

GEOLOGICAL SURVEY CIRCULAR 732



**The United States Geological Survey
in Alaska: Organization and Status
of Programs in 1976**

The United States Geological Survey in Alaska: Organization and Status of Programs in 1976

Edward H. Cobb, Editor

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V. E. McKelvey, *Director*

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ABSTRACT

This report of the activities of the U.S. Geological Survey in Alaska is organized in four parts (1) services and responsibilities of the U.S. Geological Survey; (2) organization of the U.S. Geological Survey; (3) current U.S. Geological Survey activities; and (4) cooperative projects with Federal, State, and local agencies.

SERVICES AND RESPONSIBILITIES OF THE U.S. GEOLOGICAL SURVEY

INTRODUCTION

For the many people and groups deeply interested in Alaska, a report on the Alaskan activities of the United States Geological Survey serves many purposes. For the professional geologist, hydrologist, or topographer, it contains up-to-date accounts of recent results. For various private groups, the business community, and other Federal and State agencies, there is news of investigations intended to assist them in their separate and important tasks. And for the citizen whose pleasure and livelihood are linked to the natural surroundings, the report is an introduction to Geological Survey studies of the land and water of the incomparable State of Alaska.

To reach such a complex audience, this circular is organized into four chapters. In this introductory chapter, the services and responsibilities of the Geological Survey are discussed. The second chapter presents the organizational structure of the Survey, as well as a discussion of the organizational segments serving Alaska. The next two chapters together constitute a comprehensive description of Alaskan projects active during 1975,

with the third describing Survey projects and the fourth detailing cooperative projects between the Survey and other Federal and Alaskan State and local agencies.

SERVICES

The U.S. Geological Survey serves the needs of the citizens and their government for information on the land and water of the United States. This information is obtained and analyzed by U.S.G.S. scientists and distributed to the public in the form of maps and reports. Most Survey maps and reports are published by the Federal government and announced by means of monthly notices, "New Publications of the Geological Survey," free on application to the Geological Survey, Reston, Va. 22092. Reports referred to as book publications may be ordered from:

Branch of Distribution
U.S. Geological Survey
1200 South Eads Street
Arlington, Va. 22202

Maps may be ordered from the following places:

Branch of Distribution, Central Region
U.S. Geological Survey
Box 25286
Federal Center
Denver, Colo. 80225

Alaska Distribution Section
U.S. Geological Survey
310 First Avenue
Fairbanks, Alaska 99701

Maps may be purchased over the counter from the U.S. Geological Survey, Water Resources Division, 441 Federal Bldg., 710 West Ninth St., Juneau, Alaska 99801, and the U.S. Geological Survey, Public Inquiries Office, 108 Skyline Bldg., 508 Second Ave., Anchorage, Alaska 99501. Book publications on Alaska are available from the Public Inquiries Office in Anchorage.

Some studies, in particular, those of high scientific merit, are published in professional journals; these are available at university and college, industrial, and some major public libraries.

The scope of Alaskan studies is broad and is probably best illustrated by example. The list that follows contains a selection of recent Geological Survey maps and reports accompanied by a brief explanation of what they disclose and how they may be used.

Reference: Wood, G. V., and Armstrong, A. K., 1975, Diagenesis and stratigraphy of the Lisburne Group limestones of the Sadlerochit Mountains and adjacent areas, northeastern Alaska: U.S. Geol. Survey Prof. Paper 857, 47 p. Available from: Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Va. 22202; \$2.25.

A scholarly study of physical characteristics and depositional and postdepositional history of a group of rocks that constitutes some of the petroleum reservoirs in northern Alaska. The knowledge gained from this study is readily applicable in helping predict porosity trends in the subsurface.

Reference: Wanek, A. A., 1975, Geologic reconnaissance of a proposed powersite on the Maksoutof River near Sitka, southeastern Alaska: U.S. Geol. Survey Bull. 1211-F, p. F1-F22.

Available from: Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, Va. 22202; \$1.35.

The geology and feasibility of the proposed powersite are discussed in the text and shown on maps and cross sections. These reconnaissance data are essential to any engineering study or land-use decision concerning utilization of this site.

Reference: U.S. Geological Survey, 1971, Wiseman D-2 quadrangle, Alaska: U.S. Geol. Survey Topog. Ser., scale 1:63,360. Available from: Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, Colo. 80225; (Alaska residents only) Distribution Section, U.S. Geological Survey, 310 First Avenue, Fairbanks, Alaska 99701; \$0.75.

A standard detailed topographic map at a scale of 1 inch equals 1 mile. In addition to the major streams, the map shows, by contours, the form of the land surface and its elevation above sea level. This map covers part of a scenic area that has been proposed as a National Park. Topographic maps are widely used by land planners and outdoor enthusiasts and are used as base maps for preparation of most special-purpose maps.

Reference: Clark, A. L., Berg, H. C., Cobb, E. H., Eberlein, G. D., MacKevett, E. M., Jr., and Miller, T. P., 1974, Metal

provinces of Alaska: U.S. Geol. Survey Misc. Geol. Inv. Map I-834, 1 sheet, scale 1:5,000,000. (1975)

Available from: Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, Colo. 80225; \$1.00.

A map showing large areas characterized by the presence of specific mineral commodities or groups of commodities and generalized locations of all reported metallic mineral deposits. An interpretive geologic map shows the ages of the rock units of Alaska. This publication is useful mainly to persons wishing a broad overview of the geology and the distribution of metallic minerals.

Reference: Cobb, E. H., 1975, Chromite occurrences in Alaska: U.S. Geol. Survey Mineral Inv. Resources Map MR-68, 2 p., scale 1:2,500,000.

Available from: Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, Colo. 80225; \$1.00.

A map showing the location of reported occurrences of the mineral chromite and a list, keyed to the map by numbers, giving the name of each occurrence and the reference to the most complete available description of it. The map is of value to those planning exploration for, or development of, deposits of this source of chromium.

Reference: Patton, W. W., Jr., Miller, T. P., Berg, H. C., Gryc, George, Hoare, J. M., and Ovenshine, A. T., 1975, Reconnaissance geologic map of St. Matthew Island, Bering Sea, Alaska, with Gravity map of St. Matthew and Hall Islands, by David F. Barnes and Michael B. Estlund: U.S. Geol. Survey Misc. Field Studies Map MF-642, 1 sheet, scale 1:125,000 (gravity map 1:250,000).

Available from: Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, Colo. 80225; \$0.50.

Maps, diagrams, and tables presenting geologic and geophysical data on an island near the middle of the Bering Sea. This map publication is a result of the first visit to the island by a geological field party in this century and fills a gap in our knowledge of both Alaska and the Outer Continental Shelf.

Reference: Hudson, Travis, Askevold, Gerald, and Plafker, George, 1975, A computer-assisted procedure for information processing of geologic field data: U.S. Geol. Survey Jour. Research, v. 3, no. 3, p. 369-375.

Available from: Superintendent of Documents, Government Printing Office, Washington, D.C. 20402; single copy \$3.15; subscription \$18.90 a year.

This report describes the philosophies and methods used in developing and applying a computer-assisted procedure for gathering, processing, and using field data in a long-range project with many participants. Although no other group of investigators is likely to use the identical system, it can be modified to suit the needs of many geologic field projects.

Reference: Carter, R. D., Denman, J. M., and Pierpoint, J. G., 1975, Geologic literature on the North Slope of Alaska, 1969-1974: U.S. Geol. Survey open-file report 75-384, 81 p. Available from: Alaskan Technical Data Unit, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025.

A regional bibliography with subject index and serial list that greatly facilitates library research on the geology, geophysical investigations, hydrology, topography, and min-

eral resources of an area undergoing particularly rapid exploration and development of its petroleum resources.

RESPONSIBILITIES

In addition to obtaining and analyzing land and water-resources data, the Geological Survey supervises the extraction of valuable mineral commodities from many types of federal lands, including the offshore Outer Continental Shelf.

The Alaskan activities of the Geological Survey are carried out through all of its four main operating divisions and by a number of interdivisional programs, committees, and working groups, briefly described in the following sections.

ORGANIZATION OF THE U.S. GEOLOGICAL SURVEY

The organization of the Geological Survey and its four main operating divisions is portrayed in figures 1 through 5.

The main structure of the Geological Survey (fig. 1) consists of four operating divisions—Geologic, Conservation, Water Resources, and Topographic—and three support divisions—Computer, Administrative, and Publications. Headquarters for all divisions are in Reston, Va.

Investigations of the geology of the United States and certain other countries are mainly conducted in the Geologic Division (fig. 2), comprised of six operating offices supported by an Office of Scientific Publications. The headquarters of the offices are located in Reston, Va.

The Conservation Division supervises oil, gas, and other mineral-extraction activities on certain federal lands. The regional responsibilities of the Division are vested in four operational offices. The Alaskan activities of the Conservation Division, detailed in figure 3, are supervised by the Western Region Office in Menlo Park, Calif.

The organization of the Water Resources Division of the Geological Survey is shown in figure 4 (with Alaskan activities emphasized). The main operating units are located under four regional subdivisions supported by Assistant Chief Hydrologist Offices for Scientific Publications and Data Management, Operations, and Research and Technical Coordination.

Topographic and other special-purpose geographic maps are prepared by the Topographic Division (fig. 5). The principal work responsibilities are met by four regional mapping centers under the supervision of the Chief of the Topographic Division.

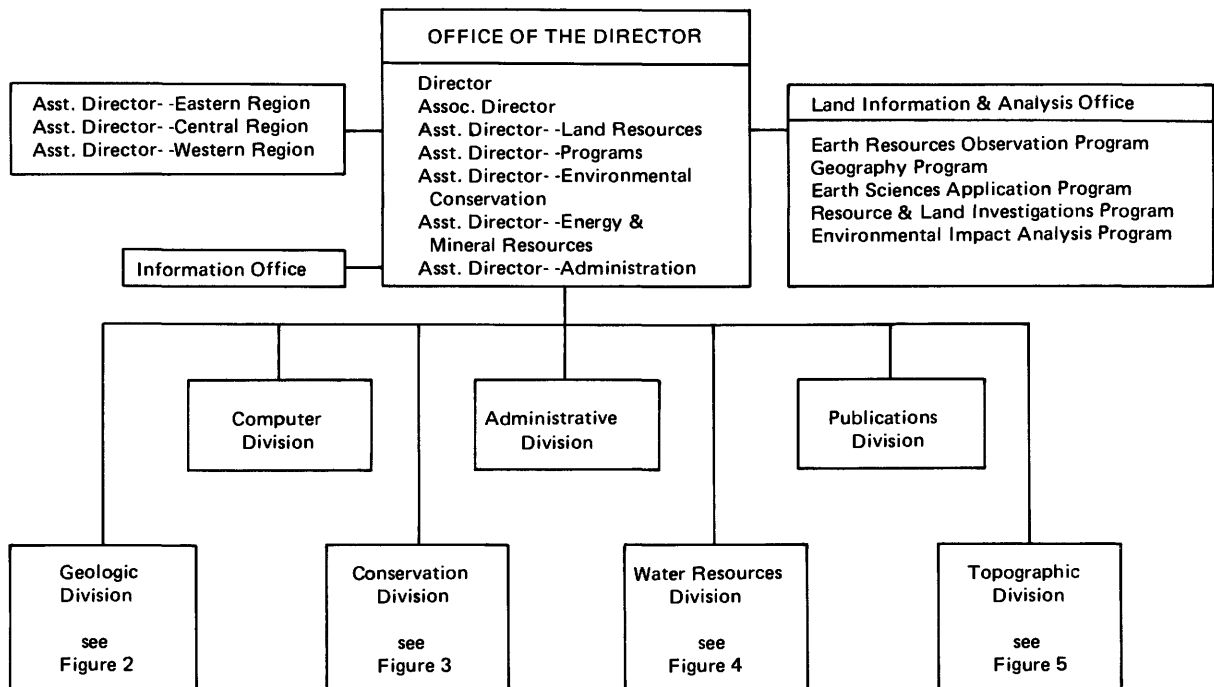


FIGURE 1.—Organization of the U.S. Geological Survey.

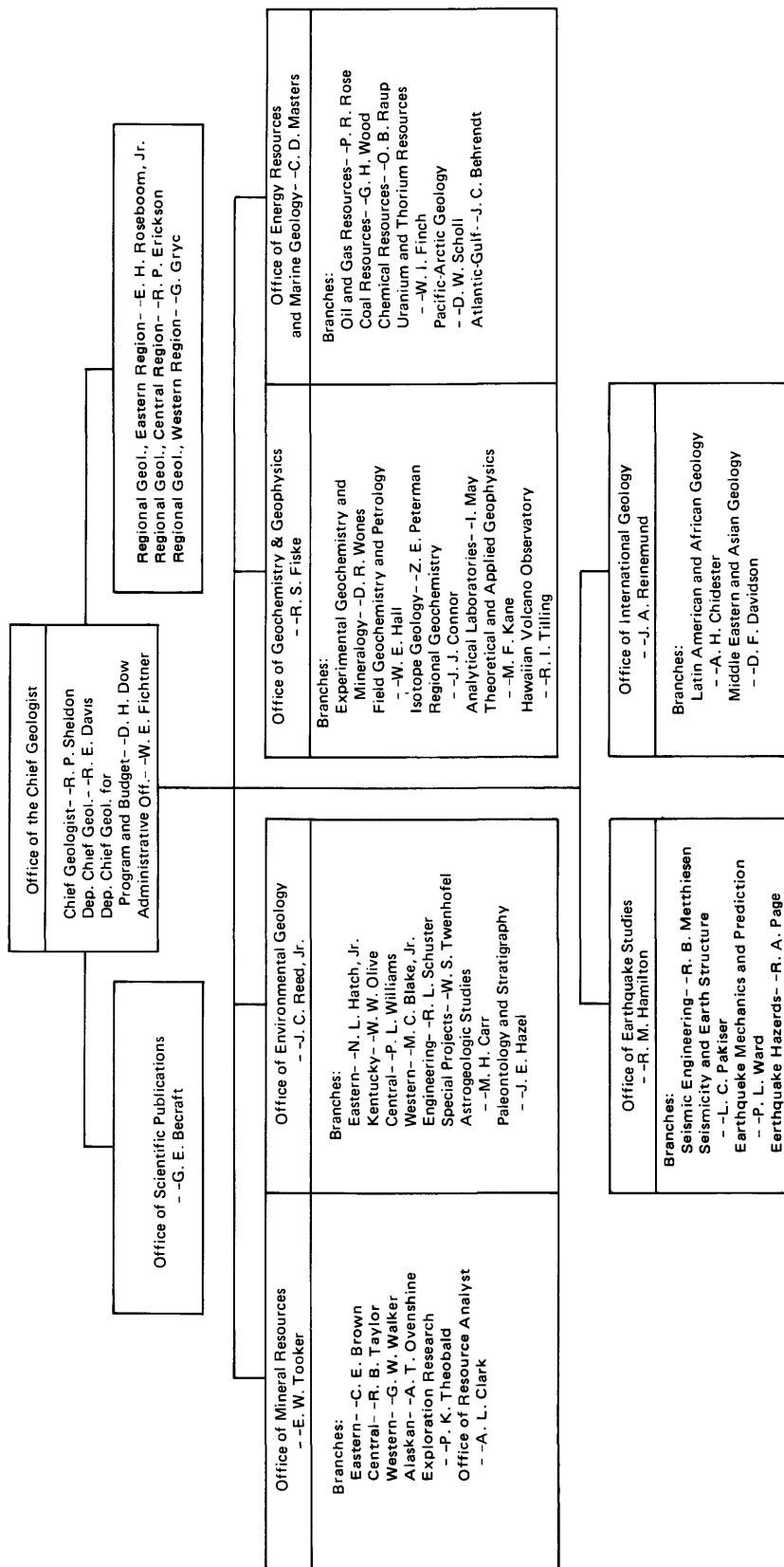


FIGURE 2.—Organization of the Geologic Division.

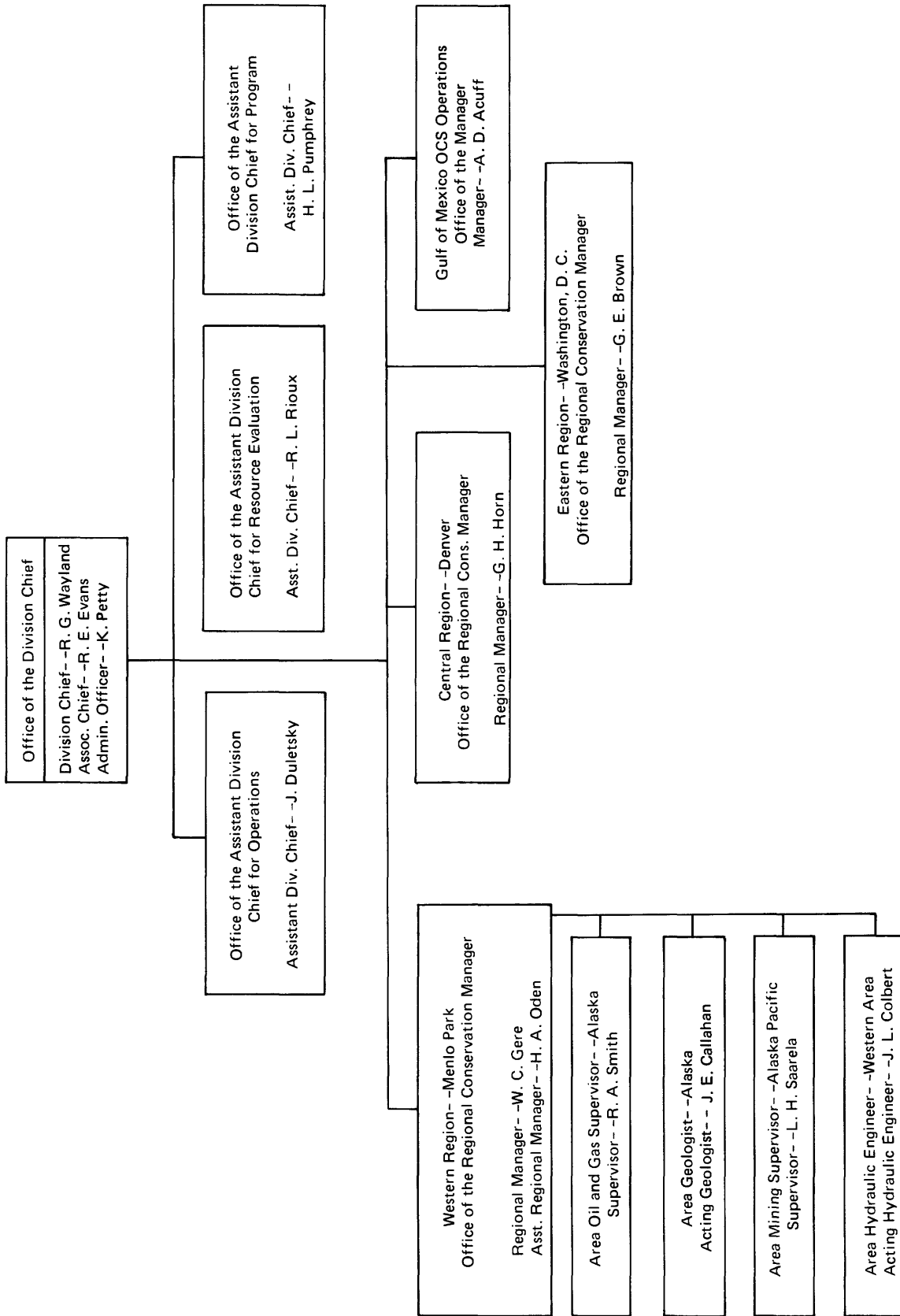


FIGURE 3.—Organization of the Conservation Division.

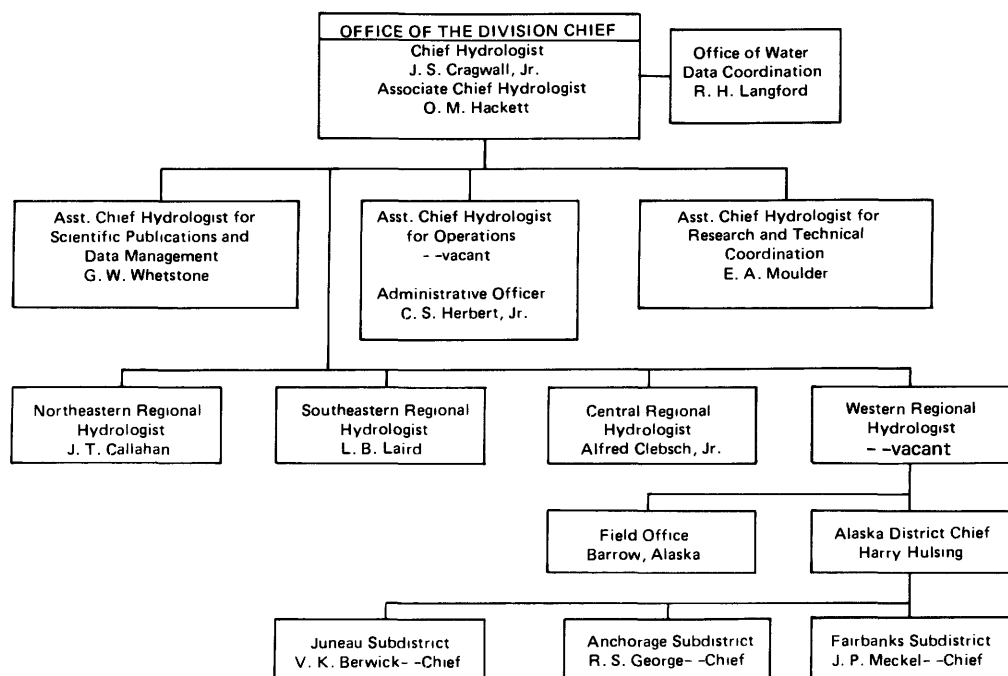


FIGURE 4.—Organization of the Water Resources Division.

ORGANIZATIONAL SEGMENTS SERVING ALASKA

All four operational Divisions of the Geological Survey—Conservation, Geologic, Topographic, and Water Resources—function in Alaska and are supported by the Administrative, Publications, and Computer Divisions as well as other organizational entities of lower than Division rank.

CONSERVATION DIVISION

The Conservation Division examines and classifies federal lands as to their mineral character and waterpower and water-storage values; determines estimated resource values for onshore and offshore competitive lease sales; supervises exploration and development for leases on Federal, Indian, and certain Naval petroleum reserve land, and the offshore Outer Continental Shelf; and maintains accounts and collects rentals and royalties from related mineral production.

Consistent with the national concern for environmental protection, the Division's regulations and procedures are subject to frequent reappraisal and revision in order to avoid or mitigate consequences that may result from pollution incidents, surface damage resulting from mining, geothermal, and petroleum operations, or other hazards that may be associated with mineral operations conducted under leases and prospecting permits.

All Alaskan activities are supervised by the Western Region Conservation Manager, 345 Middlefield Road, Menlo Park, Calif. 94025. The Office of the Alaska-Pacific Mining Supervisor is located at the Menlo Park address.

The Hydraulic Engineer for the Western Region is located at 830 N.E. Holladay, P.O. Box 3202, Portland, Oreg. 97208, and the Alaska water-power evaluation program is a function of that office. The offices of both the Acting Alaska Area Geologist, James E. Callahan, and the Alaska Area Oil and Gas Supervisor, Rodney A. Smith, are located at 800 A Street, Anchorage, Alaska 99501.

GEOLOGIC DIVISION

The current scientific investigations of the Geologic Division in Alaska include geologic mapping and mineral-resource evaluation, principally at scales of 1:250,000 and 1:63,360; mineral district mapping and evaluation; mineral-resource appraisal; geochemical studies and sampling, particularly related to mineral deposits; petroleum-resource surveys; aeromagnetic and gravity surveys and interpretation; engineering-geology studies in urban areas and along transportation routes; earthquake studies; isotope age determination and interpretation; heat flow; and submarine sampling, subbottom profiling, and other geophysical studies of the ocean floor.

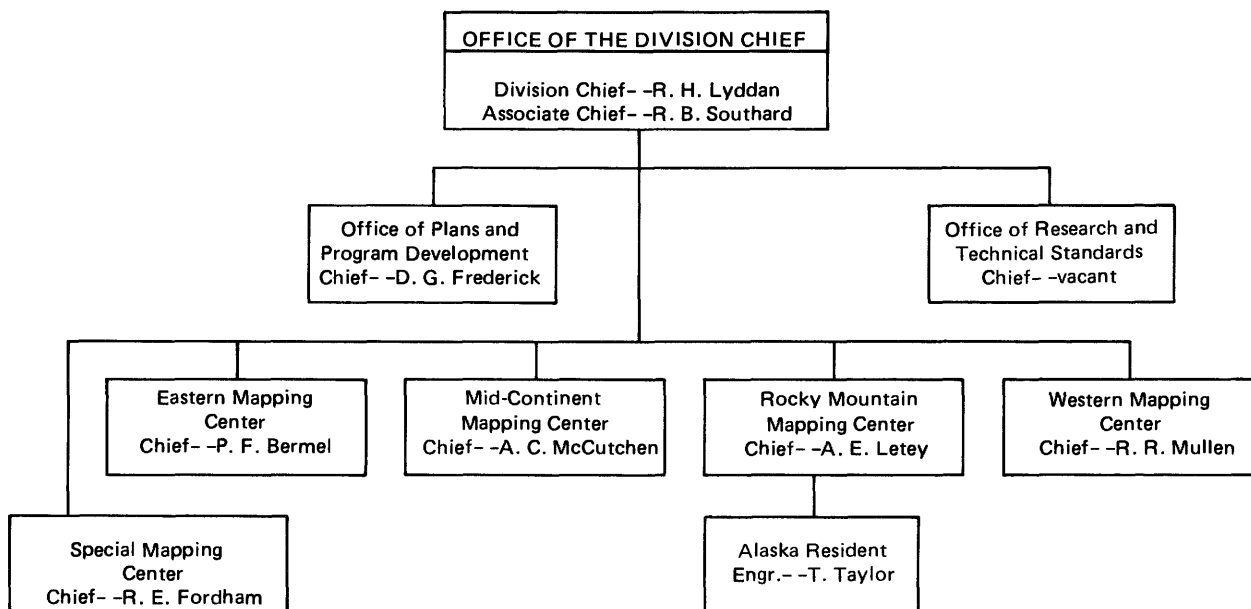


FIGURE 5.—Organization of the Topographic Division.

