	7	0	0	7
Division Director	0	1	0	0	1
Geologist I	0	5	0	0	5
Geologist II	0	1	0	0	1
Geologist III	0	4	0	0	4
Geologist IV	1	4	0	0	5
Geologist V	0	4	0	0	4
Micro/Network Spec I	0	1	0	0	1
Micro/Network Tech I	0	1	0	0	1
Petroleum Geologist I	0	1	0	0	1
Publications Spec II	0	1	0	0	1
Publications Tech II	0	1	0	0	1
Secretary	0	1	0	0	1
<b>Totals</b>	<b>1</b>	<b>37</b>	<b>0</b>	<b>0</b>	<b>38</b>