Activities in Alaska are the responsibility of several groups within the Geologic Division: The Branch of Alaskan Geology, the Office of Earthquake Studies, and the Office of Energy Resources and Marine Geology at the Pacific Coast Field Center, 345 Middlefield Road, Menlo Park, Calif. 94025; the Branches of Theoretical and Applied Geophysics, Seismicity and Earth Structure, Exploration Research, Isotope Geology, and Engineering Geology at the Rocky Mountain Field Center, Denver, Colo. 80225; and the Branch of Paleontology and Stratigraphy at the National Center, Reston, Va. 22092. Several other branches of the Geologic Division provide services or conduct research in cooperation with these units. The Branch of Alaskan Geology maintains two offices in Alaska: the main one at 1209 Orca St., Anchorage, Alaska 99501; (907) 272-8228, with Thomas P. Miller as geologist in charge, and the other at the University of Alaska; (907) 479-7245, with Florence R. Weber in charge. The Branch of Theoretical and Applied Geophysics maintains observatories at Fairbanks (College) and Barrow, both under the direction of J. B. Townshend, Yukon Drive on West Ridge, Fairbanks, Alaska 99701; (907) 479-6146. The Branch of Seismicity and Earth Structure maintains an observatory at Sitka directed by W. E. Osbakken, P.O. Box 158, Sitka, Alaska 99835; (907) 747-3332.

In its study of Alaskan geology, the Survey supports and cooperates with several universities and

other public agencies, including the State of Alaska Division of Geological and Geophysical Surveys.

TOPOGRAPHIC DIVISION

The main task of the Topographic Division is the preparation of the various series of maps of the National Mapping Program, which includes all of the quadrangle maps covering the 50 States of the Nation. The National Mapping Program of the Geological Survey is under the direction of Robert H. Lyddan, Chief, Topographic Division. Doyle G. Frederick is Chief of the Office of Plans and Program Development, which is responsible for initiating and controlling the work of the Division.

Mapping operations in Alaska are the responsibility of A. E. Letey, Chief, Rocky Mountain Mapping Center, who directs the operational functions of the Mapping Center, including all field and office operations. He may be consulted at the Federal Center, Denver, Colo. 80225; (303) 234-2351.

The Resident Engineer in Alaska is Thomas E. Taylor, who serves as the Topographic Division's representative in that State. He may be contacted at 218 E Street, Anchorage, Alaska 99501; (907) 279-5812.

WATER RESOURCES DIVISION

The Alaskan water resources program includes the collection, analysis, and interpretation of data on the availability and quality of surface and ground water and includes special studies and re-

search that seek to evaluate and increase the effective use of water resources data in the State. These basic water data provide a broad base to support the proper management and protection of the State's water and related land resources.

The network of data collection sites maintained includes the following:

	Daily sites	Intermittent or partial record sites
Streamflow -----	108	88
Sediment -----	0	20
Chemical -----	0	36
Biological -----	19	10
Temperature -----	43	153
Ground-water observation wells -----	8	12

Investigations in the western United States, including Alaska, are under the jurisdiction of the Western Region office and are the responsibility of the Regional Hydrologist, 345 Middlefield Road, Menlo Park, Calif. 94025. The Anchorage District office is in the Skyline Bldg., 218 E Street, Anchorage, Alaska 99501; (907) 227-5526, under the supervision of Harry Hulsing, District Chief. This office is operated on a year-round basis and is responsible for planning and supervising Alaskan activities.

The field activities of the Alaska District are a function of the three Subdistrict offices: Anchorage, Fairbanks, and Juneau. The Anchorage Subdistrict office is responsible for operations in south-central and western Alaska and is under the supervision of Raymond S. George. It is located at 1209 Orca Street, Anchorage, Alaska 99501; (907) 279-1563. The Juneau Subdistrict office, which is responsible for operations in southeastern Alaska, is under the supervision of Vernon K. Berwick and is located at 441 Federal Building, P.O. Box 1568, Juneau, Alaska 99802; (907) 586-7217. The Fairbanks Subdistrict office is responsible for operations in northern Alaska and is under the supervision of James P. Meckel. It is located at 310 First Avenue, Fairbanks, Alaska 99701; (907) 452-1951, ext. 176.

A field office at Barrow, Alaska, has been established to support work being done on the Arctic Ice Dynamics Joint Experiment (AIDJEX). The address is U.S. Geological Survey, c/o AIDJEX Naval Arctic Research Laboratory, Barrow, Alaska 99723; (907) 852-6588; commercial telephone is (907) 852-9245.

PUBLICATIONS DIVISION

The Publications Division edits manuscripts of scientific papers and technical reports; reproduces

topographic, geologic, and other maps; prepares exhibits and visual aids; disseminates general Survey program and publications information and distributes maps to the public.

The Division maintains two offices in Alaska for the customers' convenience in obtaining maps, book reports, and other material prepared by the U.S. Geological Survey.

The Alaska Distribution Section at 310 First Ave., Fairbanks, Alaska 99701; (907) 452-1951, ext. 174, supervised by Natalie A. Cornforth under the direction of the Publications Division, Western Region, Menlo Park, Calif., distributes maps and map-related publications by mail and over the counter to the public, to 22 commercial dealers in Alaska, and to Federal and State agencies. A schedule of map prices and discounts is available on request.

A Public Inquiries Office, at 108 Skyline Building, 508 Second Ave., Anchorage, Alaska 99501; (907) 277-0577, supervised by Margaret I. Erwin under the direction of the Office of Public Inquiries, Publications Division, National Center, Reston, Va., maintains a stock of Alaska topographic and geologic maps for over-the-counter sale, and, as an agent of the Superintendent of Documents, sells Geological Survey book reports on Alaska. It serves as a public contact point for Survey activities in the State and has a complete library of all Survey publications. The office is a depository for Alaska open-file reports and maintains a browse file containing microfilms of LANDSAT (satellite) images. Itineraries and personnel lists of all field parties are prepared as early in each year as possible and are available at the Public Inquiries Office for consultation.

ADMINISTRATIVE DIVISION

The Alaska Field Office of the Administrative Division is located at 204 Skyline Building, 218 E Street, Anchorage, Alaska 99501. This office, supervised by Betty J. McIntire, provides service and supply support to U.S. Geological Survey offices and personnel in Alaska; telephone number is FTS 265-4494 or Commercial (907) 277-0569. A warehouse at Anchorage under the supervision of Clarence (Buck) Buchanan is located about 5 miles east of downtown Anchorage, just inside the boundary of Elmendorf Air Force Base, telephone (907) 752-3834. The address is: 5500 Oilwell Road, Elmendorf Air Force Base, Anchorage, Alaska 99506. A warehouse for the Fairbanks area located

at Ft. Wainwright is staffed only if warranted by the level of field activity. The telephone number at Ft. Wainwright is (907) 353-4219.

EMERGENCY SEARCH AND RESCUE

To initiate search and rescue in cases of emergency, contact the Air Rescue Coordination Center in Anchorage at any time during the day or night. Communications can be made directly to the center, telephone (907) 277-2131, 752-2426, 752-3437, through the Alaska Field Office, either telephone or radio (see section on Radio Network), nearest FAA Flight Service Station, military installation, or State Troopers. To the extent possible, specify location and nature of emergency, time of the accident, number of people involved, and the nature of possible injuries.

For the purpose of notifying headquarters and family of any emergency as soon as possible, contact Betty McIntire or Buck Buchanan at FTS 265-4494 or commercial (907) 277-0569. Outside office hours contact Betty McIntire at (907) 272-5398 or Buck Buchanan at (907) 337-2146.

ALASKA SURVEY COMMITTEE

The Alaska Survey Committee provides a means for discussion and coordination of Alaska activities; all divisions of the Geological Survey operating in Alaska are represented on the Committee. Harry Hulsing, Water Resources Division, chairs the group for 1976; other members are James E. Callahan, Conservation Division; Thomas E. Taylor, Topographic Division; Margaret I. Erwin, Publications Division; Florence R. Weber, Geologic Division; and Betty J. McIntire, Administrative Division.

RADIO NETWORK

Radio Officer for Alaska is Florence Weber, Geologic Division, College, Alaska 99701 (907) 479-7245. Two frequencies, 5380 (5381.5) kHz and 3211.0 (3212.5) kHz (both upper SSB), are the official frequencies for U.S.G.S. personnel.

For the 1976 field season, two base stations will be established through commercial radio service facilities. Alaska Public Fixed 5167.5 (5168.9) kHz will be monitored from 6:00 a.m. through 9:00 p.m. daily in Anchorage and from 7:00 a.m. through 10:00 p.m. in Fairbanks. Only emergency calls will be accepted outside these hours. 3211 (3212.5) kHz will be monitored in Anchorage and possibly in

Fairbanks. Calls of commercial stations are WKD22 in Anchorage and KGA85 "Broadmoor" in Fairbanks.

LAND INFORMATION AND ANALYSIS OFFICE

EROS PROGRAM

The EROS (Earth Resources Observation Systems) Program was established by the U.S. Department of the Interior in 1966 to assist in realizing the practical benefits in earth resource and environment inventory and monitoring that can be obtained by use of photography and other remote-sensing data acquired by aircraft and space craft, particularly the Earth Resources Technology Satellite (ERTS), now renamed LANDSAT. The EROS Program is managed by the U.S. Geological Survey and directed by John N. DeNoyer, with headquarters at EROS Program, U.S. Geological Survey, 1925 Isaac Newton Square East, Reston, Va. 22090 (703) 860-7881 to -7885. The representative of the EROS Program for Alaska and the Pacific States is Andrew M. Spieker, EROS Applications Assistance Facility, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025 (415) 323-8111, ext. 2727.

EROS Data Center, Sioux Falls, S. Dak. 57198; (605) 594-6511, is responsible for distributing LANDSAT (formerly ERTS) imagery and other remote sensing data to users throughout the world as well as developing techniques of application of remote sensing to various resource problems and assisting users in employing these techniques. A large staff of specialists in a variety of disciplines is available to assist in the development of new applications. Inquiries on specific problems or other matters, including future training opportunities, may be directed to the Applications Assistance Branch of the Data Center.

In November 1974, an EROS Applications Assistance Facility was established in Alaska to improve the availability of technical assistance to Alaskan users. This facility, located at the Geophysical Institute, University of Alaska, College, Alaska 99701; (907) 479-7487, initially established by NASA to provide assistance to Alaskan ERTS-1 investigators, is now being operated under contract to the EROS Program to provide assistance to the entire Alaskan user community. The facility is supervised by Albert E. Belon, under the general direction of John M. Miller. Both standard and sophisticated interpretation

equipment, including a color additive viewer and minicomputer enhancer, are available. In addition, files are maintained on selected LANDSAT imagery, NASA and other aerial photography, and other remote-sensing data on various parts of Alaska.

The Applications Assistance Facility has arranged for William Stringer, of the University of Alaska, to spend 1 week each month at the Arctic Environmental Information and Data Center, 707 A Street, Anchorage, Alaska 99501; (907) 279-4523, to answer questions and provide more direct assistance to Anchorage area users.

Alaskan LANDSAT imagery is also available for inspection at the Public Inquiries Office, U.S. Geological Survey, Rm. 108 Skyline Building, 508 Second Ave., Anchorage, Alaska 99501.

GEOGRAPHY PROGRAM

As part of the Geography Program, the U.S. Geological Survey plans to provide land-use and land-cover maps for the entire United States on a systematic and comprehensive basis. A classification system has been developed by the Geological Survey in conjunction with other Federal and State agencies (Anderson, J. R., Hardy, E. E., and Roach, J. T., 1972, A land-use classification system for use with remote sensor data: U.S. Geol. Survey Circ. 671, 16 p.). In Alaska, mapping of the Fairbanks sheet ($1^{\circ} \times 2^{\circ}$) has been completed, and publication is planned for 1976 at 1:100,000 scale. For information concerning these maps, contact James R. Anderson, Chief, Geography Program, U.S. Geological Survey, 710 National Center, Reston, Va. 22092.

ALASKAN PROJECTS OF THE U.S. GEOLOGICAL SURVEY

Much of the work of the Geological Survey is organized and accomplished by projects in which the investigations of one or more scientists, engineers, and technicians are directed by a project chief. Some of the projects are statewide in scope, but most focus on one or more aspects of topography, hydrology, or geology in particular parts of Alaska. The regions into which Alaska is divided for this report are shown in figure 6; the location of active projects in figures 7-10. This chapter summarizes statewide and regional Survey projects active during 1975. Summarized in a later part are projects undertaken in cooperation with various

other Federal, State of Alaska, and local agencies. Projects in more than one region are listed as being statewide.

STATEWIDE PROJECTS

Project: Mineral resources of Alaska.

Region: Statewide.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Edward H. Cobb, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2213.

Project objectives: As a continuing project, office studies of mineral occurrence data are to be kept current and special-purpose maps, reports, and reference lists to be prepared whenever the need becomes apparent. Data are to be so organized that they can be entered into computerized storage and retrieval banks by the Alaskan Branch information processing project (M. Elizabeth Yount, project chief).

Project status: As this is a continuing project, no percentage-of-completion data are applicable. Records are now current as of December 31, 1974, and will be current as of December 31, 1975, early in 1976.

Project: Technical Data Unit.

Region: Statewide.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Mary E. Tailleux, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2342.

Project objectives: The Technical Data Unit aims to provide prompt and complete listings of all geologic data published on Alaska by the U.S. Geological Survey, the U.S. Bureau of Mines, and the State of Alaska Division of Geological and Geophysical Surveys, and to fill requests for copies of open-file reports of the Alaskan Geology Branch.

Project status: With the installation of a computer terminal, the Technical Data Unit will be able to retrieve data from the Alaska bibliographic file upon request, beginning January 1976. As time permits, it is hoped to enter many more listings from the data now stored in the unit, such as: reports published in nongovernmental publications; data on the availability of topographic and

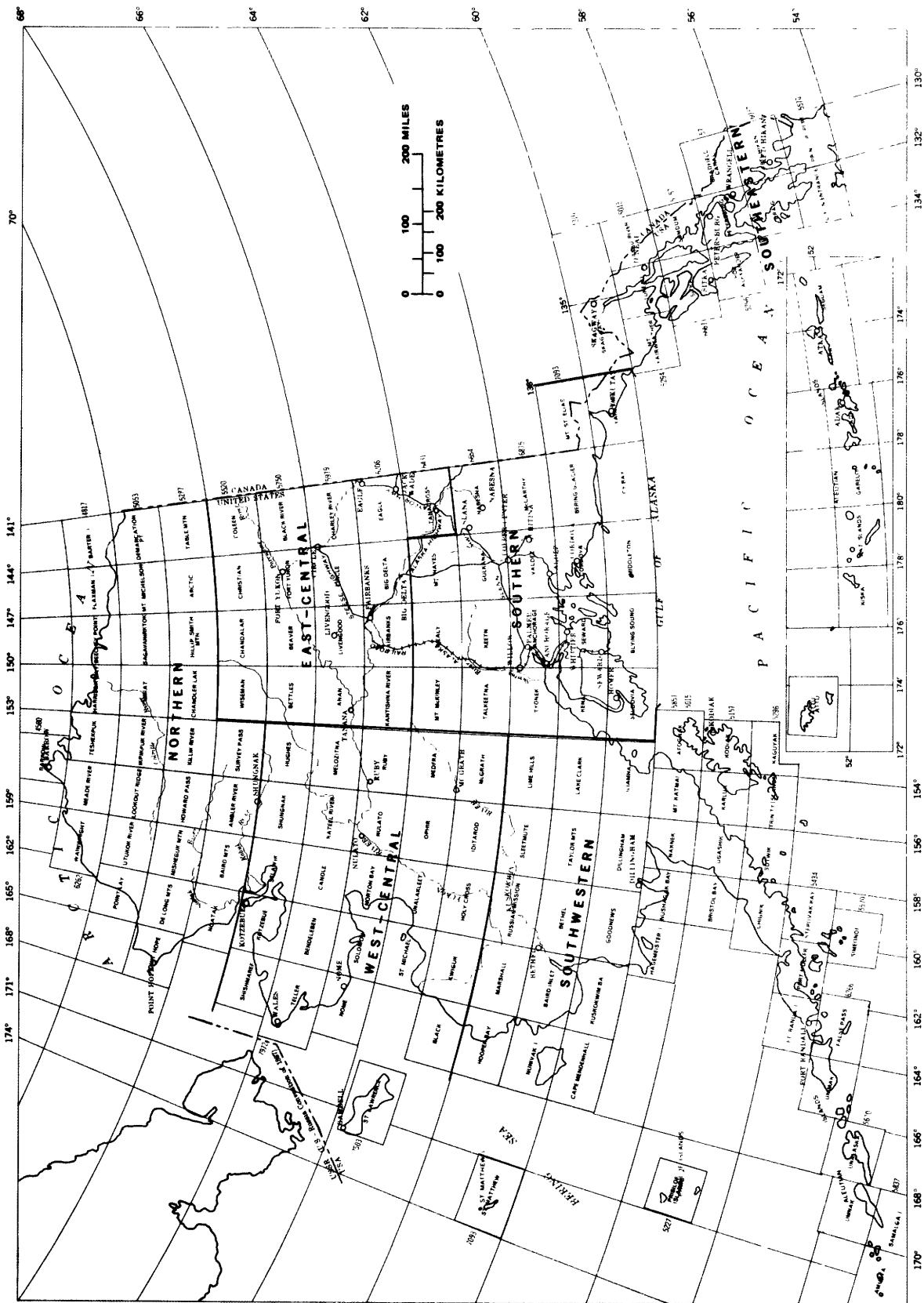


Figure 6.—Regions of Alaska used in this report.

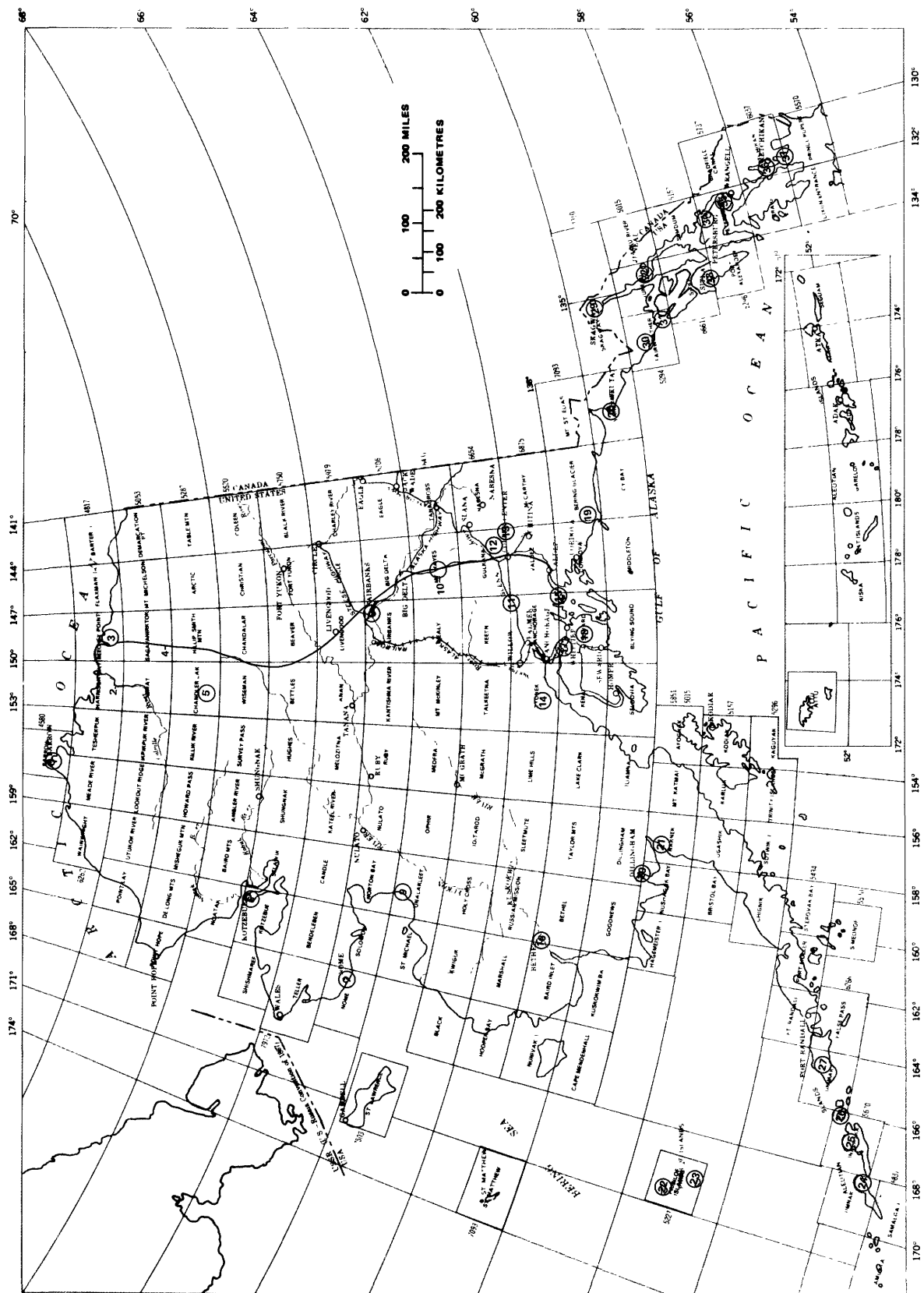


FIGURE 7.—Locations of projects of the U.S. Geological Survey (see also figs. 8-10).

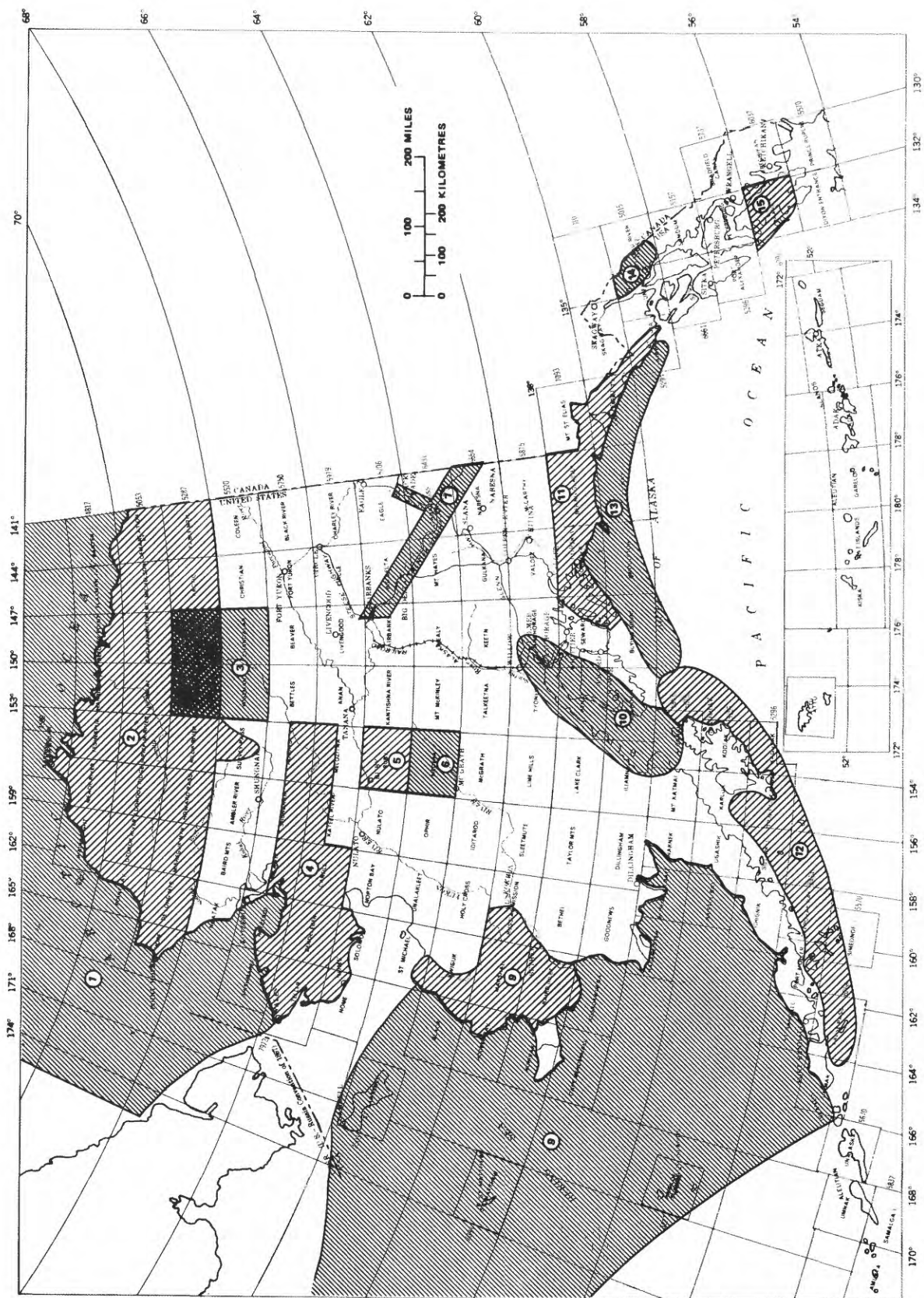


FIGURE 8.—Locations of projects of the U.S. Geological Survey (see also figs. 7, 9, 10).



FIGURE 9.—Locations of projects of the U.S. Geological Survey (see also figs. 7, 8, 10).

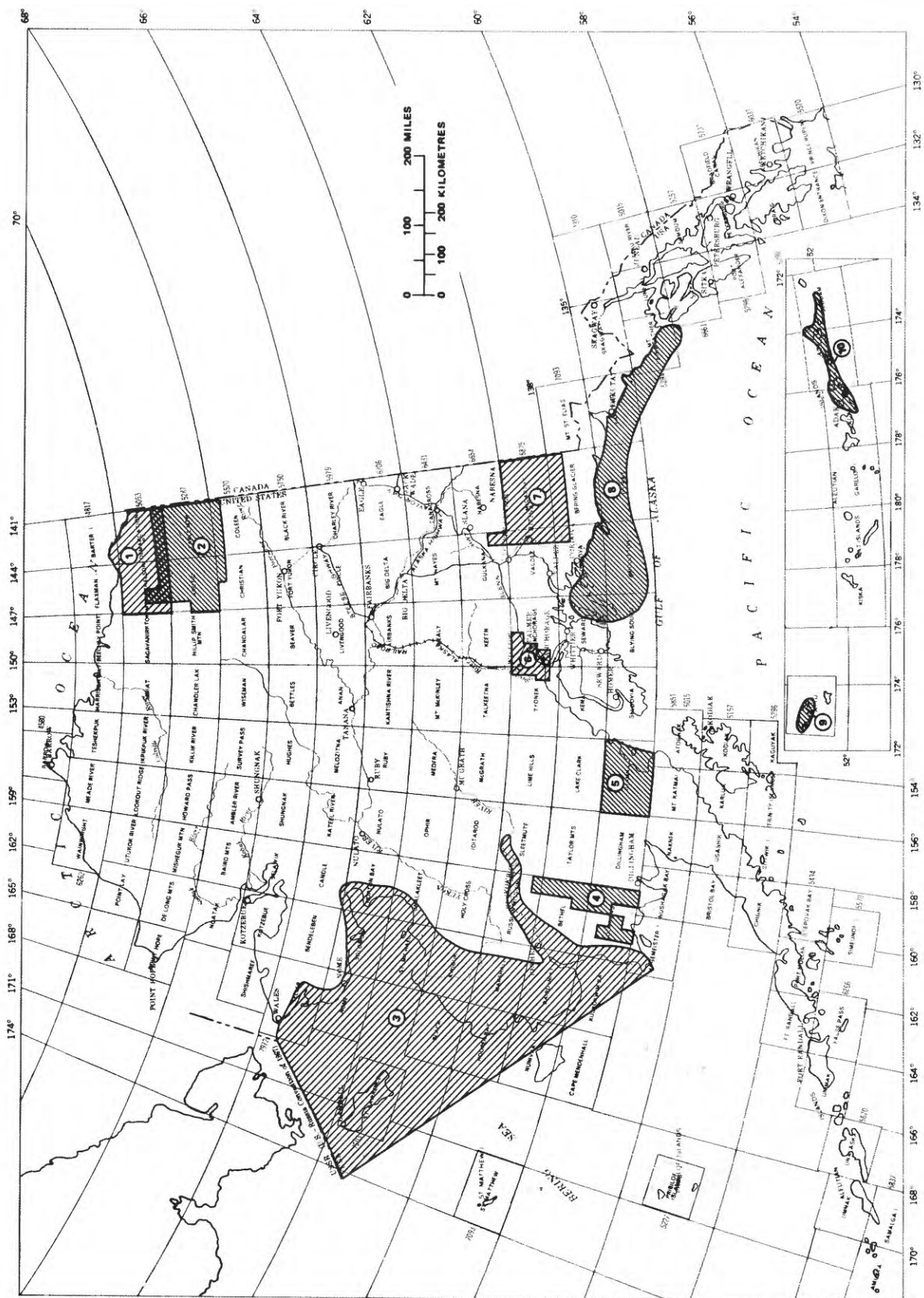


FIGURE 10.—Locations of projects of the U.S. Geological Survey (see also figs. 7-9).

TABLE 1.—*Statewide projects*

Name of project; map key	Personnel	Type of work	Area(s)
Mineral resources of Alaska	E. H. Cobb	Office studies, compilation	Statewide
Technical Data Unit	M. E. Tailleux, Elias Zendejas	Supply data to Geological Survey personnel and to general public	Statewide
Information processing	M. E. Yount, R. H. Robinson, F. A. Wahl	Creation, maintenance, and promulgation of computer banks of geologic data	Statewide
Alaskan mineral-deposit data base	G. L. Askevold, B. B. Salem, M. E. Yount, E. H. Cobb, Travis Hudson, L. J. Sanford, and other Geologic Division personnel	Apply computer technology to mineral-resources and other geologic studies	Statewide with national applications
Geologic/tectonic map of the Arctic	Michael Churkin, Jr.	Map compilation	All areas bordering Arctic Ocean
Alaska heat-flow reconnaissance	A. H. Lachenbruch	Acquisition of holes deeper than 150 m for heat-flow measurements	Statewide
Alaska Tertiary uranium basins	K. A. Dickinson	Library research; planning field program	Statewide
Late Paleozoic brachiopods and biostratigraphy	J. T. Dutro, Jr.	Establishment of stratigraphic units; systematic paleontology	Statewide with major emphasis in northern Alaska
Cenozoic stratigraphy of Alaska	W. O. Addicott	Biostratigraphic studies of Tertiary and Quaternary faunas	Arctic coast, Alaska Peninsula, Gulf of Alaska
Alaska mineral resource assessment program (PAMRAP/AMRAP); fig. 9 (3), (5), (7), (8), (9), (10), (12), (13), (15), (17)	H. C. Berg and other Geologic Division personnel	Appraisal of mineral resources through geologic mapping and geophysical and geochemical analyses	Statewide
LANDSAT imagery and applications in Alaska (AMRAP)	N. R. D. Albert, P. Chavez, C. Steele	Interpretation of satellite imagery in support of AMRAP	Statewide
Arctic environmental studies program; fig. 8 (3), (7); fig. 9 (1)	O. J. Ferrians, Jr., and other Geologic and Water Resources Division personnel	Field and office collection and use of geotechnical data related to transportation corridors and other areas of development	Statewide

TABLE 1.—*Statewide projects*—Continued

Name of project; map key	Personnel	Type of work	Area(s)
Gas pipeline environmental impact studies (Arctic environmental studies)	O. J. Ferrians, Jr., M. E. Britton, V. K. Berwick, and others	Environmental impact statement	Alaska and western Canada
Environmental impact statement on proposed gas pipelines in Alaska	A. J. Feulner, L. R. Mayo, J. P. Meckel, and others	Water resource-related information for EIS for Alaskan segments of proposed gas pipeline system; collection of additional hydrologic data to aid in analysis of environmental impacts	Northern, east-central, southern Alaska
Arctic engineering geology (TAPS); fig. 7 (4)	George Gryc and other Geologic and Water Resources Division personnel	Collection of basic data; environmental impact statement	Trans-Alaska pipeline corridor, Prudhoe Bay to Valdez
Hydrologic environment of the trans-Alaska pipeline system (TAPS); fig. 7 (4)	J. M. Childers, C. E. Sloan, J. W. Nauman, J. P. Meckel, L. R. Mayo and others	Operation of basic-data network of stream gages and water-quality monitoring sites; studies of hydrologic hazards such as glaciers, icings, channel erosion, and floods; assessment of impact on hydrology	Trans-Alaska pipeline corridor, Prudhoe Bay to Valdez
Surficial geology, central Brooks Range (Arctic environmental studies); fig. 8 (3)	T. D. Hamilton, R. M. Thorson	Surficial geologic mapping; stratigraphic studies	Chandler Lake, Philip Smith Mountains, Chandalar, Wiseman quadrangles
Tanana Valley transportation/development corridor; Fairbanks to Canadian border (Arctic environmental studies); fig. 8 (7)	L. D. Carter	Geologic mapping of surficial deposits	Tanana Valley, Fairbanks to Canadian border
Arctic water resources and environmental studies	J. M. Childers, C. E. Sloan, J. W. Nauman, J. P. Meckel, and others	Investigations of arctic Alaskan water resources, hydrologic hazards to development and potential impacts on water resources resulting from potential development	Arctic and subarctic Alaska
Glaciology studies; fig. 7 (10), (13), (15), (18)	L. R. Mayo, D. C. Trabant	Studies of ice physics, motion, balance, aerial photographic monitoring	Gulkana, Wolverine, Columbia, Black Rapids Glaciers; statewide photography

TABLE 1.—*Statewide projects—Continued*

Name of project; map key	Personnel	Type of work	Area(s)
Alaska geothermal; fig. 7 (12), (14), (24), (25), (26), (27)	T. P. Miller, Ivan Barnes, R. L. Smith, and other Geological Division personnel	Geologic mapping; geochemical sampling	Aleutian Islands, Alaska Peninsula, Mt. Drum (southwestern and southern Alaska)
Southeastern Alaska geochronology	J. G. Smith	K-Ar dating of igneous rocks	Southeastern Alaska and Talkeetna Mountains, Tanacross, Goodnews, Big Delta quadrangles
Alaska earthquake hazards; fig. 9 (16) in part	George Plafker, Travis Hudson, Meyer Rubin, R. G. Tysdal, S. J. Hunt	Geologic mapping and evaluation of risk from primary and secondary effects of earthquakes	Fairweather, Denali, Totschunda fault systems; central Alaska; Seward Peninsula
Yukon-Kuskokwim Delta (western Alaska Cenozoic); fig. 8 (9)	W. R. Dupré, D. M. Hopkins	Study of geologic hazards	Yukon-Kuskokwim Delta (west-central and southwestern Alaska)
Environmental studies of the northern Bering Sea; fig. 10 (3)	C. H. Nelson, D. A. Cacchione, A. H. Sallenger, Jr., D. E. Drake, J. R. Dinger	High-resolution profiling; side-scan sonar; vibracoring; bottom camera and TV; current meter/nephtholometer tripod; storm-surge wave modeling	Northern Bering Sea; Kuskokwim River drainage
Environmental studies of the southern Bering Sea; fig. 8 (8)	T. L. Vallier, J. V. Gardner	Outline and document seafloor instability	Bering Sea (west-central and southwestern Alaska)
Geologic framework and resource assessment of the Aleutian-Bearing Sea region; fig. 8 (8)	M. S. Marlow, A. K. Cooper, J. I. Howell, C. E. Carpenter	Marine geological and geophysical survey	Bering Sea (west-central and southwestern Alaska)
Eastern Brooks Range; fig. 10 (2)	A. E. Letey and Topographic Division	Topographic mapping	Eastern Brooks Range (east-central and northern Alaska)
Petroleum geology, Cook Inlet Basin; fig. 8 (10)	L. B. Magoon, W. L. Adkison, M. A. Fisher, J. S. Kelley	Framework and petroleum geology	Cook Inlet region (southwestern and southern Alaska)
Gulf of Alaska Tertiary Province; fig. 8 (11)	George Plafker, G. R. Winkler, Travis Hudson, R. G. Tysdal, Hugh McLean, M. A. Lanphere, Louie Marinovich	Fieldwork essentially completed; office compilation	Coastal southern Alaska; Mt. Fairweather quadrangle
Eastern Gulf of Alaska continental shelf; fig. 8 (13)	George Plafker, B. F. Molnia, P. R. Carlson, T. R. Bruns, G. R. Winkler	Evaluation of tectonic framework, petroleum potential, geologic hazards	Eastern Gulf of Alaska continental shelf (southern and southeastern Alaska)

TABLE 1.—*Statewide projects—Continued*

Name of project; map key	Personnel	Type of work	Area(s)
Erosion and deposition of shelf sediments, eastern Gulf of Alaska; fig. 10 (8)	B. F. Molnia, P. R. Carlson	Sedimentation and seismic studies	Eastern Gulf of Alaska continental shelf (southern and southeastern Alaska)
Faulting and slope instability of shelf sediments, eastern Gulf of Alaska; fig. 10 (8)	P. R. Carlson, B. F. Molnia	Investigation of sea-floor sediments for geologic hazards	Eastern Gulf of Alaska continental shelf (southern and southeastern Alaska)
Engineering studies, coastal communities; fig. 7 (1), (6), (7), (29), (34), (35), (36)	R. W. Lemke	Geologic mapping; evaluation of geologic hazards	Haines, Skagway, Wrangell, Ketchikan, Petersburg, Nome, Kotzebue, Barrow
Engineering studies, Sitka and other communities; fig. 7 (9), (16), (20), (21), (28), (31), (33), (37)	L. A. Yehle	Geologic mapping; evaluation of geologic hazards	Sitka, Metlakatla, Hoonah, Yakutat, Naknek, Dillingham, Bethel, Unalakleet

other base maps; air-photo coverage; aeromagnetic, seismic, and gravity coverage; and reports on fossil determinations, chemical analyses, and radiometric age determinations.

Project: Alaskan Branch information processing.
Region: Statewide.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: M. Elizabeth Yount, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2477.

Project objectives: This is an on-going project aimed at providing computer-based technical data files, maintaining contact with other agencies that compile or create files of Alaskan geologic or resource data, and providing training, assistance and documentation when needed. Data for the computer-based Alaskan economic mineral occurrence file and bibliographic file of Alaskan geologic literature are provided by the Mineral resources of Alaska project (Edward H. Cobb, project chief).

Project status: Several phases of the project are nearing completion. A file of Alaskan economic mineral occurrences, which was built in conjunction with, and is maintained by the Office of Resource Analysis, is being proofread, updated, and expanded. Computer output microfiche of the file will be made available through National Technical Information Service (Department of

Commerce) when the upgrading process is completed.

A bibliographic file, indexed by 1:250,000 quadrangle, is now complete for U.S. Bureau of Mines, U.S. Geological Survey, and State of Alaska Division of Geological and Geophysical Surveys through 1974. As indexing is available, citations for 1975 publications will be added to the file. Coverage for publications other than Federal and State will be added as available.

Rhoda Robinson, working nominally under this project, is converting Alaskan paleontological reports for addition to the Branch of Paleontology and Stratigraphy (P&S) computer-based file. P&S efforts are directed to keeping up with new reports and working backward in the historic reports. Robinson is starting with the earliest reports (around the turn of the century) and working forward.

Project: Alaska mineral-deposit data base.

Region: Nationwide, including Alaska.

Organizational designation: Geologic Division, Office of Mineral Resources, Office of Resource Analysis.

Project Chief: Gerald L. Askevold, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2460.

Objectives: This project is designed to develop, test, and apply modern information-system concepts and information-processing technology within the context of the mission of the U.S.

Geological Survey. Specifically, efforts have focused on Alaska in three primary areas: (1) economic mineral occurrence files; (2) computer files of geologic field data; and (3) computer-based communication systems.

Project status: (1) The Alaska Economic Mineral Occurrence File (see also Branch of Alaskan Geology information processing project)—Extensive testing of an interactive computer-inquiry system has been completed, including remote access by terminals from many points within the conterminous United States, Alaska, Hawaii, and Canada. Based partly upon user evaluation, additional information is being added to the basic file. More widespread access to the file is under consideration.

(2) Computer files of geologic field data—An interactive prompting program has been developed to facilitate entry of geologic data, to perform error checking, and to format automatically the printed output. This program was tested in parallel with the use of "intelligent terminals" for this same purpose and found to be superior. Refinements of this approach are underway, along with development of x-y coordinate plotting directly from fieldnote files.

(3) Computer-based communication systems—A version of FORUM, a computer telecommunications system developed by The Institute for the Future, was implemented on the Denver DEC-10 computer in 1975. A current application is coordination between geographically separated members of the PAMRAP/AMRAP program. Evaluation of the usefulness of this new medium is being conducted in conjunction with a NSF-funded project.

Project: Geologic/tectonic map of the Arctic.

Region: Statewide and other areas bordering Arctic Ocean Basin.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Michael Churkin, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2256.

Project objectives: The objective is to compile a geologic/tectonic map of the Arctic region at the scale of 1:5,000,000. The map will emphasize features critical to understanding the plate-tectonic history of the Arctic and will provide a

comprehensive view of the entire Arctic so that detailed studies of specific areas in Alaska underway or contemplated can be placed into perspective.

Project status: The project chief traveled to the U.S.S.R. and Europe from April to July of 1975 to obtain cooperation and source materials to start the map compilation. The trip was largely sponsored by an exchange program of the National Academy of Science of the United States and the Academy of Sciences of the U.S.S.R. Visits and exchanges of data were initiated at the following institutes: Geological Surveys of Sweden, Norway, Finland, Greenland, and U.S.S.R., Scott Polar Institute, Norsk Polar Institute, Institute of the Geology of the Arctic. Approximately 2 months of field excursions were conducted in Arctic Scandinavia, and a symposium on the Geology of Svalbard was attended in Oslo, Norway.

Project: Alaska heat-flow reconnaissance.

Region: Statewide.

Organizational designation: Geologic Division, Office of Earthquake Studies, Earthquake Hazards Branch.

Project chief: Arthur H. Lachenbruch, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2272.

Project objectives: Plans involve continued acquisition of holes (deeper than 150 m), drilled by mineral and oil exploration companies, for temperature measurements. Subject to the approval of the operators, and on a noninterference basis, plastic pipe (¾ inch i.d.) will be taken into the drilling camps for insertion into completed holes to preserve them for later temperature measurements. We will concentrate on extending our coverage of heat flow in intrusive and metamorphic terranes as part of continuing studies relating to the energetics of earthquakes and to geothermal reconnaissance. Persons who know of plans or who have plans to drill to depths greater than 150 m (500 ft) should contact the project chief. Any information of this type would be greatly appreciated.

Project status: Preliminary data that are expected to lead to reliable heat-flow determination have been obtained from 30 sites throughout the State.

Project: Alaska Tertiary uranium basins.

Region: Statewide.

Organizational designation: Geologic Division, Office of Energy Resources, Branch of Uranium and Thorium Resources.

Project Chief: Kendell A. Dickinson, U.S. Geological Survey, 1010-10th Street, Mail Stop 953, P.O. Box 25046, Federal Center, Denver, Colo. 80225; (303) 234-5038.

Project objective: The objective of this project is to assess the uranium potential for Tertiary rocks in Alaska.

Project status: The project began July 1, 1975, and is in the initial stages of literature search, planning field work, and preliminary determinations of areas to receive emphasis.

Project: Late Paleozoic brachiopods and biostratigraphy.

Region: Statewide (largely northern Alaska).

Organizational designation: Geologic Division, Office of Environmental Geology, Branch of Paleontology and Stratigraphy.

Project chief: J. Thomas Dutro, Jr., U.S. Geological Survey, Rm. E-325, Museum of Natural History, Washington, D.C. 20560; (202) 343-3222.

Project objectives: Principal objectives are: (1) field and laboratory biostratigraphic studies of the Paleozoic of Alaska, with emphasis on the upper Paleozoic of the Brooks Range; (2) systematic description of brachiopods, relating their distribution in time and space to the geologic development of Alaska and the Arctic regions; (3) inquiry into the paleogeographical and depositional implications of the faunal assemblages and correlations with other sequences in the Arctic; and (4) in cooperation with geologists from Branch of Alaskan Geology, stratigraphic studies that involve measuring sections and collecting fossils from Paleozoic rocks, with detailed geologic mapping in selected areas.

Project status: This is a lifetime project whose direction during any short-term period (2-5 years) is determined, in part, by the nature of cooperative work with other Survey geologists. Recent results include: revision of the type Mankomen Formation in the eastern Alaska Range; mapping and biostratigraphic studies in the Philip Smith Mountains quadrangle, central Brooks Range; and reconnaissance stratigraphic studies in the Nixon Fork area. Manuscripts on biostratigraphy of the Calico Bluff Formation, brachiopods of the Sadlerochit Group, and De-

vonian brachiopods of the central and western Brooks Range are in progress.

Project: Cenozoic stratigraphy of Alaska.

Region: Statewide (northern, southwestern, southern Alaska).

Organizational designation: Geologic Division, Office of Environmental Geology, Branch of Paleontology and Stratigraphy.

Project chief: Warren O. Addicott, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2767.

Project objectives: This project supplies biostratigraphic study of Tertiary and Quaternary molluscan faunas in support of regional geologic mapping and topical research on marine basins of deposition.

Project status: Recent work involves study of late Tertiary faunas from the Arctic coast in cooperation with D. M. Hopkins, L. D. Carter, and Arthur Grantz. Extensive late Tertiary megafossil collections made by Carter along the Colville River during the 1975 field season are currently being investigated for age and environmental significance. Additional late Paleocene marine mollusks referable to the "Meganos" Stage were identified from a collection from the foothills of the Saint Elias Mountains, confirming an earlier determination made on a single gastropod specimen collected by George Plafker in 1971.

Program: Alaskan Mineral Resource Assessment Program (AMRAP and PAMRAP).

Region and map keys: Statewide; fig. 9 (3), (5), (7), (8), (9), (10), (12), (13), (15), (17).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Program manager: Henry C. Berg, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2266.

Program purpose and objectives: The vast and largely unstudied State of Alaska has long been known as the Nation's last frontier, a region rich in natural attributes, including mineral resources. Current efforts to tap oil on the Arctic slope are focusing attention on Alaska's storehouse of fuels, but what are the State's resources of metallic minerals and nonmetallic commodities other than petroleum? The Nation needs to know, both to develop long-range mineral policies that will assure the Nation of con-

tinued mineral supplies and to make the difficult decisions now pending on the disposition and development of Alaskan lands during the next decade. For these critical decisions, information from this program will help insure the best possible use of Alaska's natural endowment.

The Alaska Mineral Resource Assessment Program, the continuation of a 2-year pilot (prototype) study called PAMRAP, was started by the Geological Survey in 1975 as a 10-year effort to supply this resource information. The program aims at rapid evaluations of the mineral potential of the state using systematic geologic, geochemical, and geophysical mapping, information from satellite imagery, computerized data storage, and geostatistical projections of the mineral resources. One of the $1^{\circ} \times 3^{\circ}$ (1:250,000 scale) quadrangles (Nabesna) to be studied under the program has already been completed and the results published as a folio report consisting of a text and 12 maps. Studies of 13 additional quadrangles are in progress, and 18 others are programmed. This area totals about 170,000 mi² and contains about half of the exposed bedrock regions now considered to have significant potential for mineral resources in Alaska.

Program status: The first year of the program has resulted in important new information, including: identification of a significant potential for copper, molybdenum, gold and silver, as well as several nonmetallic commodities in the Nabesna quadrangle; and recognition that this concentrated program effort, largely in inhospitable regions is a practical and efficient method of obtaining resource information.

Detailed information on the status of 1:250,000-scale Alaskan quadrangles now being studied under AMRAP and PAMRAP is listed in the following sections under the individual quadrangles.

Project: LANDSAT imagery and applications in Alaska (AMRAP).

Region: Statewide.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Nairn R. D. Albert, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2348.

Project objectives: The principal objectives of this project are to furnish the various AMRAP team leaders with LANDSAT imagery materials for reconnaissance purposes and to provide additional geologic and structural information for each AMRAP quadrangle relevant to mineral resource assessment that may not be obtained by methods other than LANDSAT imagery. The types of LANDSAT products used are: (1) black and white, single-band photomosaic of Alaska; (2) computer-enhanced false color, color ratio, and simulated natural color images; (3) interactive computer displays allowing detailed analysis of specific areas.

Project status: LANDSAT imagery computer compatible tapes have been ordered and received from the EROS Data Center, Sioux Falls, S. Dak., for 9 AMRAP-PAMRAP areas. Tapes for four of these areas are being processed at the Center of Astrogeology, Flagstaff, Ariz. The McCarthy quadrangle images have been processed and are undergoing analysis. The Nabesna quadrangle study has been completed.

Project: Arctic Environmental Studies Program.

Region and map keys: Statewide; fig. 8 (3), (7); fig. 9 (1).

Organizational Designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Program manager: Oscar J. Ferrians, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2247.

Project objectives: Objectives are: (1) to investigate energy-related transportation corridors and other areas of development in Alaska in order to obtain base-line geotechnical data needed to aid in planning, designing, operating, and maintaining engineering structures so that adverse environmental impacts will be minimized; to evaluate feasibility of proposed engineering projects; and to prepare comprehensive Environmental Impact Statements; (2) to collect and synthesize pertinent engineering-geologic data made available during construction of the trans-Alaska oil pipeline with special emphasis being given to the character and distribution of surficial deposits and permafrost, Pleistocene and Holocene stratigraphy, glacial chronology, periglacial features, seismic phenomena, and geologic processes that are either unique to or are especially active in the arctic environment;

and (3) to observe and record geotechnical maintenance and environmental problems that arise during the operation of the trans-Alaska oil pipeline in order to determine the location, character, and extent of these problems and their relations to geologic conditions and processes. This will allow an evaluation of the adequacy of the technical stipulations in controlling adverse environmental impacts and make it possible to improve stipulations for future engineering projects that would have a significant impact on the environment.

Project status: This program, begun in the fall of 1974, has initiated the following activities: (1) reconnaissance engineering geologic investigations of the Arctic Coastal Plain between Prudhoe Bay and the Canadian border; (2) reconnaissance surficial/engineering geologic mapping of the central Brooks Range; (3) 2-year seismic study of northeastern Alaska; (4) exchange program with Soviet scientists and engineers in regard to pipelines, permafrost, and environmental protection; (5) office studies of the transportation/development corridors between Fairbanks and the Canadian border along the Tanana Valley, and between Fairbanks and Anchorage along the rail belt; and (6) collection of pertinent geotechnical data made available during construction of the trans-Alaska oil pipeline. This program is scheduled for completion in 1982.

Project: Gas pipeline environmental impact studies (Arctic Environmental Studies).

Region: Alaska and western Canada.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Oscar J. Ferrians, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2247.

Project objectives: The primary objective is to prepare a large part of the consolidated Environmental Impact Statement (EIS) for the prime and alternative pipeline routes for transporting Alaskan natural gas from Prudhoe Bay to market in the conterminous states. This includes complete responsibility for the Canadian part of the EIS and, in Alaska, responsibility for describing the existing environment and evaluating the environmental impact of the proposed project in regard to geology, hydrology, and to-

pography.

Project status: The 17-volume, 9,000-page draft EIS was published in July 1975. The final EIS is scheduled for publication in February 1976.

Project: Environmental impact statement on proposed gas pipelines in Alaska.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: A. J. Feulner, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Project objectives: The major objectives are to prepare a report on the water resources-related aspects of an environmental impact statement for the Alaskan sections of the proposed gas pipeline and to collect and disseminate additional hydrologic data that would aid in the analysis of environmental impacts of the proposed pipeline.

Project status: The final environmental impact statement is in preparation. A report covering information about glaciers, icings (aufeis), and ice thickness is being prepared. Field data collection along the proposed coastal route on streamflow and water quality was completed in November and results will be included in a planned reconnaissance report of the area. A test-drilling program for the same area is also planned in April to define thawed water-bearing zones beneath river channels; results will be included in a North Slope water-resources study.

Project: Arctic engineering geology (TAPS).

Region and map key: Statewide; fig. 7 (4).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: George Gryc, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2214.

Project objectives: The principal objectives of this project include: (1) for the Technical Advisory Board to the Department of the Interior Task Force on Oil Development and for the Federal Task Force on Alaskan Oil Development, review reports and proposals concerning the trans-Alaska Pipeline System (TAPS) in terms of their accuracy and merit, prepare (in collaboration with other government agencies) an Environ-

mental Impact Statement, prepare and review environmental and technical stipulations controlling the planning, construction, and operation of the proposed pipeline, and make recommendations in regard to possible alignment changes and special engineering geologic problems; (2) collect, synthesize, and prepare for publication, engineering geologic data that will aid in determining the proper route, design, construction, and maintenance of TAPS, and that will provide similar aid to other engineering activities generated by the petroleum-related development of northern Alaska; (3) collect and synthesize basic geologic data concerning the character and distribution of permafrost, surficial deposits, and bedrock along the pipeline route; and (4) evaluate new techniques, such as remote sensing, that will aid in the rapid determination of the distribution and character of permafrost and other geologic-environmental features and consequently facilitate solving engineering geologic problems.

Project Status: Most of the objectives of this project have been accomplished. More than 50 reports have been published, including the Environmental Impact Statement, Environmental and Technical Stipulations, and preliminary engineering geologic maps of the entire pipeline route. Current activities emphasize the collection of basic geologic, seismic, and hydrologic data that are critical to the proper construction and safe operation of the pipeline.

Project: Hydrologic environment of the trans-Alaska pipeline system (TAPS).

Region and map key: Statewide, Prudhoe Bay to Valdez; fig. 7 (4).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: J. M. Childers, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Project objectives: This project assesses the hydrologic impact of the trans-Alaska Pipeline System (TAPS). A basic-data network of stream-gaging and water-quality monitoring stations will be maintained and operated to provide records of hydrologic conditions along the TAPS route throughout the life of TAPS. Hydrologic hazards including floods, icings, glaciers, and channel erosion and their interactions with TAPS will be studied. Stream, lake, spring, and

aquifer characteristics will be evaluated for assessing potential development impacts associated with TAPS. The studies will provide technical information on interactions of hydrologic and permafrost-related parameters and processes, some of which are identified by the National Academy of Sciences Committee on Permafrost and reported in "Opportunities for Permafrost-related Research Associated with the Trans-Alaska Pipeline System" (1975).

Project Status: This project, begun in 1970, is planned for continuation through the construction and early operation phases of TAPS. Basic water data are published in Alaska District annual basic-data reports. The project has begun 29 additional reports, 22 of which have been published (3 in 1975).

Project: Surficial geology of the central Brooks Range (Arctic Environmental Studies).

Project region and map key: Statewide (northern, east-central Alaska); fig. 8 (3).

Organization designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Thomas D. Hamilton, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2156.

Project objectives: The major objective is to provide data essential for investigations of energy-related transportation corridors across the central Brooks Range and for other studies involving land-use analysis and classification. This will be accomplished through the preparation of reconnaissance-scale surficial geologic maps for the central Brooks Range and the development of a general stratigraphic framework for the Quaternary deposits of this region. The maps also will be of value to programs involving geochemical studies or resource assessments of unconsolidated sediments. The stratigraphic framework, which will tie together glacial and nonglacial deposits of northern and southern Brooks Range, will provide a model to which other Quaternary events in northern Alaska can be related.

Project status: Field mapping and ancillary studies were carried out in the Philip Smith Mountains, Chandalar, and Chandler Lake quadrangles during June and July, 1975. Mapping was completed in about 70 percent of the Philip Smith Mountains quadrangle and 60 per-

cent of the Chandalar quadrangle; most of the work within the Chandler Lake quadrangle was of a reconnaissance nature.

Mapping during the summer of 1976 is scheduled to be completed in the Philip Smith Mountains and Chandalar quadrangles and to be extended westward into the Chandler Lake and Wiseman quadrangles. Surficial geologic maps for the Philip Smith Mountains and Chandalar quadrangles are expected to be completed during the winter of 1976-77.

Project: Tanana Valley transportation/development corridor; Fairbanks to the Canadian border (Arctic Environmental Studies).

Region and map key: Statewide (east-central, southern Alaska); fig. 8 (7).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: L. D. Carter, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2406.

Project objectives: The project objective is to compile a map of the distribution of the various kinds of unconsolidated surficial deposits within the transportation/development corridor that extends southeastward up the Tanana Valley from Fairbanks to the Canadian border. A tabular text will accompany the map, and will consist of a description of lithology, topography, and geologic hazards in terms of the map units. Planned field work includes geologic mapping at a scale of 1:125,000 in parts of the Fairbanks, Big Delta, Eagle, Mt. Hayes, Tanacross, and Nabesna quadrangles. This project is part of the Arctic Environmental Studies Program formulated to provide base-line geotechnical data needed in planning, designing, operating, and maintaining engineering structures in this region.

Project status: Existing geologic mapping has been compiled at a scale of 1:125,000. Field checking and additional geologic mapping will be undertaken in the summers of 1976 and 1977. A preliminary geologic map will be completed for the open files or the Miscellaneous Field Studies Map Series in 1978.

Project: Arctic water resources and environmental studies.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: J. M. Childers, U.S. Geological Survey, 218 E Street, Anchorage, Alaska, 99501; (907) 277-5526.

Project objectives: The project studies arctic Alaskan water resources to provide information for planning, design, and operation of development in Alaska. Hydrologic hazards including floods, icings, glaciers, and channel erosion are being evaluated in development areas. Stream, lake, spring, and aquifer characteristics are examined in order to assess potential developmental impacts. Selected sites are studied to determine causes, processes, and effects of development impacts on water resources. These studies include water-quality evaluation and attention to icings and acceleration of erosion. This project is designed to help develop Alaska's resources for the national need and concurrently to protect the environment in Alaska.

Project status: This study, begun in 1974, is a continuing project. Accomplishments include work along the trans-Alaska pipeline system (TAPS) route as well as on the central and eastern North Slope of Alaska. Several technical reports have been or are being prepared. Most information from the project has been made available through open-file release for timely use in design and review of the TAPS oil pipeline and the proposed Arctic Gasline.

Project: Glaciology studies.

Region and map keys: Statewide (mainly southern Alaska); fig. 7 (10), (13), (15), (18).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: L. R. Mayo, U.S. Geological Survey, 310 First Avenue, Fairbanks, Alaska 99701; (907) 452-1951, ext. 176.

Project objectives: Objectives are: (1) long-term monitoring of the interactions between general climate, mass balance, runoff, and ice motion of Gulkana and Wolverine Glaciers. Data obtained are used to guide the analysis of glacier activity throughout Alaska, which is monitored by aerial photographic reconnaissance; (2) monitoring of specific, potential hazards: outburst floods from glacier-dammed lakes and volcanoes, glacier advances and surges, and tidal glacier activity; and (3) addressing specific questions about glacial activity and potential

hazards related to glaciers and other surface ice forms.

Project status: Continuing activities are: year-round field work on Gulkana and Wolverine Glaciers on mass balance, ice motion, and the collection of high-altitude air-temperature and precipitation data; studies on the mechanism of surging and photographic documentation of glacier surges in Alaska; aerial observations of changes and potential hazards on Mount Wrangell where volcanic activity is increasing; monitoring of aufeis activity and unusual aufeis events in the State; increased aerial photographic reconnaissance of glaciers, glacier-dammed lakes, glacier-clad volcanoes, and aufeis deposits; and intensified field and aerial monitoring of Columbia Glacier.

Radar depth-sounding studies are planned on Wolverine and Snow Glaciers to aid in understanding ice kinematics and ice dams at glacier-dammed lakes. The precision survey net at Wolverine Glacier was resurveyed in August 1975, and ice kinematics for the first 7 months have been calculated. Reduction and analysis of the data from glaciers is ongoing.

Project: Alaska geothermal project.

Region and map keys: State wide (southern, southwestern Alaska); fig. 7 (12), (14), (24), (25), (26), (27)

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Thomas P. Miller, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 272-8228.

Project objectives: Reconnaissance geologic and geochemical investigations of areas of recent volcanism and hot springs in Alaska are the project objectives. Fieldwork included: (1) geologic mapping and sampling of all geologically recent calderas and silicic volcanic centers in that part of the Aleutian volcanic arc extending from near Mount Spurr to Umnak Island and in the western Wrangell Mountains; (2) collecting samples for C-14 and K-Ar age dating from these areas; (3) a gravity survey of Mount Drum in the western Wrangell Mountains; and (4) reconnaissance geochemical sampling of selected hot springs in all parts of Alaska.

Project: Southeastern Alaska geochronology.

Region: Statewide.

Organizational designation: Geologic Division,

Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: James G. Smith, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2484.

Project objectives: The principal objectives of this project are: (1) to use K-Ar dating techniques to help unravel the geologic history of the Coast Range plutonic metamorphic complex in southeastern Alaska; and (2) to assist other geologists in solving their geochronology problems. This help includes advice as well as determination of K-Ar ages on minerals and rocks from all of Alaska. For this fiscal year, more than half of the project's dates were from areas outside southeastern Alaska, chiefly AMRAP quadrangles.

Project status: Fieldwork in southern southeastern Alaska is largely complete. Preliminary results were presented at the Cordilleran section meeting of the Geological Society of Canada. A paper on the intrusive and metamorphic history of the Coast Range in the Ketchikan area, based on the K-Ar data, is in preparation. Fieldwork in the Tracy Arm-Fords Terror Wilderness Study Area is complete, and determination of ages is underway. This work will give a K-Ar transect across northern southeastern Alaska. Outside southeastern Alaska, problems currently under study include: age of Tertiary volcanic rocks in the Talkeetna Mountains; age of plutonic intrusions in Tanacross and Goodnews quadrangles; age of ore deposits and relation to Tertiary volcanic rocks in Tanacross and Big Delta quadrangles; time of emplacement of ultramafic rocks in Big Delta quadrangle, Goodnews quadrangle, and Tracy Arm area; and timing of latest movement on the Togiak-Tikchik fault.

Project: Alaska earthquake hazards.

Region and map key: Statewide; fig. 9 (16) in part.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: George Plafker, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2201.

Project objectives: The overall objective of this project is to study and evaluate risk in Alaska from tectonic displacement, seismic shaking, and secondary geologic effects. A more general goal is to gain insight into tectonic processes within the seismically active zones of Alaska, with special emphasis on south-central Alaska.

Project status: The project is a 5-year program, fieldwork to be completed by September 1977 and final reports prepared in 1978. The 1975 fieldwork focused on geochronology studies of marine terraces near Lituya Bay to determine regional uplift rates in this area, detailed mapping and C-14 dating of moraines along the southern trace of the active Fairweather fault to determine the nature and amount of recent displacements, and reconnaissance investigations of the major tectonic features of Chichagof and Baranof Islands. This work completes project field investigations in southern Alaska. Remaining fieldwork includes a regional study of the Denali-Totschunda fault system and reconnaissance studies of faults with known or suspected Holocene displacement in north-central Alaska and Seward Peninsula. Several maps and reports have been completed and others are being prepared.

Project: Yukon-Kuskokwim Delta (western Alaska Cenozoic).

Region and map key: Statewide (west-central, southwestern Alaska); fig. 8 (9).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: William R. Dupré, Department of Earth and Environmental Sciences, Wesleyan University, Middletown, Conn. 06547, and David M. Hopkins, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (203) 347-9411, ext. 282, and (415) 323-8111, ext. 2659, respectively.

Project objectives: The Yukon-Kuskokwim Delta, one of the least known and logistically most difficult parts of Alaska, plays a crucial role in the life-cycle of a large population of migratory birds, feeds large volumes of sediment and nutrients into northern Bering Sea, and is the home of a large human population living a subsistence economy. This project is intended to provide basic data on geologic hazards on Yukon-Kuskokwim Delta for use in evaluating the impact of possible transportation corridors there. It is designed to determine: rates and directions of change in the position of the coast line; cause and frequency of large-scale channel diversions; distribution, ice content, and stability of permafrost; pattern of sedimentation; and distribution, character, magnitude, and age of young faults.

Project status: Effort to this time has consisted of searching out maps and aerial images that provide sequential views of changes in the shoreline and the positions of major channels; a photogeologic analysis (still incomplete), of the delta itself, and a 2-week field visit devoted mainly to obtaining an aerial overview, planning future logistics and obtaining minimal ground-truth for the photogeologic study. A preliminary report will be submitted in 1976.

Project: Environmental geologic studies of the northern Bering Sea.

Region and map key: Statewide (southwestern, west-central Alaska); fig. 10 (3).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chief: C. Hans Nelson, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2603.

Project objectives: The following environmental geologic factors are to be assessed in preparation for the Outer Continental Shelf leasing program: (1) tectonic stability, including active faulting and seismicity; (2) sediment stability, including thickness and engineering properties of recent sediment bodies, regions of active slumping and significant sediment scour by ice, currents, and large mammals; (3) sediment dynamics, including significant sediment transport by strong dynamic currents and storm surges and important sites of deposition off major river sources; and (4) contaminant dispersal pathways of artificially and naturally introduced materials.

Assessment of the mineral-resource potential of near-surface sedimentary materials will be completed.

Project status: Analyses of trace- and heavy-metals content has been completed for all offshore and shoreline sediments in the study area. All data has been entered into RASS computer files and retrieved into STATPAC format. Computer analysis and data compilation have been completed for all Kuskokwim River and Bay samples and will be undertaken for all other northern Bering Sea samples this year. Offshore cruises for environmental assessment will begin in the summer of 1976 and will continue offshore until 1978. Work in the summer of 1976 is planned for the offshore area surrounding the Yukon Delta and the Norton Sound region.

Shipboard research in 1977 will extend to Chirikov Basin and to inshore regions surrounding the Yukon delta. Ancillary studies on coastal regions began in the summer of 1975 and will continue until 1978.

Project: Environmental geologic studies of the southern Bering Sea.

Region and map key: Statewide (west-central, southwestern Alaska); fig. 8 (8).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chief: T. L. Vallier, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2971.

Project objectives: The project is designed to outline and document problems related to sea-floor instability along the outer continental shelf and upper continental slope of the southern Bering Sea. From the data, environmental hazards related to petroleum recovery and transportation can be evaluated.

Project status: A cruise of 4 to 6 weeks is planned for the summer of 1976 and data analysis will continue throughout 1976 and 1977. The completion of a number of reports is planned for 1978.

Project: Geologic framework and resource assessment of the Aleutian-Bering Sea region.

Region and map key: Statewide (west-central, southwestern Alaska); fig. 8 (8).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chief: M. S. Marlow, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2656.

Project objectives: Current plans are for a 6-week geophysical and geologic survey of the southern Bering Sea shelf and adjacent slope and basin. The R/V S. P. LEE will be equipped to collect 24-channel seismic reflection, gravity, magnetic, bathymetric, and intermediate and high-resolution seismic reflection data during the summer of 1976. Dredge samples may be taken.

Project status: Plans for 1975 called for the collection of geophysical data from 5,000 km of traverse, but owing to a breakdown of the rudder on the R/V S. P. LEE, only 740 km of data were recovered. Hence approximately 5,000-7,000 km of data, including 24-channel seismic reflec-

tion information, remains to be collected in 1976. Because of the vast size of the Bering Sea, these lines are entirely reconnaissance in nature. Preliminary assessments of the resource potential of the area are expected to be complete by 1977.

Project: Eastern Brooks Range; Table Mountain, Arctic, Demarcation Point, Mt. Michelson, Christian and Coleen quadrangles.

Region and map key: Statewide (northern, east-central Alaska), fig. 10 (2).

Organizational designation: Topographic Division, Rocky Mountain Mapping Center.

Project chief: A. E. Letey, Chief, Rocky Mountain Mapping Center, Federal Center, Denver, Colo. 80225; (303) 234-2351.

Project objectives: The objective is to provide new 1:63,360-scale topographic maps for an area proposed as a possible gas pipeline route to and through Canada. The project area consists of 57 1:63,360-scale quadrangles.

Project status: Seventeen maps have been published and five quads await publication. Three quadrangles have advance manuscript copy available; 30 quadrangles will be compiled as soon as aerial photography is obtained.

Project: Petroleum geology of Cook Inlet Basin.

Region and map key: Statewide (southwestern, southern Alaska); fig. 8 (10).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Oil and Gas Resources, Branch of Pacific-Arctic Geology.

Project chief: Leslie B. Magoon, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2116.

Project objectives: The major objectives are to provide a geologic framework and the petroleum geology of the Lower Cook Inlet for inclusion in the Environmental Impact Statement required by law for the anticipated Federal Outer Continental Shelf (OCS) lease sale. To accomplish these objectives, the following items are being pursued: (1) in the Cape Douglas area, describe and sample stratigraphic sections of Jurassic, Cretaceous, and Tertiary rocks; (2) prepare new geologic maps (1:63,360) of the Cape Douglas and Seldovia areas; (3) prepare a Cook Inlet geologic map (1:250,000); and (4) collect and interpret 300 miles (480 km) of 3600% CDP marine

seismic data. From this work, the onshore geology will be extended into the subsurface of Lower Cook Inlet.

Project status: Fieldwork was completed in the summer of 1975. In June and July, L. B. Magoon and W. L. Adkison, assisted by R. M. Egbert and S. M. Lankford, measured sections, collected samples and fossils, and mapped geology in the Cape Douglas area. J. A. Wolfe collected Tertiary leaf floras in this area, at other places on the west side of Cook Inlet, and in the Homer area. In July and August J. S. Kelley, assisted by D. M. Peterson, mapped geology and collected samples in the Seldovia area. M. A. Fisher collected marine seismic data in July. Rock samples have been submitted for micropaleontological study, geochemical and hydrocarbon-maturity analyses, thin-section study, and porosity and permeability determinations. Marine megafossils and additional leaf fossils have been distributed to D. L. Jones and J. A. Wolfe, respectively. The seismic data are partly processed, and preliminary interpretation is started. Geologic maps for the Cape Douglas and Seldovia areas are being prepared for open-file release in 1976. The Cook Inlet geologic map is being prepared. Other reports are scheduled for 1976.

Project: Gulf of Alaska Tertiary province.

Region and map key: Statewide (southern, southeastern Alaska); fig. 8 (11).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: George Plafker, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2201.

Project objectives: This is an ongoing project aimed at delineation of the major geologic features of the Tertiary basin, evaluation of its resources, and study of the adjacent pre-Tertiary terranes.

Project status: Fieldwork was essentially completed during the 1975 season. Work in preparation for publication includes: (1) an analysis of Tertiary sandstone reservoir characteristics; (2) a paper on the Paleogene Orca Group; (3) a paper on intrusive igneous and metamorphic rocks of the Saint Elias Mountains; (4) a geologic map of the Ragged Mountains (Cordova A2, B2 quadrangles); and (5) reconnaissance geologic maps of the Yakutat, Mount Saint Elias, Bering

Glacier, Icy Bay, Cordova, and Middleton Island 1:250,000 quadrangles.

Project: Eastern Gulf of Alaska continental shelf.

Region and map key: Statewide (southern, southeastern Alaska); fig. 8 (13).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chief: George Plafker, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2201.

Project objectives: Evaluation of the tectonic framework, petroleum potential, and geologic hazards of the eastern Gulf of Alaska Outer Continental Shelf are the project objectives.

Project status: Geophysical surveys and bottom sampling were approximately two-thirds completed during 1974 and 1975 field seasons. Open-file reports completed or in preparation based primarily on the 1974 cruise of R/V THOMAS G. THOMPSON include: (1) submarine slides and near-surface faults, northern Gulf of Alaska by Carlson and others; (2) preliminary structural map of part of the offshore Gulf of Alaska Tertiary Province by Bruns and Plafker; (3) refraction profiling on the OCS between Kayak Island and Icy Bay, Gulf of Alaska, by Core and others; (4) petroleum resource potential and geologic hazards of the OCS of the Gulf of Alaska Tertiary Province by Plafker and others; (5) preliminary isopach map of Holocene sediments, northern Gulf of Alaska, by Carlson and Molnia; (6) surface-sediment distribution map, northern Gulf of Alaska, by Molnia and Carlson; and (7) base map of the northern Gulf of Alaska by Molnia and Carlson. Tentative plans for 1976 are to collect fill-in multichannel seismic data aboard the R/V S. P. LEE, to carry out a deep dredging program with an as yet unspecified vessel, and to make a near-shore high-resolution seismic and bottom-sampling survey with a chartered small boat.

Project: Erosion and deposition of shelf sediments, eastern Gulf of Alaska.

Region and map key: Statewide (southern, southeastern Alaska); fig. 10 (8).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chiefs: Bruce F. Molnia and Paul R. Carlson, U.S. Geological Survey, 345 Middlefield

Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2804, 2853, 2612.

Project objectives: This project was originated to locate areas of high erosion, of high deposition, and of sediment by-passing on the continental shelf. The methods used in locating the areas of sediment activity are: high-resolution seismic profiling, sediment sampling, analysis of aerial photography and satellite imagery, and analysis of water-column suspended material.

Project status: This project has been active since September 1974. Three geophysical research cruises and one sediment-sampling cruise have been staged to the area. More than 18,000 km of geophysical profiles and 400 sediment samples have been collected. These profiles and samples and photographic images of the area are in various stages of analysis. To date, the analyses have produced a sediment-distribution map and an isopach map of Holocene sediment, released to open files. Future products will include: maps of sediment size variation; maps of primary sediment sources and sinks; maps delineating areas of principal sedimentary structures and surface bedforms; maps of areas of erosion, deposition, and bypassing; and a series of interpretive reports.

Project: Faulting and instability of shelf sediments, eastern Gulf of Alaska.

Region and map key: Statewide (southern, southeastern Alaska); fig. 10 (8).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chiefs: Paul R. Carlson and Bruce F. Molnia, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2612 and 2804, respectively.

Project objectives: The continental shelf of the eastern Gulf of Alaska is tectonically active; therefore, the sea floor must be thoroughly examined prior to any activities related to petroleum exploration. The critical hazards being investigated are (1) location, magnitude, and age of offshore, near-surface faults, and (2) presence of and potential for ground failures, such as submarine slumps or slides.

Project status: Geophysical cruises on the R/V THOMPSON (Sept.-Oct., 1974) and the NOAA SURVEYOR (April-May, 1975) have provided about 12,000 km of high-resolution seismic reflection lines from the continental shelf of the

eastern Gulf of Alaska. About 50 percent of these profiles have been analyzed and preliminary maps have been released as open-file reports dealing with (1) submarine slides and near-surface faults, (2) thickness of Holocene sediments, (3) distribution of sea-floor sedimentary units, and (4) submarine morphology. Surficial sediments have been sampled on a reconnaissance grid and are currently being analyzed for physical properties. Additional seismic and sediment data will be gathered in 1976 to provide more information about the age, sense of motion, and continuity of near-surface faults. Submarine slides and areas of potential slides will be scrutinized with TV and bottom cameras and will be selectively sampled with piston and box corers.

Project: Engineering geology reconnaissance studies of selected coastal communities.

Region and map keys: Statewide (southeastern, west-central, northern Alaska); fig. 7 (1), (6), (7), (29), (34), (35), (36).

Organizational designation: Geologic Division, Office of Environmental Geology, Branch of Engineering Geology.

Project chief: R. W. Lemke, (W.A.E.) U.S. Geological Survey, Denver Federal Center, Lakewood, Colo. 80225; (303) 234-3546 or 234-3818.

Project objectives: The main objective of the project was to perform engineering geology studies and evaluate, by reconnaissance methods, the earthquake damage potential and other geologic hazards of significant coastal communities not already adequately investigated or included as separate projects.

Project status: Fieldwork has been completed in the following eight community areas: Haines, Skagway, Wrangell, Ketchikan, Petersburg, Nome, Kotzebue, and Barrow. Open-file reports on the first four of these community areas and a regional open-file report pertaining to southeastern Alaska have been released. Preparation of short reports on the other communities is planned.

Project: Reconnaissance engineering geology of Sitka area and certain other coastal communities, Alaska.

Region and map keys: Statewide (southeastern, southwestern, west-central Alaska); fig. 7 (9), (16), (20), (21), (28), (31), (33), (37).

Organizational designation: Geologic Division,

Office of Environmental Geology, Branch of Engineering Geology.

Project chief: L. A. Yehle, U.S. Geological Survey, Denver Federal Center, Denver, Colo. 80225; (303) 234-2999 or 234-3818.

Project objectives: Objectives are to evaluate by reconnaissance field methods the general and engineering geology of certain Alaskan communities for geologic hazards, including earthquakes, and present the results on maps and in reports.

Present status: Reconnaissance fieldwork has been completed for the communities of Sitka, Metlakatla, Hoonah, Yakutat, Naknek, Dillingham, Bethel, and Unalakleet. Open-file reports on Sitka and Yakutat have been completed and released to the public. Reports on other communities will be prepared.

REGIONAL PROJECTS

A large part of the Geological Survey's Alaskan program consists of regional projects of less than statewide scope. Many projects are intensive investigations that require several years to complete. As with most technical studies, final formulation and publication of results are accomplished at the end of the investigation. For some projects, interim results and findings are compiled and presented in "Summary of important results," part of a companion circular (733). Interim accounts of the continuing hydrologic investigations are prepared and separately published by the Water Resources Division. Inquiries on the status of the various projects should be directed to the project chiefs at the addresses listed in the project summaries.

NORTHERN ALASKA

Project: Philip Smith Mountains quadrangle (AMRAP).

Region and map key: Northern Alaska; fig. 9 (3).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: Hillard N. Reiser and William P. Brosgé, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2387 and 2316, respectively.

Project objectives: Reconnaissance geologic, geochemical, geophysical, and telegeologic mapping is to provide the data for a rapid assessment of the mineral resources of the quadrangle. Planned fieldwork includes: (1) geologic

mapping at 1:250,000 scale, coupled with detailed studies of the Lisburne and Sadlerochit Groups and reconnaissance study of the Endicott Group and older rocks; (2) a geochemical sample survey for metals and examination of mineral claims; (3) completion of the regional gravity survey and one profile across the eastern part of the quadrangle; (4) an aeromagnetic survey; (5) sampling of shale units to assess their hydrocarbon potential.

Project status: The project was planned for two field seasons. In June and July 1975, Reiser, Brosgé, Robert L. Detterman, and J. Thomas Dutro, Jr., completed about two-thirds of the geologic mapping and subdivided parts of the Endicott Group into local members. Field studies of the Sadlerochit by Detterman were essentially completed. Shale of Devonian through Cretaceous age was sampled in the various structural zones. The two to three months' fieldwork still to be done includes: geochemical sampling; investigation of prospects; gravity and aeromagnetic surveys; the Lisburne Group study; completion of geologic mapping and further study of the Endicott Group. A preliminary geologic map and Sadlerochit fence diagram will be submitted in 1976. Final project reports are due in 1977.

Project: Ipewik-Kukpuk.

Region and map key: Northern Alaska; fig. 9 (4).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: I. L. Tailleux, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2254.

Project objectives: Originally focused on the structural knot at the west end of the Brooks Range fold belt, the project now encompasses the geology and mineral resources of the western half of the fold belt and of the North Slope petroleum province. Work has been merged in informal cooperation with that of the southwestern Brooks Range project of the Alaska Division of Geological and Geophysical Surveys and the North Slope Petroleum Program of the Branch of Oil and Gas Resources.

Project status: Much of the fold belt has been studied; a critical and logistically costly region in the west remains inadequately mapped and assessment of its resource incomplete. Progress in 1975 consisted largely of an evaluation of the

TABLE 2.—*Regional projects, northern Alaska*

Name of project; map key	Personnel	Type of work	Area(s)
Philip Smith Mountains quadrangle (AMRAP); fig. 9 (3)	H. N. Reiser, W. P. Brosgé, R. L. Detterman, J. T. Dutro, Jr.	Geologic mapping; mineral-resource assessment	Philip Smith Mountains quadrangle
Ipewik-Kikpuk; fig. 9 (4)	I. L. Tailleux, C. F. Mayfield, R. B. Forbes, G. H. Pessel	Geologic mapping; petroleum and coal-resource studies	Mainly Ambler River, Baird Mountains, Survey Pass quadrangles
Beaufort-Chukchi continental shelf; fig. 8 (1)	Arthur Grantz, Gary Boucher, S. L. Eittreim, O. T. Whitney	Subsea surveys to assess mineral-fuel and mineral-resource potential	Beaufort and Chukchi Seas
Environmental geologic studies of the Beaufort and Chukchi Seas; fig. 8 (1)	P. W. Barnes, Erk Reimnitz, D. E. Drake, L. J. Toimil	Arctic shelf sedimentary processes	Beaufort and Chukchi Seas continental shelves
Arctic Coastal Plain (Arctic environmental studies); fig. 9 (1)	O. J. Ferrians, Jr.	Reconnaissance engineering geologic studies; geologic mapping	Northeastern Alaska
Gubik Formation (western Alaska Cenozoic); fig. 7 (2)	L. D. Carter, D. M. Hopkins	Stratigraphic analysis, including paleomagnetic and paleontologic studies	Umiat to Prudhoe Bay
North Slope petroleum program; fig. 8 (2)	R. D. Carter and other Geologic Division personnel	Appraisal of petroleum potential by means of surface and subsurface geology, geophysics, and geochemistry	North Slope
Geophysical investigations (North Slope petroleum program)	B. A. Kososki	Acquisition of data through fieldwork and purchase, interpretation thereof	Eastern part of North Slope
Reservoir study of Lisburne group; structural and stratigraphic studies (North Slope petroleum program)	K. J. Bird	Petrographic studies of cores and samples; detailed well-log correlations; structural/stratigraphic profiles integrating geologic and geophysical data	Eastern part of North Slope
Outcrop investigations (North Slope petroleum program)	C. G. Mull, I. L. Tailleux, C. F. Mayfield, G. H. Pessel, G. W. Newman, P. J. Swetland, J. E. Fox, R. E. Hunter	Outcrop observations to determine structure, facies relationships, reservoir potential; sampling for geochemical and paleomagnetic analyses	Northern Alaska
Northern Alaska petroleum; fig. 10 (1)	H. N. Reiser, R. L. Detterman, and other Geologic Division personnel	Geologic mapping; detailed stratigraphic studies	Demarcation Point, Mount Michelson quadrangles

TABLE 2.—*Regional projects, northern Alaska—Continued*

Name of project; map key	Personnel	Type of work	Area(s)
Barrow Observatory; fig. 7 (1)	J. B. Townshend	Geomagnetic observatory	Barrow
Beechey Point revision; fig. 7 (3)	A. E. Letey and Topographic Division	Topographic mapping	Beechey Point quadrangle
Anaktuvuk Pass phosphate and oil shale resources; fig. 7 (5)	G. Shearer, T. MacKinnon	Resource evaluation for land classification	Anaktuvuk Pass
Kokolik-Utukok River coal investigations; fig. 9 (2)	J. E. Callahan	Geologic mapping, coal sampling	Point Lay, Utukok River quadrangles

hydrocarbon potential of the Arctic and a revision of northern Alaska coal-resource estimates. Data from the eastern oil-exploration region were assembled into a folio of isopach and structure maps. Systematic field-checking of critical areas and of enigmatic observations made possible the compilation and completion of geologic maps of the foothills and adjoining mountain belts in several quadrangles and of regional stratigraphic, tectonic, and resource syntheses and interpretations.

Project: Beaufort-Chukchi continental shelf.

Region and map key: Northern Alaska; fig. 8 (1).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chief: Arthur Grantz, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2259.

Project objectives: Major objectives are to determine the geologic structure and stratigraphy and to assess the mineral-fuel and mineral-resource potential of the Alaskan continental shelf and slope in the Beaufort and Chukchi Seas of the Arctic Ocean.

Project status: The reconnaissance phase of fieldwork on this project was completed during the 1974 field season. Reports on the reconnaissance geologic framework and petroleum potential of the continental shelf in the Chukchi and Beaufort Seas, and related topical studies, are in preparation. The basic data acquired each field season have, in most cases, been released during the following winter or spring. The 1976 field

season will initiate an intermediate-scale geophysical program, sea-floor outcrop sampling, and topical studies on the Beaufort-Chukchi continental shelf and slope. Preliminary plans call for the concurrent acquisition of multichannel seismic reflection, gravity, magnetic gradient, and long-range sonobuoy refraction data from the U.S. Geological Survey R/V S. P. LEE. This vessel will obtain measurements and participate in a deep seismic refraction study utilizing ocean-bottom seismometers (OBS).

Preliminary plans envision the availability of a U.S. Coast Guard icebreaker to serve as a shooting ship for the OBS-based deep seismic refraction studies. This ship would also serve as a platform for dredging, piston and dart coring, heat-flow measurements, and precision bathymetry on the continental slope, and for gravity measurements over the continental slope and rise.

Project: Environmental geologic studies of the Beaufort and Chukchi Seas.

Region and map key: Northern Alaska; fig. 8 (1).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chiefs: Peter W. Barnes and Erk Reimnitz, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2114 and 2695, respectively.

Project objectives: Objectives are: (1) a study of the present Arctic sediment transport regime. Data on river effluents, ice rafting, turbidity, space-

craft imagery, ice gouging, and nearshore and bottom currents are used to provide information on the modern system for comparison with past and future differences in the Arctic environment; (2) definition of the character, source, physical and chemical composition of bottom materials, including permafrost; (3) historical studies of the geologic record by coring and outcrop examination to provide information concerning the stability or instability of the present-day regime; and (4) study of the sea-ice regime as it affects the geologic processes of Arctic shelves.

Project status: The project is planned as an ongoing study for which fieldwork has been underway since 1970. Aspects studied in reconnaissance to this time are: river overflow, strudel scour, ice gouging, sediment facies, trace metals, coastal currents, Holocene sediments, sediment temperatures, sediment structures, suspended sediment, and coastline changes. It has been shown that ice plays a significant role in the sedimentary processes of arctic shelves. Critical questions remain as to the rate of ice gouging, the fate of river-supplied sediments, nature of offshore permafrost, stability of barrier islands, and seasonal variation of river, ice and hydrologic processes as they interact with the sediments. Initial reports and maps have been completed, several more are in progress and contemplated, detailing studies of the sea ice shear zone, river icings, and river overflow. For the open-water periods of 1976, additional field work is planned from the U.S. Geological Survey's coastal research vessel KARLUK to include seismic reflection profiling, vibrocoring, diving observations, hydrography, thermoprobes, bathymetry, and suspended-sediment studies.

Project: Arctic Coastal Plain (Arctic Environmental Studies).

Region and map key: Northern Alaska; fig. 9 (1).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Oscar J. Ferrians, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2247.

Project objectives: The major objective is to complete reconnaissance engineering-geologic investigations that will provide base-line

geotechnical data needed to aid in planning, designing, operating, and maintaining engineering structures (such as the proposed Arctic Gas Pipeline) in this region. Planned field work includes engineering-geologic mapping at a scale of 1:125,000. Studies of permafrost conditions and geomorphic features and permafrost-related processes, and of other geologic processes important to arctic engineering will be emphasized. Potential geotechnical problems that require special consideration include: slope stability, drainage conditions, frost action, thawing of permafrost, availability of natural construction materials, swelling of soils, earthquake effects, erosion, flooding, and icings.

Project status: Enough data have been collected during 5 weeks' helicopter-supported fieldwork to prepare preliminary engineering-geologic maps of the entire region. After these maps have been prepared, 3 to 4 weeks' fieldwork will be required to prepare the final maps. Preliminary engineering-geologic maps will be completed for open files or the Miscellaneous Field Studies Map series in 1976.

Project: Gubik Formation study (Western Alaska Cenozoic).

Region and map key: Northern Alaska; fig. 7 (2).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: L. D. Carter and D. M. Hopkins, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2406 and 2659, respectively.

Project objective: The project objective is to determine the history of sea-level fluctuations and erosion and deposition recorded by landforms and unconsolidated deposits of the western Arctic Slope of Alaska. Emphasis is on detailed stratigraphic analysis of selected areas, primarily along the Colville River and its tributaries, and along the Arctic coast. Sampling for foraminifers, ostracodes and mollusks is expected to expand the known fauna, and may allow zonation of the marine deposits. In conjunction with the faunal data, paleomagnetic analysis of thin-bedded silt and fine sand may permit correlation of the deposits with established transgressions in western Alaska. Examination of pollen and fossil wood will permit inferences to

be drawn regarding paleoclimate. The project is being operated in cooperation with the Arctic near-shore project of Erk Reimnitz and Peter Barnes to provide knowledge of the onshore stratigraphy that will assist in interpreting their seismic records and information to be obtained during off-shore drilling. Information obtained during this study regarding the nature and distribution of surficial deposits will be needed for future development of the western Arctic Slope and coastal zone of Alaska.

Project status: During the summer of 1975, stratigraphic sections were measured and sampled south of Umiat along the Colville River, on several tributaries of the Colville and along the Beaufort Sea Coast from the Colville River to Prudhoe Bay. Sample analysis is in progress. Additional work is planned westward along the coastal plain for the following several seasons in order to attack stratigraphic problems delineated during the past summer and to trace the continuity of a coastal terrace and associated deposits that occur near the head of the Colville Delta.

Project: North Slope Petroleum Program.

Region and map key: Northern Alaska; fig. 8 (2).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Oil and Gas Resources.

Program manager: Robert D. Carter, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2116.

Project objectives: Objectives are to determine, map, and describe on the surface and in the subsurface by geologic and geophysical methods: (1) Brooks Range and North Slope structural framework and regional structural trends; (2) depositional environments and lateral relations of Paleozoic, Mesozoic, and Cenozoic facies; (3) possible hydrocarbon reservoirs and their regional trends; (4) paleontologic, lithologic, and electric log correlations across the North Slope; (5) the thermal history, hydrocarbon source potential, and relation of extracted hydrocarbons to known North Slope oils; and (6) geologic history of the basin related to potential reservoirs, source and seal rocks, hydrocarbon formation and migration, and present structural trends.

Project status: Present undertakings include a reservoir study of the Lisburne Group, K. J.

Bird; construction of stratigraphic and structural correlation charts of the eastern North Slope utilizing paleontology, geophysical data, and logs, K. J. Bird, R. D. Carter, B. A. Kososki; geochemical analyses of Prudhoe Bay section outcrop samples, P. J. Swetland; interpretation of field investigations of Brooks Range structural styles and Lower Cretaceous and Mississippian facies, C. G. Mull, I. L. Tailleux; paleomagnetic analyses of shallow cores, G. W. Newman; examination of well cuttings and cores and establishment of subsurface reference sections, W. L. Adkison; preparation of reports on gravity data collected in the Arctic Wildlife Range and south of Prudhoe Bay, B. A. Kososki; and preparation of a folio of structure and thickness maps of the Prudhoe Bay area, I. L. Tailleux, G. H. Pessel. A bibliography, "Geological literature on the North Slope of Alaska, 1969-1974," was published in 1975.

Project: Geophysical investigations (North Slope Petroleum Program).

Region: Northern Alaska.

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Oil and Gas Resources.

Project chief: Bruce A. Kososki, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2117.

Project objectives: The primary objective is to gain knowledge of the general subsurface stratigraphic and structural framework of the North Slope sedimentary basins through utilization of geophysical data.

Project status: The project is one of long range, with no definite termination date. In August 1975, Kososki completed a 100-mile regional north-south gravity survey in the vicinity of the Susie well. Two-dimensional geologic modeling of this data is planned. Kososki, I. L. Tailleux, and C. F. Mayfield completed a regional gravity survey within the northern one-third of the Arctic National Wildlife Range. These data will be open-filed in the form of contour maps on a scale of 1:250,000. A subsequent Miscellaneous Field Studies Map of the gravity field of northeastern Alaska will be completed in 1976. Planned additional North Slope geophysical investigations include the digital processing of old Navy seismic records from Naval Petroleum Reserve No. 4. The resulting seismic sections will be open-



FIGURE 11.—R/V KARLUK, Geological Survey vessel used for investigations in the Beaufort Sea.

filed as they are generated.

Project: Reservoir study of Lisburne Group and structural and stratigraphic studies in the eastern foothills of the Brooks Range (North Slope Petroleum Program).

Region: Northern Alaska.

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Oil and Gas Resources.

Project chief: Kenneth J. Bird, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2227.

Project objectives: The goal is to indirectly map reservoir trends by first determining the relation of reservoir characteristics to lithofacies, then constructing a series of lithofacies maps. Analysis of all available Lisburne well logs and selective study of well samples and thin sections is designed to determine reservoir characteristics and lithofacies. Study of recently available well data in the foothills of the eastern Brooks Range is designed to provide (1) a better understanding of Cretaceous and Tertiary depositional setting and stratigraphic relations, and

(2) further documentation of the tectonic styles of the Brooks Range front.

Project status: The Lisburne study, begun in January 1975, is about one-third complete. Preliminary results show that dolomite, deposited in an intertidal to supratidal environment, is the most important reservoir rock in terms of areal extent, thickness, and predictability. The dolomite, which thins northward, is present throughout the Prudhoe area and can be predicted with confidence to extend into the offshore and into Naval Petroleum Reserve No. 4. Its extent in these two areas may be limited by erosional truncation at the top of, and possibly within, the Lisburne Group. Additional study of well data is planned in order to complete a correlation network and definition of lithofacies prior to construction of maps. Structural and stratigraphic studies in the eastern foothills, now in the data gathering stage, will consist of an east-trending regional correlation line and a north-trending structure cross section. They will combine data from wells, outcrops, and seismic lines and may include some new gravity, magnetic, and paleontologic data.

Project: Outcrop investigations project (North Slope Petroleum Program).

Region: Northern Alaska.

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Oil and Gas Resources.

Project chiefs: C. G. Mull, I. L. Tailleir, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2058, 2254, respectively.

Project objectives: Project studies are focused toward assessment of the hydrocarbon potential of Naval Petroleum Reserve No. 4 (NPR-4) and the western Arctic Slope through: (1) a transect of the Brooks Range to show its structural style and relations to the rocks of the Arctic Foothills and Coastal Plain; (2) studies of the reservoir potential of Lower Cretaceous and Mississippian rocks of the central and western Arctic Slope; (3) sampling for organic geochemistry in a study of the hydrocarbon source potential of various shales on the Arctic Slope; (4) collection of shallow cores for a paleomagnetic study of Brooks Range rocks; and (5) testing of concepts of Brooks Range and Arctic Slope geology.

Project status: 1975 reconnaissance mapping will be used for revision of Tailleir's 1960 maps of the Nuka-Etiviluk area. A strip map and cross section for the Brooks Range structural transect will be completed in 1976. Samples for the organic geochemical and paleomagnetic studies were obtained from the western, central, and northeastern Brooks Range, and analyses have begun. Studies of the Lower Cretaceous reservoir potential in NPR-4 and the western Arctic Slope were begun.

Project: Northern Alaska petroleum.

Region and map key: Northern Alaska; fig. 10 (1).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: H. N. Reiser, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2387.

Project objectives: Objectives are: (1) completion of reconnaissance geologic mapping of the Mount Michelson and Demarcation Point quadrangles; (2) detailed biostratigraphic and lithofacies studies of rocks of the Carboniferous Lisburne Group and the Permian-Triassic Sadlerochit Group; (3) study of the Mesozoic and Cenozoic

stratigraphic sequence for the purpose of correlating these rocks with rocks of similar age west of the area of study; and (4) study of the profound sub-Mississippian unconformity and the stratigraphic succession below it.

Project status: Field studies related to the northeast Brooks Range are complete. An open-file preliminary geologic map of the Mount Michelson quadrangle and Miscellaneous Field Studies Map of the Demarcation Point quadrangle have been released. Publications by W. P. Brosgé, J. T. Dutro, Jr., R. L. Detterman, A. K. Armstrong, and H. N. Reiser during 1969 through 1975 document the accomplishment of most of the project objectives. A treatise on the pre-Mississippian rocks of the area is anticipated but not yet initiated.

Project: Barrow Observatory.

Region and map key: Northern Alaska; fig. 7 (1).

Organizational designation: Geologic Division, Office of Geochemistry and Geophysics, Branch of Theoretical and Applied Geophysics.

Project chief: John B. Townshend, College Observatory, Yukon Drive on West Ridge, Fairbanks, Alaska 99701; (907) 479-6146.

Project objectives: Continuous monitoring of the variations of the geomagnetic field and making absolute observations at regular intervals.

Project status: The Barrow Observatory has been in operation since 1949 in cooperation with the Naval Arctic Research Laboratory.

Project: Beechey Point revision; part of Beechey Point quadrangle.

Region and map key: Northern Alaska; fig. 7 (3).

Organizational designation: Topographic Division, Rocky Mountain Mapping Center.

Project chief: A. E. Letey, Chief, Rocky Mountain Mapping Center, Federal Center, Denver, Colo. 80225; (303) 234-2351.

Project objectives: The project is to update two 1:63,360 quadrangles (Beechey Point A-3 and B-3) using available photography.

Project status: These two revised quadrangles will be published in 1976.

Project: Anaktuvuk Pass phosphate and oil shale resources.

Region and map key: Northern Alaska; fig. 7 (5).

Organizational designation: Conservation Divi-

sion, Office of the Area Geologist, Anchorage, Alaska.

Project chief: Gerald Shearer, U.S. Geological Survey, 800 A Street, Anchorage, Alaska 99501; (907) 278-3571.

Project objectives: The objective was resource evaluation, including geologic mapping and sampling, to determine the extent and quality of phosphate and oil shale at selected locations along the front of the Brooks Range from Monotis Creek to Shainin Lake, Alaska. The data were urgently needed for classification of these lands under the Alaska Native Claims Settlement Act.

Project status: Fieldwork was completed by Gerald Shearer and Tom MacKinnon during the last 2 weeks of June 1975, with camp and helicopter support shared with Irvin L. Tailleux, C. Gil Mull, and party of the Geologic Division. The analysis of samples has not been completed. A full report should be out by March 1976.

Project: Kokolik-Utukok River coal investigations.

Region and map key: Northern Alaska; fig. 9 (2).

Organizational designation: Conservation Division, Office of the Area Geologist, Alaska Area.

Project Chief: J. E. Callahan, P.O. Box 259, Anchorage, Alaska 99510; (907) 277-0570.

Project objectives: Geologic mapping and surface sampling of the Cretaceous coals in western

Naval Petroleum Reserve No. 4 was initiated in 1975 to prepare for the eventuality that leasing act minerals in Naval Petroleum Reserve No. 4 will be leased and managed by the Interior Department.

Project status: The current project area is between Utukok and Kokolik Rivers in the northern foothills in the Oxbow and Lookout Ridge Synclinal Basins. During 1975, participation by the U.S. Bureau of Mines was limited to equipment use. More active participation by the Bureau of Mines is anticipated for 1976.

EAST-CENTRAL ALASKA

Project: Chandalar quadrangle (AMRAP).

Region and map key: East-central Alaska; fig. 9 (5).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology and Branch of Exploration Research.

Project chiefs: Sherman P. Marsh (party chief) U.S. Geological Survey, Building 25, Federal Center, Denver, Colo. 80225; (303) 234-3131, ext. 3852, William P. Brosgé and Hillard N. Reiser (team leaders), U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2316, 2387, respectively.

Project objectives: Geochemical, geophysical, telegeologic and mineral-deposit mapping will be combined with the available geologic reconnaissance map to provide the data for a rapid assessment of the mineral resources of the quad-

TABLE 3.—Regional projects, east-central Alaska

Name of project; map key	Personnel	Type of work	Area(s)
Chandalar quadrangle (AMRAP); fig. 9 (5)	S. P. Marsh, W. P. Brosgé, H. N. Reiser, E. E. Detra, T. A. Doerge, A. J. Medrano, S. C. Smith	Geochemical sampling; geophysical survey; mineral-resource assessment	Chandalar quadrangle
Big Delta quadrangle (AMRAP); fig. 9 (7)	H. L. Foster, F. R. Weber, T. E. C. Keith, T. D. Hessin	Geologic mapping; mineral-resource assessment	Big Delta quadrangle
Tanacross quadrangle (PAMRAP); fig. 9 (8)	H. L. Foster and other Geologic Division personnel	Geochemical sampling; mineral-resource assessment	Tanacross quadrangle
College Observatory; fig. 7 (8)	J. B. Townshend	Geomagnetic and seismic observatory	Fairbanks

range. Planned fieldwork includes (1) a geochemical sample survey, (2) study of selected mining claims, (3) one or two gravity profiles to augment the existing regional survey, and (4) field checks of certain anomalies shown by the already completed aeromagnetic survey.

Project status: In July and August 1975, Sherman P. Marsh and four assistants completed the geochemical sampling, and Milton A. Wiltse, M. W. Henning, and J. W. Buza, Alaska Division of Geological Survey, mapped and sampled copper mineral deposits. The geophysical fieldwork remains to be done. The geochemical data and the mineral deposit maps will be open-filed in 1976. Final project reports are due in 1977.

Project: Big Delta quadrangle (AMRAP).

Region and map key: East-central Alaska; fig. 9 (7).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Helen L. Foster, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2331.

Project objectives: Major objectives are to: complete reconnaissance geologic mapping of the Big Delta quadrangle at a scale of 1:250,000; carry out a reconnaissance geochemical sampling program; and evaluate the mineral-resource potential of the area using geologic, geochemical, geophysical, and telegeologic data.

Project status: Geologic reconnaissance mapping of the A-1 and B-1 quadrangles done in 1974 has been compiled for publication as a Miscellaneous Field Studies Map. Quadrangles A-2 and A-3, also mapped in 1974, are being compiled for open filing. During the summer of 1975, Helen L. Foster, Florence R. Weber, and Terry E. C. Keith carried on reconnaissance geologic mapping in the C-1, D-1, B-2, D-2, B-3, C-3, and D-3 quadrangles. Reconnaissance geochemical sampling was done in the eastern half of the Big Delta quadrangle by Thomas D. Hessin and three assistants. Multiple samples were collected from about 400 localities. James G. Smith and Frederic H. Wilson collected a number of samples for dating by the K-Ar method; these samples are now being prepared for analysis. A minimum of one additional full helicopter-supported field season is needed to complete the

geologic mapping and reconnaissance geochemical sampling.

Project: Tanacross quadrangle (PAMRAP).

Region and map key: East-central Alaska; fig. 9 (8).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Helen L. Foster, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2331.

Project objectives: Primary objectives are geochemical sampling and mineral-resource evaluation of the Tanacross quadrangle using geologic, geochemical, geophysical, and telegeologic data. As the quadrangle is an example of a poorly exposed complex geologic area, analyses of several types of geochemical samples are being compared and evaluated.

Project status: Reconnaissance-type geochemical sampling was done in the summer of 1974 by Gary C. Curtin, Sherman T. Marsh, Richard B. Tripp, and Richard B. Carten, and samples are now being analyzed and data compiled. Analyses of samples, including pan concentrates, will be completed in 1976, and other geochemical data analyzed and prepared for publication as a folio of maps similar to that of the Nabesna quadrangle. Geologic, geochemical, and geophysical data are being analyzed for preparation of a mineral-resources map.

Project: College Observatory.

Region and map key: East-central Alaska; fig. 7 (8).

Organizational designation: Geologic Division, Office of Geochemistry and Geophysics, Branch of Theoretical and Applied Geophysics.

Project chief: John B. Townshend, College Observatory, Yukon Drive on West Ridge, Fairbanks, Alaska 99701; (907) 479-6146.

Project objectives: The general mission of the observatory is to produce accurate and comprehensive data in the field of geomagnetism and seismology and to cooperate with other scientists and organizations in making studies in various scientific disciplines within the capability of personnel and facilities. The observatory monitors seismic and magnetic activity 24 hours a day. The facility plays a major part in keeping the people of Interior Alaska informed of current



FIGURE 12.—Headquarters office of a geomagnetic and seismological observatory maintained by the Geological Survey on the campus of the University of Alaska at Fairbanks.

earthquake activity and informing scientists and organizations of the occurrence of major world magnetic events. The observatory is responsible for operation of the Barrow Observatory at Point Barrow in cooperation with the University of Alaska's Naval Arctic Research Laboratory.

WEST-CENTRAL ALASKA

Project: Western Alaska uranium.

Region and map key: West-central Alaska; fig. 8 (4).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan

Geology; and Office of Energy Resources, Branch of Uranium and Thorium Resources.

Project chief: Thomas P. Miller, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 272-8228.

Project objectives: The goal of the project is to provide a more thorough evaluation of the uranium and thorium potential of the region through detailed geologic, geochemical, and radioactivity studies of selected areas within the uranium-thorium province of western Alaska. Fieldwork includes mapping at 1:63-360 scale together with detailed petrologic studies of various plutonic host rocks that contain uranium and

TABLE 4.—*Regional projects, west-central Alaska*

Name of project: map key	Personnel	Type of work	Area(s)
Western Alaska uranium; fig. 8 (4)	T. P. Miller	Geologic mapping; detailed petrologic studies	Seward Peninsula; parts of Selawik, Shungnak, Hughes, Kateel River, Melozitna quadrangles
Nixon Fork stratigraphic studies (Shungnak-Hughes); fig. 8 (6)	W. W. Patton, Jr., J. T. Dutro, Jr., R. M. Chapman	Stratigraphic studies; reconnaissance geologic mapping	Medfra quadrangle
Arctic mineral resources (Ruby quadrangle); fig. 8 (5)	R. M. Chapman, W. W. Patton, Jr.	Reconnaissance geologic mapping; geochemical sampling	Ruby quadrangle
Nome investigations; fig. 9 (6)	C. L. Hummel	Geologic mapping; geochemical and geophysical studies; mineral-resource assessment	Nome area

thorium in higher than normal amounts. These studies will use as a foundation earlier reconnaissance studies by the Geological Survey and the Energy Research and Development Administration in the region.

Project status: Fieldwork will begin the summer of 1976. Two reports on the uranium and thorium content of plutonic rocks of the region were open filed in May 1975. Interim reports will be released as field and laboratory studies progress.

Project: Nixon Fork stratigraphic studies (Hughes-Shungnak).

Region and map key: West-central Alaska; fig. 8 (6).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: William W. Patton, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2248.

Project objectives: The primary objective is a detailed stratigraphic study of the Precambrian to Cenozoic sedimentary, metamorphic, and volcanic rocks of the northern Kuskokwim Mountains. These studies are needed to provide a basic geologic framework for future mapping and mineral assessment of the Ruby geanticline. The Nixon Fork region was selected for these

initial investigations because it is one of the few areas within the densely vegetated terrain of the Ruby geanticline with good bedrock exposures. In addition to the stratigraphic studies, fieldwork will include reconnaissance mapping of the Medfra quadrangle and structural investigations of the Nixon Fork-Iditarod fault zone.

Project status: The project was planned for two field seasons. In late July and early August, 1975, Patton, J. T. Dutro, Jr., and R. M. Chapman completed 3 weeks' stratigraphic study of the Paleozoic and Mesozoic rocks in the Nixon Fork area and a brief reconnaissance of the northern part of the Medfra quadrangle. About 1 month of fieldwork remains to be done, including a detailed study of the Paleozoic carbonate rocks in the northeastern part of the Medfra quadrangle and completion of the reconnaissance mapping of the northeastern and southeastern parts of the Medfra quadrangle.

Project: Arctic mineral resources (Ruby quadrangle).

Region and map key: West-central Alaska; fig. 8 (5).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Robert M. Chapman, U.S. Geologi-

cal Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2670.

Project objectives: The Ruby quadrangle encompasses the central and previously unmapped part of the Ruby geanticline, basic geologic knowledge of which is critical to regional geologic interpretations; assessment of the mineral-resource potential of interior Alaska; and land-use evaluations. The objectives of this project are to complete a reconnaissance coverage of the unmapped areas, to define more fully the major bedrock units and structures, and to collect bedrock samples that will provide geochemical data to aid in evaluation of the mineral-resource potential.

Project status: In August 1975, Robert M. Chapman and William W. Patton, Jr., completed reconnaissance geologic mapping and geochemical sampling in about 70 percent of the Ruby quadrangle. With this mapping, fieldwork for reconnaissance coverage of the northern portion of the Ruby geanticline is nearly complete. The reconnaissance nature of the work precluded detailed examinations; further field studies are warranted in several areas, and geologic mapping should be extended southward into the Ophir and Iditarod quadrangles. Preliminary geologic and geochemical survey maps of the Ruby quadrangle will be prepared in 1976. Preliminary geologic maps of the adjoining Tanana and Kantishna River quadrangles were released to open files in 1975; and reconnaissance geochemical survey maps and a more comprehensive map and text for the Tanana and northeast part of the Kantishna River quadrangles are scheduled for 1976.

Project: Nome Investigations.

Region and map key: West-central Alaska; fig. 9 (6).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: C. L. Hummel, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2606.

Project objectives: The purpose of the project is to evaluate the mineral-resource potential of a part of southwest Seward Peninsula. It comprises geologic, geochemical, and geophysical investigations in a 5000 km² region where the

metamorphic complex that forms the bedrock of most of the peninsula is well exposed. Other objectives include determination of the regional stratigraphy, structure, and controls of mineralization.

Project status: Field data sufficient to depict the geology and mineral deposits at 1:125,000 scale are available for nearly all of the region; two weeks is needed to complete fieldwork. The metamorphic complex has been subdivided into numerous rock units of regional extent. Although the relations of some units are still uncertain, the units are adequate for delineating gross features of the bedrock. Ground magnetic data for several of the units were developed by Johy Cady in 1972, and thereafter correlated with results of the aeromagnetic survey of the region. Selective sampling of the rocks making up the units, and of detritus derived from them, has been completed, but most of the samples have not been analyzed. Analytical results, when available, will be used to determine the geochemical character of the individual units and the general background and threshold levels of metals in the complex. A map and report covering the geology and mineral resources of the region is planned for release in open file during 1976.

SOUTHWESTERN ALASKA

Project: Goodnews and Hagemeister Island quadrangles (AMRAP).

Region and map key: Southwestern Alaska; fig. 9 (15).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: J. M. Hoare, W. L. Coonrad, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2372 and 2608, respectively.

Project objectives: The principal objective is to assess the mineral resources of the quadrangles by using reconnaissance geologic, geochemical, geophysical, and telegeologic mapping. Field work includes: (1) subdivision of the Gemuk Group into smaller mappable units and additional geologic mapping at 1:250,000 scale; (2) geochemical sampling; (3) completion of a regional gravity survey; and (4) sampling of old metamorphic terrane and intrusive bodies for radiometric dating.

TABLE 5.—*Regional projects, southwestern Alaska*

Name of project; map key	Personnel	Type of work	Area(s)
Goodnews and Hagemeister Island quadrangles (AMRAP); fig. 9 (15)	J. M. Hoare, W. L. Coonrad, T. D. Hessin, and other Geologic Division personnel	Geologic mapping; geochemical sampling; mineral-resource assessment	Goodnews, Hagemeister Island quadrangles
Iliamna quadrangle; fig. 10 (5)	R. L. Detterman	Fieldwork completed; final report on geology, mineral, and energy potential being prepared	Iliamna quadrangle
Andreanof and Attu Islands; fig. 10 (9), (10)	J. R. Hein, Hugh McLean, P. T. Fuller	Reconnaissance geologic mapping; sampling for age dating and reservoir characteristics	Aleutian Islands
Pribilof Islands (western Alaska Cenozoic); fig. 7 (22), (23)	D. M. Hopkins, M. L. Silberman	Evaluation of geologic hazards; geologic mapping	Pribilof Islands
Bethel-Goodnews; fig. 10 (4)	A. E. Letey and Topographic Division	Topographic mapping	Bethel, Goodnews, Russian Mission quadrangles
Western Gulf of Alaska continental shelf; fig. 8 (12)	Roland von Huene, M. A. Hampton, A. H. Bouma, G. W. Moore, T. R. Bruns	Evaluation of tectonic framework, petroleum potential, geologic hazards	Western Gulf of Alaska

Project status: The project was planned for two field seasons. In preparation for fieldwork, all previous geologic observations were replotted on modern mile-to-the-inch topographic bases. In July and August 1975 about two-thirds of the geologic mapping was completed. Sampling of the old metamorphic rocks was completed by R. B. Forbes, D. L. Turner, and F. H. Wilson. All known intrusive bodies were sampled for radiometric dating. About one-half of the geochemical sampling was completed by T. D. Hessin and four assistants, who also collected many additional gravity data. About 2 months' fieldwork will be required to complete geologic mapping and geochemical sampling. Final reports, scheduled for 1977, are somewhat dependent upon availability of a modern 1:250,000-scale topographic map of the Goodnews quadrangle.

Project: Iliamna quadrangle.

Region and map key: Southwestern Alaska; fig. 10 (5).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Robert L. Detterman, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2244.

Project objectives: Major objectives are: geologic mapping and mineral-resource assessment of the quadrangle, including geochemical sampling in areas of known or suspected mineralization; investigation of the earthquake-hazards potential of the Bruin Bay and Lake Clark faults; and the potential for a destructive volcanic eruption on Augustine Island.

Project status: The fieldwork has been completed, and most of the data are available in published and open-file reports. The final report on the bedrock geology including the mineral and energy potential of the quadrangle is nearing completion and will be ready for review during 1976.

Project: Andreanof and Attu Islands.

Region and map key: Southwestern Alaska; fig. 10, (9), (10).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology and Branch of Oil and Gas Resources.

Project chiefs: James R. Hein, Hugh McLean, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2775 and 2802, respectively.

Project objectives: Reconnaissance geologic mapping and resource analysis, including consideration of the oil and gas potential of offshore sedimentary basins, are the principle objectives. Planned field activities involve: (1) geologic mapping of sedimentary sequences; (2) sampling units for both paleontologic and radiometric age dating and for petrography and mineralogy; and (3) sampling for source rock and reservoir quality.

Project status: The project is planned for three to four field seasons. During August 1975, Hein, McLean, and Paul T. Fuller surveyed and sampled sedimentary rocks on northern and southwestern Adak Island. The Eocene sedimentary sequence on Adak consists of shallow marine volcanoclastic sandstones, mudstones, and cherts (possibly in part biogenic), interbedded with and intruded by andesitic and more mafic dikes, flows, and sills. Volcanic conglomerates and sandstone sequences in the southwest part of the island were thermally metamorphosed by Miocene(?) granitic plutons. Fieldwork on Atka and Amlia Island is scheduled for August 1976, work on Attu Island for August 1977.

Project: Pribilof Islands (western Alaska Cenozoic).

Region and map key: Southwestern Alaska; fig. 7 (22), (23).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: David M. Hopkins and M. L. Silberman, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2659 and 2675, respectively.

Project objectives: The project is designed to provide basic data on geologic hazards in the Pribilof Islands and on the adjoining continental shelf for use in evaluating the possible impact of

oil exploration and production. In particular, the project is to determine: the distribution, character, magnitude, age, and frequency of faulting and volcanic eruptions; and rates and directions of change in the coast line.

Project status: Fieldwork was done during 2 weeks in June and early July 1975. Effort was focused on collecting suitable lavas for K-Ar dating and attempting to collect screen concentrates suitable for radiocarbon dating from aeolian deposits. Progress on K-Ar dating has been slow because of equipment problems. The radiocarbon samples contain minimal or possibly less than minimal quantities of organic material and are badly contaminated by roots. An open-file report showing distribution and age of faults and volcanic vents will be submitted in 1976. It is hoped that a final geologic map (largely the result of previous fieldwork) with supporting text will be in final draft at that time.

Project: Bethel-Goodnews area.

Region and map key: Southwestern Alaska; fig. 10 (4).

Organizational designation: Topographic Division, Rocky Mountain Mapping Center.

Project chief: A. E. Letey, Chief, Rocky Mountain Mapping Center, Federal Center, Denver, Colo. 80225; (303) 234-2351.

Project objectives: This project, consisting of 24 quadrangles at 1:63,360 scale, will provide topographic mapping of an area previously unmapped at this scale. Completion of mapping will allow the preparation of more accurate 1:250,000-scale maps to replace the present reconnaissance maps of that series.

Project status: Advance manuscript copy will be available for these quadrangles in early 1976 with publication scheduled for about 1978. No field operations are scheduled.

Project: Western Gulf of Alaska continental shelf.

Region and map key: Southwestern Alaska; fig. 8 (12).

Organizational designation: Geologic Division, Office of Energy Resources and Marine Geology, Branch of Pacific-Arctic Geology.

Project chief: Roland von Huene, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111.

Project objectives: The project objectives are evaluation of the tectonic framework, petroleum

potential, and geologic hazards of the western Gulf of Alaska Outer Continental Shelf.

Project status: A regional geophysical survey was run in 1975, when approximately 1,800 km of gravity, magnetic and multichannel seismic data were collected from a Geophysical Service Inc. vessel, the M/V CECIL H. GREEN. Processing of the seismic data will be essentially complete by the end of 1975, and interpretation will begin. Tentative plans for 1976 are to collect additional multichannel seismic data aboard the R/V LEE and to carry out high-resolution and bottom-sampling surveys with a yet unspecified vessel. Project personnel in addition to von Huene are M. A. Hampton, A. H. Bouma, George W. Moore, and T. R. Bruns.

SOUTHERN ALASKA

Project: Talkeetna quadrangle (PAMRAP).

Region and map key: Southern Alaska; fig. 9 (9).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Bruce L. Reed, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 272-8228.

Project objectives: Project objectives are reconnaissance geologic, geochemical, geophysical and telegeologic mapping to provide data for preliminary assessment of mineral resources in the quadrangle. Fieldwork consists of: (1) geologic mapping at 1:250,000 scale and detailed investigations of mineralized areas; (2) geochemical investigations, primarily through the use of sediment, pan-concentrate and altered- or mineralized-rock samples to delineate areas of metal enrichment; (3) an aeromagnetic survey and interpretation to support the geologic mapping and aid in mineral-resource assessment; (4) regional gravity survey; and (5) mapping selected areas of Tertiary sedimentary rocks to assess their coal potential.

Project status: Geologic mapping for this 3-year project began in 1974 in the northwestern part of the quadrangle by Reed, James C. Ratté, and visiting geologists Donald H. Richter, William P. Sharpe, Warren B. Hamilton, and David L. Jones. In 1975 Reed, Steven W. Nelson and visiting geologists Ratté and Robert L. Detterman completed geologic mapping in the southwestern part of the quadrangle; Inyo Ellersieck in-

itiated studies on Tertiary coal bearing rocks; and Gary C. Curtin undertook one month of geochemical studies. Two-thirds of the geologic mapping has been completed. Work remaining to be done in 1976 includes: 2 months' geochemical sampling, completion of geologic mapping in the eastern one-third of the quadrangle, and further study of the complex geology at Shellabarger Pass. The geologic map and final reports are scheduled for completion in 1977.

Project: Talkeetna Mountains quadrangle (AMRAP)

Region and map key: Southern Alaska; fig. 9 (10)

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Béla Csejtey, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2277.

Project objectives: The principal objectives are the evaluation of the mineral resources of the quadrangle through reconnaissance geologic, geochemical, geophysical, and telegeologic mapping. Fieldwork includes: (1) regional geologic mapping at 1:250,000 scale and detailed mapping of mineralized areas; (2) a geochemical survey utilizing stream-sediment, soil, and mineralized-bedrock samples; (3) sampling mineral deposits for age determinations and for trace-element and stable-isotope studies; and (4) completion of a regional gravity survey.

Project status: The project was planned for two field seasons. During July and August 1975, Csejtey, Willis H. Nelson, and visiting scientists Paul C. Batemen, Edward M. MacKevett, Jr., Peter J. Coney, James G. Smith, David L. Jones, Gary C. Curtin, Robert L. Morin, and Miles L. Silberman completed nearly half of the geologic mapping, reconnaissance geochemical investigations and gravity measurements in the western one-third of the quadrangle, and detailed sampling of the adjacent Willow Creek mining district for age determinations and isotope studies. Fieldwork planned for 1976 includes geologic mapping, geochemical sampling, gravity measurements, and detailed isotopic and age investigations of mineralized areas in the central part of the quadrangle. Preliminary maps and reports are scheduled for completion in 1976.

TABLE 6.—*Regional projects, southern Alaska*

Name of project; map key	Personnel	Type of work	Area(s)
Talkeetna quadrangle (PAMRAP); fig. 9 (9)	B. L. Reed, J. C. Ratte, S. W. Nelson, Inyo Ellersieck, G. C. Curtin, and other Geologic Division personnel	Geologic mapping; geochemical and geophysical studies; mineral-resource assessment	Talkeetna quadrangle
Talkeetna Mountains quadrangle (AMRAP); fig. 9 (10)	Béla Csejtey, Jr., W. H. Nelson, G. C. Curtin, M. L. Silberman, and other Geologic Division personnel	Geologic mapping; geochemical sampling	Talkeetna Mountains quadrangle and adjacent areas (mainly in Anchorage quadrangle)
Seward-Blying Sound quadrangles (AMRAP); fig. 9 (13)	R. G. Tysdal, J. E. Case, G. R. Winkler, E. M. MacKevett, Jr., R. B. Tripp	Geologic mapping; geochemical and geophysical studies; mineral-resource assessment	Seward, Blying Sound quadrangles
McCarthy quadrangle (PAMRAP); fig. 9 (12)	E. M. MacKevett, Jr., A. K. Armstrong, M. L. Silberman	Fieldwork completed; map folio being prepared	McCarthy quadrangle
Nelchina area; fig. 7 (11)	Arthur Grantz	Fieldwork completed; final report recessed	Southeastern Talkeetna Mountains, northeastern Anchorage quadrangles
Eastern Alaska Range; fig. 10 (7)	D. H. Richter	Fieldwork completed; final reports and maps being completed	Nabesna quadrangle and adjacent areas
Anchorage; fig. 10 (6)	A. E. Letey and Topographic Division	Topographic mapping	Parts of Anchorage, Tyonek quadrangles
Greater Anchorage area Borough; fig. 9 (11)	Ernest Dobrovolny, H. R. Schmoll	Geologic mapping coordinated with hydrologic investigations	Anchorage area
Alaskan coastal environments; fig. 7 (17)	A. T. Ovenshine, S. R. Bartsch-Winkler, Reuben Kachadoorian	Sedimentology studies	Turnagain Arm
Alaska seismic studies	J. C. Lahr	Assessment of level of seismicity and potential seismic risk; operation of 56 seismic stations	Cook Inlet to Yakutat
Bering Glacier-Mt. St. Elias area; fig. 9 (14)	A. E. Letey and Topographic Division	Topographic mapping	Bering Glacier, Mt. St. Elias, Yakutat quadrangles
Bering Glacier coal field; fig. 7 (19)	R. B. Sanders	Structural mapping to determine continuity of coal beds	Carbon Mountain Area, Bering Glacier quadrangle

Project: Seward-Blying Sound quadrangles (AMRAP).

Region and map key: Southern Alaska; fig. 9 (13).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Russell G. Tysdal, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2613.

Project objectives: The objectives of the project are reconnaissance geologic, geophysical, geochemical, and telegeologic mapping to provide data for rapid assessment of mineral resources of the quadrangles. Fieldwork is to include: (1) geologic mapping at 1:250,000 scale; (2) geochemical survey for metals and examination of mineral claims; (3) aeromagnetic survey of entire area; (4) obtaining more gravity data to enhance existing map; and (5) telegeologic mapping using LANDSAT (formerly ERTS) imagery.

Project status: The project was planned for three field seasons in order to accommodate projected study of the Nellie Juan Wilderness Area, which lies in the center of the AMRAP project area. During the 60-day field season in 1975, about half of the geologic mapping was completed by Tysdal and J. E. Case, with help from G. R. Winkler and E. M. MacKevett, Jr. Geochemical sampling was done for streams accessible from roads and on Resurrection Peninsula. Aeromagnetic mapping was completed for about 15 percent of the area. Copper prospects on Knight and Latouche Islands were examined by MacKevett. Remaining fieldwork includes: completion of geologic mapping; a geochemical survey for major part of area; completion of the aeromagnetic survey; acquisition of the remaining gravity data; and examination of prospects in gold districts.

Project: McCarthy quadrangle (PAMRAP).

Region and map key: Southern Alaska; fig. 9 (12).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: E. M. MacKevett, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2216.

Project objectives: Prime objectives are: (1) to provide modern multipurpose geologic maps of the McCarthy 1:250,000 quadrangle and many of its

component quadrangles; (2) to provide sound estimates of the mineral resources and mineral-resource potential of the quadrangle; and (3) to study and report on significant topics in such fields as structure, stratigraphy, mineral deposits, and petrology that are well developed in the quadrangle. The quadrangle is a key area for regional tectonic interpretations and geologic correlations for large parts of southern Alaska and nearby Canada.

Project status: Fieldwork was completed during the 1974 field season. Project work during 1975 focused on the preparation of a folio that includes input from such disciplines as geochemistry, geophysics, mineral economics, and telegeology, along with the geologic data. The folio, which should provide a sound understanding of the mineral resources of the quadrangle and their potential, is scheduled for completion in 1976. Detailed studies of Kennecott-type copper deposits, also within the project framework include isotope investigations headed by M. L. Silberman and studies of the host carbonate rocks by A. K. Armstrong. The project has produced numerous geologic maps and reports; several maps and reports are either in preparation or projected. Publications during 1975 were one geologic quadrangle map and one abstract of an orally presented paper.

Project: Nelchina area.

Region and map key: Southern Alaska; fig. 7 (11).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Arthur Grantz, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2259.

Project objectives: Detailed geologic mapping, stratigraphic studies, and assessment of the mineral and mineral-fuel resources of the Nelchina area, southern Alaska, are the project objectives.

Project status: Work on final report was recessed pending completion of subsequent assignments. During 1975, Grantz and C. E. Kirschner completed a report entitled "Tectonic framework of petroliferous rocks in Alaska."

Project: Eastern Alaska Range.

Region and map key: Southern Alaska; fig. 10 (7).

Organizational designation: Geologic Division,

Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Donald H. Richter, Trail End Ranch, P.O. Box 79, Winston, N. Mex. 87943.

Project objectives: Major objectives were to map geologically and assess the mineral resources of the Nabesna quadrangle and adjacent parts of the Mount Hayes, Gulkana, and McCarthy quadrangles, into which the principal geologic units of the Nabesna quadrangle extend. Other objectives included tectonic studies of the Denali and Totschunda faults, major features of the eastern Alaska Range; bodies of ultramafic rocks that may represent original oceanic crust; and young volcanic rocks of the northern Wrangell Mountains.

Project status: Fieldwork is complete and most reports and maps have been published. The remaining maps and a report on the ultramafic rocks are to be completed on a time-available basis by the project chief, now employed part time.

Project: Anchorage.

Project and map key: Southern Alaska; fig. 10 (6).

Organizational designation: Topographic Division, Rocky Mountain Mapping Center.

Project chief: A. E. Letey, Chief, Rocky Mountain Mapping Center, Federal Center, Denver, Colo. 80225; (303) 234-2351.

Project objectives: The Anchorage project, consisting of 31 quadrangles at 1:25,000 scale with contour intervals of 5, 10, or 20 metres, will provide modern large-scale maps of the greater Anchorage area. Sixteen of these maps are standard line maps; 15 will be orthophotomaps.

Project status: All field operations are complete. Advance manuscript copy is available for the 16 standard line maps and orthophotoquads are available as advance copy for the 15 orthophotomaps. All maps are scheduled to be published in 1977.

Project: Greater Anchorage Area Borough, Alaska.

Region and map key: Southern Alaska; fig. 9 (11).

Organizational designation: Geologic Division, Office of Environmental Geology, Branch of Engineering Geology.

Project chief: Ernest Dobrovolny, U.S. Geological Survey, Federal Center, Denver, Colo. 80225; (303) 234-3131, ext. 3471.

Project objective: The project objective is to provide the geologic information needed for citywide and boroughwide land-use planning. Providing this information involved geologic mapping, determining physical properties of selected materials, correlating geologic units, deciphering the local geologic history, and evaluating geologic processes. The studies were undertaken in response to requests from local government officials and are closely coordinated with hydrologic investigations by the Water Resources Division.

Project status: Fieldwork has been completed. Maps and reports are in preparation. Special-purpose maps are being prepared from the geologic maps for use by planners and developers. Several interpretive maps have been released and others are being completed.

Project: Alaskan coastal environments.

Region and map key: Southern Alaska; fig. 7 (17).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: A. Thomas Ovenshine, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2463.

Project objectives: The project goal is to develop an information base for coastal zone management in the Cook Inlet region. The initial phase of the investigation is in upper Turnagain Arm, where Ovenshine and Susan R. Bartsch-Winkler are studying contemporary patterns of sedimentation in a high tidal range environment. In this phase, four objectives are: (1) reconnaissance of sediments by means of textural, compositional, and facies analysis; (2) detailed study of the sedimentology of Girdwood Bar; (3) study of transgressive intertidal deposits formed at Portage as a result of the subsidence accompanying the 1964 Alaskan earthquake; and (4) in collaboration with Reuben Kachadoorian, obtaining and analyzing approximately 100 m of core from the Portage area.

Project status: The initial phase of the project is about four-fifths complete. Objectives 1, 2, and 3 were met through fieldwork during 1973 and 1974; reports are published or in press and preliminary interpretations have been orally presented at scientific meetings. The core drilling essential to objective 4 was begun in February 1975 and completed in May. Textural,

mineralogical and faunal analysis is nearly complete; facies logging has not yet commenced. The remaining commitments for investigating and reporting probably can be met during 1976.

Project: Alaska seismic studies.

Region: Southern Alaska.

Organizational designation: Geologic Division, Office of Earthquake Studies, Branch of Earthquake Hazards.

Project chief: John C. Lahr, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2510.

Project objectives: The fundamental goals of this project are to develop an understanding of the current tectonic processes that generate earthquakes and to assess the level of seismicity and the potential seismic risk in populated or developed regions of Alaska. Of particular importance is the search for premonitory phenomena and physical conditions prior to moderate and large-sized earthquakes.

Project status: The Alaska seismic studies project has been in operation since 1971 and currently operates 56 seismic stations in Alaska covering the region from Cook Inlet to Yakutat Bay. Topics currently under investigation include: review and relocation of the historic seismic events along the eastern Gulf of Alaska; summarization of the data collected to date, including distribution of earthquakes, focal mechanisms, and aftershock studies; and detailed study of earthquakes in the vicinity of Valdez based in part on data from a network of stations that temporarily augments the permanent network. Open-file reports are being prepared with quarterly summaries and maps of the earthquakes located.

Project: Bering Glacier—Mt. St. Elias area.

Region and map key: Southern Alaska; fig. 9 (14).

Organizational designation: Topographic Division, Rocky Mountain Mapping Center.

Project chief: A. E. Letey, Chief, Rocky Mountain Mapping Center, Federal Center, Denver, Colo. 80225; (303) 234-2351.

Project objectives: The project will provide new 1:63,360-scale maps in an area previously unmapped at this scale.

Project status: This project area consists of 50 1:63,360-scale quadrangles. Five quadrangles have been compiled and advance manuscript

copy is available. The remainder will be compiled by FY 1978. No field operations are scheduled.

Project: Bering River coal field.

Region and map key: Southern Alaska; fig. 7 (19).

Organizational designation: Conservation Division, Office of the Area Geologist, Alaska Area.

Project chief: R. B. Sanders, U.S. Geological Survey, 800 "A" Street, Anchorage, Alaska 99501.

Project objectives: The project is designed to provide data for the evaluation and classification of the coal resources of this area, long subject to controversy. Planned fieldwork includes geologic mapping at 1:1,000, 1:24,000, and 1:63,360 scale as best suited to outcrop availability; extensive mapping and sampling of coal beds; and assessment of structural and stratigraphic complexities affecting the potential for exploitation of the coal.

Project status: Although the project was planned for five seasons, and only half of the area has actually been studied after 3 years, the results to date indicate that the project objective can be met by changing to a "reconnaissance scale" of 1:63,360. If weather conditions are favorable, a single field season with full helicopter support should suffice to complete the field work required. Formal classification of part of the area studied to date has been initiated.

SOUTHEASTERN ALASKA

Project: Ketchikan-Prince Rupert quadrangles (AMRAP).

Region and map key: Southeastern Alaska; fig. 9 (17).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: Henry C. Berg and Raymond L. Elliott, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2266 and 2614, respectively.

Project objectives: The main goal of this project is to assess the mineral-resource potential of the Ketchikan and Prince Rupert 1:250,000-scale ($1^{\circ} \times 2^{\circ}$) quadrangles. The area is being mapped geologically and surveyed systematically by geochemical and geophysical methods, including interpretation of space-satellite imagery. The project incorporates and extends the results

TABLE 7.—*Regional projects, southeastern Alaska*

Name of project; map key	Personnel	Type of work	Area(s)
Ketchikan-Prince Rupert quadrangles (AMRAP); fig. 9 (17)	H. C. Berg, R. L. Elliott, J. G. Smith	Geologic mapping; mineral-resource assessment	Ketchikan, Prince Rupert quadrangles
Craig quadrangle; fig. 8 (15)	G. D. Eberlein, Michael Churkin, Jr.	Geologic mapping; stratigraphic, petrologic, structural studies	Craig quadrangle
Petrology of the La Perouse layered intrusion; fig. 7 (30)	R. A. Loney, G. R. Himmelberg, G. K. Czamanske	Detailed mapping; laboratory study of samples and cores	Fairweather Range, Glacier Bay National Monument
Juneau investigations; fig. 8 (14)	D. A. Brew, A. B. Ford	Geological and geochemical mapping; mineral-resource assessment	Juneau, Taku River quadrangles
Surficial geology of the Juneau urban area and vicinity; fig. 7 (32)	R. D. Miller	Fieldwork completed; report preparation	Juneau area
Sitka Observatory; fig. 7 (33)	W. E. Osbakken, C. A. Dick	Geomagnetic and seismic studies	Sitka
Sitka revision; fig. 7 (33)	A. E. Letey and Topographic Division	Topographic mapping	Sitka vicinity

of four recently completed geologic and mineral-resource investigations within the quadrangle.

Project status: The project is planned for two field seasons. In July and August 1975, a four-man helicopter-supported team, led by R. L. Elliott, completed reconnaissance geologic mapping and partial geochemical sampling of Portland Peninsula east of East Behm Canal. Their work resulted in the discovery of small sulfide-bearing plutons in the Smeaton Bay area and in substantial new geologic and isotopic data bearing on the history of the Coast Range plutonic-metamorphic complex. At the same time, a three-man team led by H. C. Berg completed geologic mapping and preliminary geochemical sampling and examination of mineral occurrences along the coastlines of Cleveland Peninsula and southwestern Revillagigedo Island. The principal results of their work include: (1) discovery of a northwest-trending belt several kilometres wide of sulfide-bearing metamor-

phosed sedimentary and igneous rocks containing traces to possibly significant amounts of zinc, copper, gold, and other metals; and (2) discovery of a cataclastic zone a kilometre or more wide along Revillagigedo Channel that may be the structural boundary between two major tectono-stratigraphic units in southeastern Alaska. Fieldwork scheduled for 1976 includes geologic mapping of inland and coastal areas of remaining unmapped parts of Revillagigedo Island and Cleveland Peninsula, geochemical sampling, a regional aeromagnetic survey, and structural studies in the Texas Creek area.

Project: Craig quadrangle.

Region and map key: Southeastern Alaska; fig. 8 (15).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chiefs: G. Donald Eberlein and Michael

Churkin, Jr., U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2210 and 2256, respectively.

Project objectives: The primary objective is to provide the public and other Government agencies with a modern geologic map of the Craig quadrangle at 1:250,000 scale as a frame of reference for resource appraisal, development, and multiuse planning. Secondary objectives relate to developing the stratigraphic, petrologic, and structural data needed to understand, especially in the light of modern plate tectonic concepts, the geologic evolution of a major part of the Alexander Archipelago.

Project status: In July 1975, H. C. Berg, R. L. Elliott, and two assistants, working with a chartered vessel and helicopter, extended mapping of the Annette-Gravina Islands belt into the Craig C-1, D-1 and part of the D-2 subquadrangles. Using the R/V DON J. MILLER II as a base for helicopter-supported operations from August 18 to September 21, Eberlein, Churkin, and two assistants completed field geologic mapping of the previously unmapped interior areas of Prince of Wales, Suemez, Sukkwan, Noyes, Baker, Lulu, and San Fernando Islands. Between August 22 and September 17, N. M. Savage, University of Oregon contractee, continued biostratigraphic studies on the basis of conodonts and brachiopods. From September 6 to 15, R. VanderVoo, University of Michigan, collected some 300 oriented core samples from 44 sites selected to assess the paleomagnetic research potential of dated stratigraphic units. Fieldwork sufficient to provide control for preparation of an up-to-date 1:250,000-scale geologic map of the Craig quadrangle has now been completed. Final compilation copy is scheduled for submittal in 1976. Publication plans call for a Geologic Quadrangle Map of the Craig C-5 and C-6 subquadrangles and open-filing of other subquadrangles as warranted by the available geologic control. Final reports, mainly in the form of short topical papers, are scheduled for completion in 1977.

Project: Petrology of La Perouse layered intrusion.

Region and map key: Southeastern Alaska; fig. 7 (30).

Organizational designation: Geologic Division,

Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Robert A. Loney, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2384.

Project objectives: The objectives are to attempt to determine the petrogenesis, geologic setting, and economic potential of the La Perouse layered intrusion by petrographic, chemical, and structural means. The Ni-Cu sulfide-bearing basal ultramafic zone is largely unexposed and data concerning it come mostly from drill core from the Brady Glacier prospect of Newmont Exploration Limited. The predominant upper gabbro zone is well exposed, though difficult of access.

Project status: The sampling of the drill cores from the Brady Glacier Cu-Ni prospect was done in two stages; an initial general sampling by Robert A. Loney and Glen R. Himmelberg in the summer of 1973, and a final sampling in the summer of 1975 by the same workers, assisted by Gerald Czamanske and Lewis Calk. The La Perouse area was briefly visited by Loney, Himmelberg, and Czamanske, in August of 1975 when preliminary sampling of the exposed gabbro was done. About 2 weeks' fieldwork in the La Perouse area, planned for the summer of 1976, is expected to largely complete the fieldwork. Loney and Himmelberg have completed a petrographic study of the initial core samples and are continuing to study material collected in 1975. Himmelberg is beginning a microprobe study of silicate minerals, and Czamanske and Calk are engaged in a petrographic and microprobe study of the sulfide minerals. In addition, chemical and isotopic analyses are being made. First reports will probably be submitted in 1977.

Project: Juneau investigations.

Region and map key: Southeastern Alaska; fig. 8 (14).

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: D. A. Brew, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2178.

Project objectives: The major objectives are reconnaissance (in part) and detailed (in part) geologic and geochemical mapping and mineral-resource appraisal of a broad transect

across the Coast Range batholithic complex from the low-grade intermediate pressure and temperature facies series metavolcanic and metaclastic rocks on the southwest through higher grade schists, gneisses, and spatially associated metaintrusive rocks to the relatively young intrusive rocks and associated low pressure-high temperature facies series metavolcanic and metaclastic rocks along the International Boundary. Geochronologic studies of the transect are made in cooperation with the Coast Range geochronology project, J. G. Smith, Chief. This information will provide the regional framework for the Juneau Gold Belt and for mineral occurrences immediately east of the U.S.-Canada boundary.

Project status: The project has been active since 1964 with full or near-full seasons devoted to fieldwork in 1964, 1965, 1967, 1968, 1970, and 1973. To date detailed (1:31,680) mapping of about three quadrangles has been completed; one preliminary 1:31,680 quadrangle map has been published and the two others are nearly ready; and three short papers have been published. Completion of the reconnaissance geologic mapping of the remainder of the Juneau and Taku River 1:250,000 quadrangles will require one more full season with helicopter support, not anticipated for the near future. In the meantime, Brew and A. B. Ford (who are primarily engaged in other projects) continue compilation and petrographic studies in the office and attempt every season to map a few more square miles. Final report completion depends on completion of the field studies.

Project: Surficial geology of the Juneau urban area and vicinity.

Region and map key: Southeastern Alaska; fig. 7 (32).

Organizational designation: Geologic Division, Office of Environmental Geology, Branch of Engineering Geology.

Project chief: R. D. Miller, U.S. Geological Survey, Denver Federal Center, Denver, Colo. 80225; (303) 234-3818.

Project objectives: The project is designed to provide detailed mapping of the surficial deposits in and adjacent to the Juneau urban area and to obtain data regarding distribution and physical properties of geologic materials to aid in

evaluating ground motion that might occur in response to major earthquakes in southeastern Alaska.

Project status: Fieldwork has been completed. A Miscellaneous Geologic Investigations Map of the surficial geology of the Juneau area is in press. Preparation is continuing on the final report, to be published as a U.S. Geological Survey Professional Paper; completion of the manuscript is anticipated during 1976.

Project: Sitka Observatory.

Region and map key: Southeastern Alaska; fig. 7 (33).

Organizational designation: Geologic Division, Office of Earthquake Studies, Branch of Seismicity and Earth Structure.

Project chief: Willis E. Osbakken, U.S. Geological Survey, Box 158, Sitka, Alaska 99835; (907) 747-3332.

Project objectives: The observatory operates seismic instruments for acquiring information on the global occurrence of earthquakes; telemeters seismic and tide station data to the NOAA Tsunami Warning System Observatory at Palmer; and records and measures, on a continuous basis, the various elements of the Earth's magnetic field and distributes these data to scientists involved in geomagnetic studies, either directly or through the Branch of Theoretical and Applied Geophysics at Denver.

Project status: This project is one of a continuing nature; the station has functioned as a geomagnetic observatory since 1902 and as seismic station since 1925. The station furnishes seismic recordings to the National Earthquake Information Service for epicenter studies. Telemetered data furnished to Palmer is considered vital to the Warning System, as Sitka Observatory is the only data source south of Yakutat. As a geomagnetic observatory, Sitka plays an important role in the international scientific community, being 1 of 13 selected observatories used in the derivation of K_p , the planetary geomagnetic activity index. Geomagnetic data collected at the station find a wide range of uses, including the compiling of magnetic charts, radio propagation studies, and ionospheric studies. Recently installed digital and analog recording equipment has increased the geomagnetic data output.

Project: Sitka Revision.

Region and map key: Southeastern; fig. 7 (33).
Organizational designation: Topographic Division, Rocky Mountain Mapping Center.

Project chief: A. E. Letey, Chief, Rocky Mountain Mapping Center, Federal Center, Denver, Colo. 80225; (303) 234-2351.

Project objectives: The project is to update two 1:63,360-scale quadrangles (Sitka A-4 and A-5) using available photography.

Project status: These two revised quadrangles will be published in 1976.

COOPERATIVE PROJECTS WITH OTHER AGENCIES

Certain projects of the Geological Survey are undertaken to meet specific needs of city or State governments or to provide scientific and technical data required by other Federal agencies. These projects are funded jointly and are termed cooperative projects. In addition to joint funding for cooperative projects, members of the participatory agencies may collaborate in the scientific work.

Listed in this section are the Cooperative projects of the U.S. Geologic Survey. Most cooperative projects concern the hydrology of Alaska and are statewide in scope; others have a regional focus.

STATEWIDE PROJECTS

Project: Alaska water assessment

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: G. O. Balding, U.S. Geological Survey, P.O. Box 1568, Juneau, Alaska 99802; (907) 586-7216.

Cooperating agency: Alaska Power Administration.

Project objectives: This project presents the current availability, quality, and use of water in 18 subareas of Alaska as a supplementary report to the Technical Memorandum developed for the Water Resources Council.

Project status: Draft is completed.

Project: Surface-water stations.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: R. D. Lamke, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agencies: Alaska Power Administra-

tion; U.S. Air Force; U.S. Army Corps of Engineers; U.S. Forest Service; State of Alaska, Department of Fish and Game, Department of Highways, and Department of Natural Resources; Municipality of Anchorage; Kenai Peninsula Borough.

Project objectives: The Geological Survey operates a network of gaging stations to provide data on (1) streamflow, (2) flood discharges and stages, (3) lake stage and contents, and (4) estuary flow conditions. This program is part of an ongoing national assessment of the nation's water resources. The data are used in project design and planning of water-supply and waste-disposal systems and of bridges and are useful in the assessment of environmental impact of these and other proposed activities.

Project status: Continuing; all data are published in the annual series "Water Resources Data for Alaska." The 1975 report will be completed by September 1976.

Project: Floods from small drainage areas.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: Stanley H. Jones, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agencies: State of Alaska, Department of Highways; U.S. Forest Service.

Project objectives: This project collects and publishes flood-peak data from a network of small-stream crest-gaging stations for the purpose of defining the magnitude and frequency of floods within Alaska.

Project status: Continuing; all data are published in the annual series "Water Resources Data for Alaska." The 1975 report will be completed by September 1976. A flood frequency and magnitude analysis by multiple-regression methods will be made to define a set of equations that can be used to estimate flood magnitudes for selected recurrence intervals at any site on ungaged streams in Alaska. The equations will relate floods to drainage-basin characteristics. The analysis will be complete by June 1976. A hydrologic reconnaissance of the TAPS haulroad was made during spring breakup 1975 and a report is being prepared.

Project: Ground-water stations.

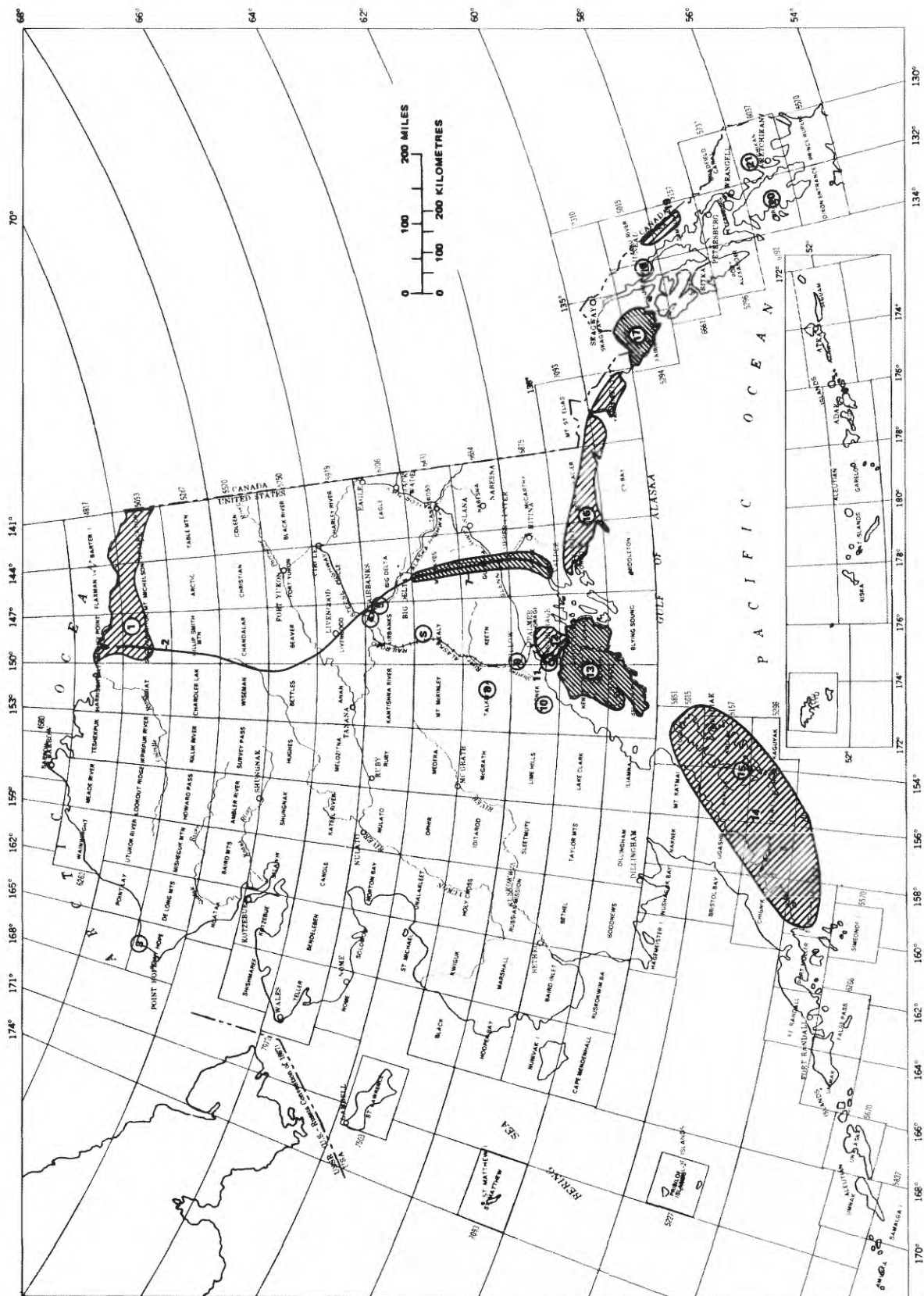


FIGURE 13.—Locations of projects of the U.S. Geological Survey and cooperating agencies.

TABLE 8.—*Statewide cooperative projects*

Name of project: map key	Project chief	Type of work	Area(s)	Cooperating agencies
Alaska water assessment	G. O. Balding	Presentation of current water availability, quality, and use	Statewide	Alaska Power Administration
Surface-water stations	R. D. Lamke	Monitoring a network of stream, lake, and estuary gaging stations	Statewide	Alaska Power Administration; U.S. Air Force; U.S. Army Corps of Engineers; U.S. Forest Service; State of Alaska, Dept. of Fish and Game, Dept. of Highways, Dept. of Natural Resources; Municipality of Anchorage; Kenai Peninsula Borough
Floods from small drainage areas	S. H. Jones	Flood peak data collection from a network of crest-stage gages	Statewide	State of Alaska, Dept. of Highways; U.S. Forest Service
Ground-water stations	L. L. Dearborn	Monitoring a network of ground-water observation wells	Statewide	Kenai Peninsula Borough; State of Alaska, Dept. of Natural Resources; Municipality of Anchorage; U.S. Air Force
Ground-water inventory	G. S. Anderson	Ground-water data collecting, processing, filing, and tabulation	Statewide	State of Alaska, Dept. of Natural Resources, Division of Geological and Geophysical Surveys
Quality-of-water stations	R. J. Madison	Monitoring a network of water-quality stations	Statewide	U.S. Army Corps of Engineers; U.S. Forest Service; State of Alaska, Dept. of Environmental Conservation, Dept. of Fish and Game
Sediment stations	P. J. Still	Monitoring a network of sediment stations on streams, lakes, and estuaries	Statewide	U.S. Forest Service; U.S. Army Corps of Engineers
Hydrological studies for fisheries enhancement; fig. 13 (5), (9), (15), (20), (21)	G. A. McCoy	Limnological investigations, gas saturation studies, and quality-of-water resource studies	Statewide	State of Alaska, Dept. of Fish and Game

TABLE 8.—*Statewide cooperative projects—Continued*

Name of project: map key	Project chief	Type of work	Area(s) ¹	Cooperating agencies
Hydrological studies related to coal mining; fig. 13 (6), (8), (10)	D. R. Scully	Investigations of effects of development of coal resources on water resources	Statewide	Environmental Protection Agency
Hydrological studies for Alaskan Air Command; fig. 13 (3), (12)	R. J. Madison	Investigations of hydrologic problems involved in their operations	Statewide	U.S. Air Force, Alaskan Air Command
Geologic map of Alaska	H. M. Beikman	Office compilation	Statewide	State of Alaska, Division of Geological and Geophysical Surveys
Metamorphic facies map of Alaska	D. A. Brew, Béla Csejtei, Jr., A. B. Ford, H. L. Foster, T. P. Miller, H. N. Reiser	Office compilation	Statewide	State of Alaska, Division of Geological and Geophysical Surveys
Alaskan gravity Survey	D. F. Barnes	Field observations leading to 1:250,000 gravity maps	Statewide	State of Alaska, Division of Geological and Geophysical Surveys
TAPS construction hydrology; fig. 13 (2)	C. E. Sloan	Investigations of hydrologic impact of construction and operation of TAPS	Trans-Alaska pipeline corridor Prudhoe Bay to Valdez	State of Alaska, Alaska State Pipeline Coordinator's Office

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: Larry Dearborn, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 279-1563.

Cooperating agencies: Kenai Peninsula Borough; State of Alaska, Department of Natural Resources; Municipality of Anchorage; U.S. Air Force.

Project objectives: A network of ground-water observation wells is maintained to provide information on water levels throughout Alaska. These wells indicate ground water in storage or in transit and the availability of supplies, show changes in groundwater storage, and are used for estimating base flow of streams. They provide long-term records for basin or watershed

studies by means of which shorter records can be correlated.

Project status: Continuing; work during 1976 includes plans to publish a 5-year summary of records for Federal observation wells and Kenai project wells.

Project: Ground-water inventory.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: G. S. Anderson, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 279-1563.

Cooperating agency: State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys.

Project objectives: This project collects and pub-

TABLE 9.—Regional cooperative projects

Name of project; map key	Project chief	Type of work	Area(s)	Cooperating agencies
North Slope water-resources study; fig. 13 (1)	G. L. Nelson	Compiling data on consumption test drilling, various other studies	North Slope	State of Alaska, Department of Environmental Conservation
Geohydrology of Fairbanks North Star Borough; fig. 13 (4)	G. L. Nelson	Monitoring observation wells, water-quality sampling, various other studies	Fairbanks area	Fairbanks North Star Borough; U.S. Army Corps of Engineers
Water resources of Kodiak-Shelikof area; fig. 13 (14)	S. H. Jones	Compilation and summary of hydrologic data	Shelikof Strait portion of Aleutian Peninsula and Kodiak Island Borough	State of Alaska, Department of Environmental Conservation
Water-resources investigations of Valdez-Delta Junction area; fig. 13 (7)	C. E. Sloan	Report preparation on water resources of the area	Along TAPS corridor in south-central Alaska	State of Alaska, Department of Environmental Conservation
Geohydrology of the Anchorage area; fig. 13 (12)	Chester Zenone	Water availability, ground water recharge experiments and various hydrologic studies related to urban development	Anchorage area	Municipality of Anchorage; State of Alaska, Department of Fish and Game
Water-resources investigations of the Kenai Peninsula Borough areas; fig. 13 (13)	G. S. Anderson	Monitoring observation wells, stream-gaging stations and lakes, geohydrologic studies	Kenai Peninsula Borough	City of Kenai; Kenai Peninsula Borough
Eastern Gulf of Alaska seismicity	J. C. Lahr	Seismic network to monitor earthquake activity	Prince William Sound to Yakutat	National Oceanic and Atmospheric Administration
Northern Gulf of Alaska Tertiary Province stratigraphy study; fig. 13 (16)	I. F. Palmer	Fieldwork completed; report preparation	Coastal southern Alaska	State of Alaska, Division of Geological and Geophysical Surveys
Glacier Bay National Monument Wilderness Study Area; fig. 13 (17)	D. A. Brew	Reconnaissance geologic mapping, geochemical and geophysical surveys, mineral- resource assessment	Glacier Bay National Monument	U.S. Bureau of Mines, Alaska Field Operations Center

TABLE 9.—Regional cooperative projects—Continued

Name of project; map key	Project chief	Type of work	Area(s)	Cooperating agencies
Water resources City and Borough of Juneau; fig. 13 (18)	G. O. Balding	Water-resources data compilation, aquifer tests	Juneau area	City and Borough of Juneau
Tracy Arm-Fords Terror Wilderness Study Area; fig. 13 (19)	D. A. Brew	Fieldwork completed; report preparation	Parts of Taku River and Sumdum quadrangles	U.S. Bureau of Mines, Alaska Field Operations Center

lishes data on ground water. Information also is collected on ground-water development and special studies related to ground-water availability are made. Other work includes field inventories, aquifer tests, water-quality sampling, and geophysical logging.

Project status: In 1976, work efforts will be concentrated in southeastern Alaska, Kodiak Island, Cook Inlet basin, and the northern part of the Gulf of Alaska area. Beginning in 1976, efforts will be made to convert existing ground-water data to the new National Ground-water Site-Inventory Data Base. A report entitled "Water resource reconnaissance of St. George Island, Pribilof Islands, Alaska," by G. S. Anderson is ready for release. A summary of ground-water conditions will be included in a water-resources summary report of the Kodiak-Shelikof area scheduled for 1976.

Project: Quality-of-water stations.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: R. J. Madison, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agencies: U.S. Army Corps of Engineers; U.S. Forest Service; Alaska Department of Environmental Conservation; Alaska Department of Fish and Game.

Project objectives: This project provides information on the physical and chemical properties of water by: (1) determining the mineral content and biological aspects of water, thereby establishing a base line from which changes can be evaluated; and (2) determining mineral compo-

sition of water to evaluate its use for domestic, municipal, and industrial water supplies. This will be accomplished by operation of a network of water-quality stations.

Project status: Continuing; all data are published in the annual series "Water Resources Data for Alaska." The 1975 report will be completed by September 1976.

Project: Sediment stations.

Region: Statewide.

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: P. J. Still, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 279-1563.

Cooperating agencies: U.S. Forest Service; U.S. Army Corps of Engineers.

Project objectives: A network of sediment stations is maintained to provide information on sediment in streams, lakes, and estuaries by determining: (1) seasonal normal concentrations and particle-size distribution of suspended sediments; (2) sediment yields; (3) particle-size distribution of bed and bank material; (4) bedload transport; and (5) ranges in turbidity.

Project status: Continuing.

Project: Hydrological studies for fisheries enhancement.

Region and map keys: Statewide (east-central, southwestern, southern, southeastern Alaska); fig. 13 (5), (9), (15), (20), (21).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: G. A. McCoy, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska

99501; (907) 279-1563.

Cooperating agency: State of Alaska, Department of Fish and Game.

Project objectives: This study provides basic hydrologic data for fisheries enhancement.

Project status: Limnological investigations of Salmon Lake near Kasaan, and Patching, Klawak, and Heckman Lakes near Ketchikan will be made to determine their suitability for restocking with fish. Monitoring of the Salcha River near Fairbanks during and after the pipeline construction will be continued. A study of the hydrologic regime of the Karluk Lake basin on Kodiak Island is continuing, and two additional basins, Akalura Lake near Olga Bay and Big Lake near Wasilla, are being studied. Reports on each of these studied are planned for release during 1976.

Project: Hydrological studies related to coal mining.

Region and map keys: Statewide (northern, southern Alaska); fig. 13 (6), (8), (10).

Organizational designation: Water Resources Division, Alaska District, Anchorage Subdistrict Office.

Project chief: David R. Scully, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska; (907) 279-1563.

Cooperating agency: Environmental Protection Agency.

Project objectives: This project collects data on streamflow, suspended sediment, water quality, and ground water to delineate the present hydrologic conditions in areas of known potential for coal development and predicts, insofar as possible, the effects of coal mining operations on the water resources. Information obtained includes: (1) quantity and seasonal distribution of water discharge; (2) seasonal and areal variations in surface-water quality including organic and inorganic constituents, minor element concentrations, sediment load, and turbidity; and (3) stream-basin characteristics.

Project status: Initial reconnaissance trips were made to the Susitna, Beluga, Peters Creek, and Healy areas during the period July through October 1975. Field investigations in 1976 will include these same areas as well as reconnaissance of the northwest Arctic coast. Data collection will continue through the 1979 season. An atlas report summarizing the existing hy-

drologic data in the Susitna and Healy areas is being prepared and will be completed in 1976.

Project: Hydrological studies for Alaskan Air Command.

Region and map keys: Statewide (northern, southern Alaska); fig. 13 (3), (12).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: R. J. Madison, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agency: U.S. Air Force, Alaskan Air Command.

Project objectives: This project is to assist the Alaskan Air Command by conducting special hydrological studies on problems relating to their operations in Alaska. Continuing cooperative work with the Alaskan Air Command will include temperature studies of the water in Ship Creek near the powerplant and miscellaneous hydrologic studies as requested.

Project status: Continuing; a geophysical study to determine water availability at Cape Lisburne was completed. The report will be submitted to the U.S. Air Force by February 1976.

Project: Geologic map of Alaska.

Region: Statewide.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: Helen M. Beikman, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2330.

Cooperating agency: State of Alaska, Division of Geological and Geophysical Surveys.

Project objectives: The objectives of this project are: (1) preparation of five preliminary uncolored geologic maps at a scale of 1:1,000,000, which together cover the entire State; (2) preparation of a preliminary uncolored map at 1:2,000,000 and of a multicolored map at 1:2,500,000, also covering the entire State; and (3) preparation of a report briefly describing the stratigraphic units included in the map units shown on the multicolored 1:2,500,000-scale map, which will supersede the geologic map of Alaska published in 1957.

Project status: Uncolored geologic maps at a scale of 1:1,000,000, preliminary compilations on

which the final multicolored map will be based, are being published as soon as they are completed. Interim maps at this scale have been published as MF-611, covering the southwestern part of the State; MF-612, covering the south-central part; MF-673, covering southeastern Alaska; and MF-674, covering the Alaska Peninsula and Aleutian Islands. The preliminary map of northern Alaska is scheduled for early 1976, and the entire project should be completed by the end of 1976.

Project: Metamorphic facies map of Alaska.

Region: Statewide.

Organizational designation: Geologic Division, Office of Mineral Resources, Branch of Alaskan Geology.

Project chief: D. A. Brew (Chairperson of Branch Committee), U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2178. (Other members of committee: Béla Csejtei, Jr., A. B. Ford, H. L. Foster, T. P. Miller, H. N. Reiser.)

Cooperating agency: State of Alaska, Division of Geological and Geophysical Surveys.

Project objectives: Compilation of a 1:2,500,000-scale metamorphic facies map of Alaska from existing information and from current branch-wide field studies and compilation of the supporting data.

Project status: The project was initiated in winter 1972-73 with the goal of map manuscript preparation by June 1975. The explanation and the compilation techniques were worked out first and the six regional compilations have been prepared. Synthesis of those compilations is underway and the map manuscript should be completed in 1976.

Project: Alaskan gravity survey.

Region: Statewide.

Organizational designation: Geologic Division, Office of Geochemistry and Geophysics, Branch of Theoretical and Applied Geophysics.

Project chief: David F. Barnes, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2249.

Cooperating agency: State of Alaska, Division of Geological and Geophysical Surveys.

Project objective: In the past the prime objectives of Alaskan gravity surveys have been the com-

pletion of a 1:2,500,000-scale map of the State and to locate basins of sedimentary rocks beneath large areas of alluvial cover. Now the emphasis is shifting to provide data suitable for a few 1:250,000-scale maps to study some of the anomalies that seem to be associated with mineralization and to provide background data for land-use decisions.

Project status: Past Alaskan gravity surveys have relied primarily on small-boat transportation and have thus obtained a skeletal network of data that now covers the entire State. These data permitted the compilation during 1975 of a new 1:2,500,000-scale Bouguer anomaly map of Alaska. Another 1975 product was a 1:250,000-scale complete-Bouguer anomaly map of the Nabesna quadrangle (prepared as part of the PAMRAP program) that summarized approximately 600 gravity measurements and provided an indication of deep geologic structure. Additional gravity measurements have been made in other AMRAP and PAMRAP quadrangles, and several of these project folios will include gravity maps although terrain corrections will be made only for quadrangles, that contain more than 500 evenly distributed measurements. Current effort is to release a group of simple-Bouguer anomaly maps at a scale of 1:250,000 covering the Brooks Range and adjacent areas to show the southern edge of the Colville Geosyncline and the trace of a pronounced gravity high that seems to correlate with mineralization.

Project: TAPS construction hydrology.

Region and map key: Statewide (trans-Alaska pipeline corridor, Prudhoe Bay to Valdez); fig. 13 (2).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: C. E. Sloan, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agency: State of Alaska, Alaska State Pipeline Coordinators Office (ASPCO).

Project objectives: The project measures and reports turbidity resulting from construction disturbance in selected streams; defines water-quality changes resulting from waste disposal and accidental oil spills; and evaluates pore pressure problems at construction sites based on

piezometric head data.

Project status: Field data collection is nearly complete for the waste-disposal aspects of the study. Field data collection of turbidity and associated water-quality parameters is about 25 percent complete. From time to time, topical reports will be prepared covering different aspects of the project with project conclusion at end of FY 77.

NORTHERN ALASKA

Project: North Slope water-resources study.

Region and map key: Northern Alaska; fig. 13 (1).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: G. L. Nelson, U.S. Geological Survey, 310 First Avenue, Fairbanks, Alaska 99701; (907) 452-1951, ext. 176.

Cooperating agency: State of Alaska, Department of Environmental Conservation.

Project objectives: The program summarizes existing information on water use and water-supply development in the North Slope area and evaluates the availability and quality of water. Emphasis is on winter low-flow conditions when streamflow near the Arctic coast drops to imperceptible levels in several major rivers and companies operating in the area experience severe water shortages.

Project status: This is a new project and no original fieldwork has been completed. The research objectives interconnect with several other northern Alaskan hydrologic studies. We have been able to assess very quickly the scope of the problem and compile necessary reconnaissance data to plan for the winter field season. An interim report should be available in 1976 pending completion of the project in 3 years.

EAST-CENTRAL ALASKA

Project: Geohydrology of Fairbanks North Star Borough.

Region and map key: East-central Alaska; fig. 13 (4).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: G. L. Nelson, U.S. Geological Survey, 310 First Avenue, Fairbanks, Alaska 99701; (907) 452-1951, ext. 176.

Cooperating agencies: Fairbanks North Star Borough, U.S. Army Corps of Engineers.

Project objectives: Objectives are to assess water

quality and availability and to monitor the effects of urbanization on water resources of the Fairbanks North Star Borough, particularly the rapidly developing North Pole and Farmer's Loop areas. Water-level data from observation wells in the alluvial aquifer of the flood plain and the fractured schist aquifer in the uplands, as well as data from well drillers' logs, homeowners' reports, a water-quality sampling program, and other basic data collection programs will be incorporated in interpretive maps and reports designed to provide a geohydrologic framework for land-use planning.

Project status: This is an ongoing project of at least 3 years' duration. Preliminary assessment of published data has been completed and ground-water data have been recorded and filed for computer storage. A report on the alluvial aquifer of the flood plain should be completed in 1976.

SOUTHWESTERN ALASKA

Project: Water resources of Kodiak-Shelikof area.

Region and map key: Southwestern Alaska; fig. 13 (14).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: Stanley H. Jones, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agency: State of Alaska, Department of Environmental Conservation.

Project objectives: Under this project, all available water-resources information for the Kodiak-Shelikof area will be compiled and summarized. The water-resources data summary will provide a reduced data base for planning water-resource development, delineating water problem areas, making impact evaluations, and evaluating existing water quality and availability.

Project status: The water-resources data for the Kodiak-Shelikof area are presently being compiled and analyzed. An interpretive hydrologic analysis of this data will be summarized in an atlas-type report planned for 1976.

SOUTHERN ALASKA

Project: Water-resources investigations of Valdez-Delta Junction area.

Region and map key: Southern Alaska; fig. 13 (7).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: C. E. Sloan, U.S. Geological Survey, 218 E Street, Anchorage, Alaska 99501; (907) 277-5526.

Cooperating agency: State of Alaska, Department of Environmental Conservation.

Project objectives: The purpose of the project is to make a hydrologic appraisal of water availability and quality as related to the industrialization and urbanization activities in and along the trans-Alaska pipeline corridor.

Project status: The project is 80 percent complete; all field and laboratory data have been collected, and report preparation is 50 percent finished. Completion is expected in 1976.

Project: Geohydrology of the Anchorage area.

Region and map key: Southern Alaska; fig. 13 (12).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: Chester Zenone, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 279-1563.

Cooperating agency: Municipality of Anchorage; State of Alaska, Department of Fish and Game.

Project objectives: This project monitors the effects of urban development on water and water-related resources and assesses water availability by means of: test drilling and aquifer hydraulics analyses as guides to site selection and design of production wells; experiments in artificial recharge of ground water using infiltration ponds; definition of quality of water and potential for pollution of ground water at landfill sites; application of electric analog and digital models of local hydrologic systems; and a continuing basic-data program for collecting information on surface and ground water and water quality.

Project status: The project is now in its tenth year. As urbanized Anchorage expands, the need for studies of water availability and the effects of urban development on the hydrology problems identified by Barnwell and others (Barnwell, W. W., George, R. S., Weeks, J. B., and Zenone, Chester, 1972, *Water for Anchorage—An atlas of the water resources of the Anchorage area, Alaska*: U.S. Geol. Survey open-file report [pub. by the city of Anchorage and the Greater Anchorage Area Borough], 77 p.) have been treated in depth in recent reports. Continuing studies will focus on: potential increase in ground-water

availability through artificial recharge; evaluation of alternative management schemes for optimal use of water in Ship Creek basin where heavy demand is placed on surface water during winter; determination of ground-water pollution potential at existing and proposed landfill sites; and evaluation of geologic and hydrologic data in relatively undeveloped areas where conditions are marginal for safe and efficient operation of individual water-supply and waste-disposal systems.

Project: Water resources investigation of the Kenai Peninsula Borough area.

Region and map key: Southern Alaska; fig. 13 (13).

Organizational designation: Water Resources Division, Alaska District Office.

Project chief: G. S. Anderson, U.S. Geological Survey, 1209 Orca Street, Anchorage, Alaska 99501; (907) 279-1563.

Cooperating agencies: City of Kenai; Kenai Peninsula Borough.

Project objectives: Long-term effects of ground-water development are monitored by means of water-level measurements of observation wells and lakes and by stream-gaging stations. Inventories are made of industrial and municipal ground-water withdrawals.

Project status: A report summarizing 5 years' data collection on lake-level fluctuations will be completed in 1976.

Project: Eastern Gulf of Alaska seismicity.

Region: Southern Alaska.

Organizational designation: Geologic Division, Office of Earthquake Studies, Branch of Earthquake Hazards.

Project chief: John C. Lahr, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2510.

Cooperating agency: National Ocean and Atmospheric Administration.

Project objectives: The objective of this research project is to evaluate the hazards associated with earthquake activity in the eastern Gulf of Alaska and adjacent onshore areas that pose a threat to the safety of petroleum exploration and development.

Project status: A network of seismic stations installed in 1974 and expanded in 1975 is now operating between Prince William Sound and

Yakutat Bay. Data from this network are now providing detailed information on the pattern of seismicity of this region.

Project: Northern Gulf of Alaska Tertiary Province stratigraphy study.

Region and map key: Southern Alaska; fig. 13 (16).

Organizational designation: Conservation Division, Office of the Alaska Area Geologist.

Project chief: I. F. Palmer, U.S. Geological Survey, P.O. Box 259, Anchorage, Alaska 99510.

Cooperating agency: State of Alaska, Division of Geological and Geophysical Surveys.

Project objectives: Objectives were to collect more specific additional reservoir and source-rock data than existed from previous regional work and to strengthen the statistical base upon which offshore extrapolations of geologic data must be made to facilitate evaluation of prospect areas and tracts in the OCS area.

Project status: The fieldwork for this project was completed in July 1975.

Eight stratigraphic sections totaling 14,490 feet were measured and sampled. Five sandstone traverses totaling 26,990 feet were measured and sampled. Samples were taken for porosity, permeability, microfossil and macrofossil age determinations, hydrocarbon (ppm) source rock-determinations, stream-sediment geochemistry, seep-oil analyses, and selected special analyses such as petrography and oriented sandstones. Measurements were obtained on stratigraphic parameters and paleocurrents, thicknesses, reservoir parameters, stream-sediment profiles and gravity.

Data resulting from the project will fill gaps in regional stratigraphic control and enhance efforts of workers who need more detail in making offshore extrapolations of geologic data.

All segments of the report are planned for release by State of Alaska, Division of Geological and Geophysical Surveys, in open-file format prior to the OCS Lease Sale No. 39. The fieldwork, interpretation, and report preparation were cooperative efforts with W. M. Lyle, State of Alaska, Division of Geological and Geophysical Surveys.

SOUTHEASTERN ALASKA

Project: Glacier Bay National Monument Wilderness Study Area.

Region and map key: Southeastern Alaska; fig. 13 (17).

Organizational designation: Geologic Division, Office of Mineral Resources, Wilderness Program and Branch of Alaskan Geology.

Project chief: D. A. Brew, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2178.

Cooperating agency: U.S. Bureau of Mines, Alaska Field Operations Center.

Project objectives: The principal objective is an appraisal of the mineral-resource potential of a large area of complex geology just northwest of the Alexander Archipelago, using: (1) reconnaissance geologic, geochemical, and detailed mineral-occurrence information gathered in the 1966 Geological Survey study of the Monument (cf. Professional Paper 632); (2) reconnaissance geologic mapping of previously unstudied areas; (3) reconnaissance bedrock geochemical sampling; (4) reconnaissance stream-sediment geochemical sampling of previously unsampled areas; (5) aeromagnetic surveying; (6) gravity surveying; and (7) detailed examination and sampling of selected known mineral occurrences and of areas containing anomalous concentrations of selected metallic elements. Geochronologic studies are being done in cooperation with the Branch of Isotope Geology. The appraisal is part of the U.S. National Park Service study of the suitability of the area for inclusion in the National Wilderness Preservation System established by the Wilderness Act of 1964.

Project status: The project started in the 1975 field season with the main emphasis on verification testing of geochemical data from the 1966 studies, reconnaissance geologic mapping in previously unmapped areas, and reconnaissance bedrock geochemical sampling. The project is scheduled to be in the field in both 1976 and 1977. Aeromagnetic and gravity surveys are planned for 1976. Manuscript submittal is tentatively scheduled for 1978.

Project: Water resources of the City and Borough of Juneau.

Region and map key: Southeastern Alaska; fig. 13 (18).

Organizational designation: Water Resource Division, Alaska District Office.

Project chief: G. O. Balding, U.S. Geological Sur-

vey, Rm. 443 Federal Building, 710 West 9th Street, (P.O. Box 1568), Juneau, Alaska 99801; (907) 586-7216.

Cooperating agencies: City and Borough of Juneau.

Project objectives: The project was designed to determine the aquifer characteristics and water quality in deposits in the Juneau area.

Project status: One test well and two observation wells, all between 70 and 85 feet deep, have been cased in a potential water-bearing zone in the Mendenhall Valley.

Project: Tracy Arm-Fords Terror Wilderness Study Area.

Region and map key: Southeastern Alaska; fig. 13 (19).

Organizational designation: Geologic Division, Office of Mineral Resources, Wilderness Study Program and Branch of Alaskan Geology.

Project chief: D. A. Brew, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, Calif. 94025; (415) 323-8111, ext. 2178.

Cooperating agency: U.S. Bureau of Mines, Alaska Field Operations Center.

Project objectives: The principal goal of the project is an appraisal of the mineral-resource potential of the area, a broad transect across the Coast Range, using: (1) reconnaissance geologic mapping; (2) reconnaissance bedrock geochemical sampling; (3) reconnaissance stream-sediment geochemical sampling; (4) aeromagnetic surveying; and (5) detailed examination and sampling of known mineral occurrences and of areas containing anomalous concentrations of selected metallic elements.

Geochronologic studies are being done in cooperation with the southeastern Alaska geochronology project, J. G. Smith, Chief. The appraisal is part of the U.S. Forest Service study of the suitability of the project area for inclusion in the National Wilderness Preservation System established by the Wilderness Act of 1964.

Project status: The project was initiated in 1973 and fieldwork was completed during the 1973, 1974, and 1975 seasons. The aeromagnetic survey was completed in 1973. All analytical work has been completed, report preparation is underway, and the joint USGS-USBM manuscript is scheduled for submittal in 1976.