



*Photo: U.S. Geol. Surv. by R. R. Coats*  
Survey geologist taking notes on Kiska volcano, Aleutian Islands.

## THE GEOLOGICAL SURVEY IN ALASKA: FIELD SEASON OF 1949\*

By John C. Reed†

**T**HE Geological Survey has been making geological, mineral resources and other investigations in Alaska, and has been carrying on topographical mapping there for more than fifty years. Formerly the work was on a very inadequate scale, but the results none the less have been a large factor in the development of Alaska. Shortly before the Second World War, the Alaskan activities of the Survey began to expand, and the expansion has continued until Survey parties are now distributed each field season from Ketchikan to Barrow, from the Canadian boundary at the 141st meridian westward to the islands of the Bering Sea, and southwestward to the end of the Aleutian Chain.

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The Geological Survey is organized into four principal operating divisions, each of which now has Alaska responsibilities:

Geologic Division—Geological mapping, mineral resources investigations, and related activities.

Topographic Division—Topographical and planimetric mapping.

Water Resources Division—Water resources investigations, including surface water, ground water, and quality of water.

Conservation Division—Supervision of development under mineral leases on Federal and Indian lands, and the classification of such lands as to their mineral or non-mineral character and as to their water and power potentialities.

The activities that were carried on by the Survey in Alaska during the season of 1949 are outlined below. The funds for the work are provided largely by direct appropriation to the Geological Survey but substantial amounts are received also by transfers or advances from other federal agencies, including all three armed services, for specific investigations that come within the Survey's fields of special competence.

Many of the Alaskan geologists return to Washington headquarters in the winter to prepare reports and to use the laboratory and library facilities there. However, to facilitate its Alaskan work the Geologic Division has established a sub-office in San Francisco which serves as headquarters for some of the geologists; other Alaskan activities are carried out from Denver, and a few geologists now have their headquarters in Alaska in small, centrally located offices at Juneau, Cordova, Palmer, and Fairbanks.

The Alaskan operations of the Topographic Division are handled from the office of the Rocky Mountain Region of that division in Denver.

The Water Resources Division has assigned a District Engineer and several other engineers to perform surface water investigations, with offices at Juneau and Palmer. Ground water investigations are carried out by a ground water geologist and several assistants. A quality of water office and laboratory has been established at Palmer. The land-classification responsibilities of the Conservation Division relating to water power are undertaken by the Tacoma office of that division, and those relating to minerals are handled in Washington.

#### GEOLOGIC DIVISION

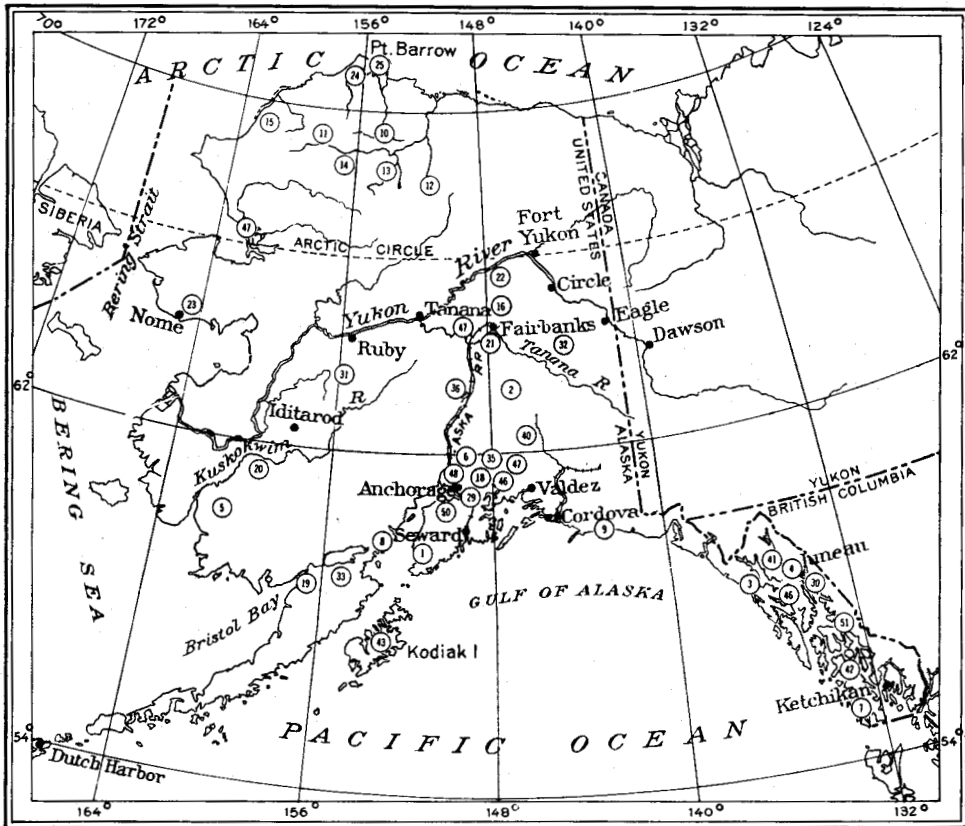
The diverse activities of the Geologic Division in Alaska can be considered conveniently by type of investigation. During the 1949 season the following were underway:

##### *Coal investigations:*

(1) Coal investigations were continued for a second full season in the Homer area on the Kenai Peninsula. The Tertiary rocks of the western part of this peninsula contain large coal resources. The collection

of information necessary for coal-land classification, which formed a substantial amount of the work of the party, was carried out for the Conservation Division.

(2) Coal investigations were continued eastward from the Nenana River area, caches being placed by helicopter. This was the sixth consecutive season that this large coal-bearing area had been under investigation. The complete project will cover approximately 1,800 square miles.



Some Geological Survey field projects in 1949. (Numbers correspond to project numbers in the text.)

#### *Gold and associated metals:*

(3) Geological mapping and study of the mineral possibilities in the Chichagof Island–Icy Strait–Glacier Bay region were continued, with the aid of a recently purchased 36-foot boat.

(4) The study of the Juneau district and adjacent parts of the Juneau mineralized belt has been underway for three seasons and the field work is now essentially complete. The geologists have their headquarters at Juneau and the project has been conducted on a year-round basis.

(5) The past summer's work completed a long-range geological

mapping project and appraisal of mineral resources in the Lower Kusko-kwim region. This includes an area of 6,000 square miles of which about half is covered by alluvium.

(6) A project was continued in the Willow Creek mining district north of the Matanuska Valley. The area contains important resources of lode gold and the systematic and detailed study of the structural geology may yield information on the localization and emplacement of the lodes.



Photo: U.S. Geol. Surv. by F. F. Lawrence

Independence Mine, Willow Creek district, one of the most important producers in the region.

The project was initiated in 1948 and is expected to cover three seasons.

*Limestone and other investigations:*

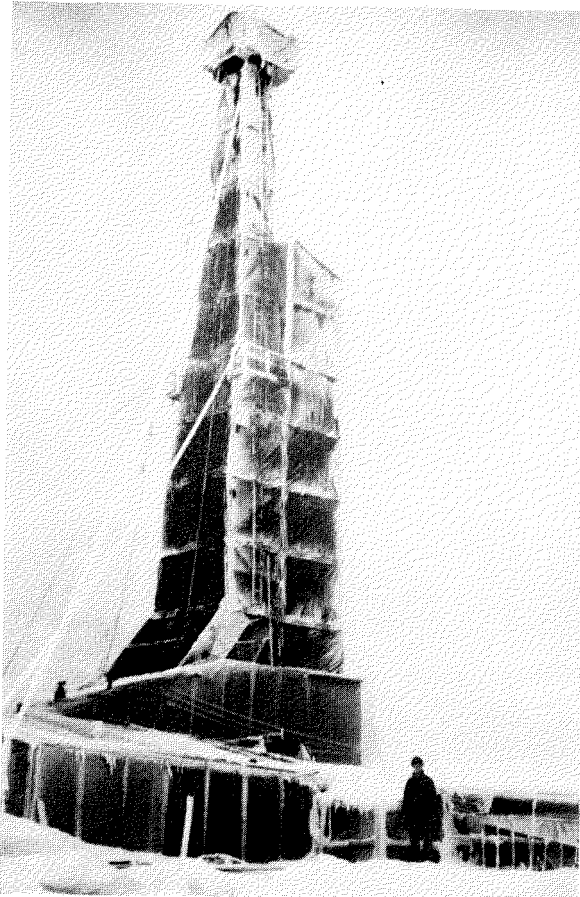
(7) The limestone resources on the west coast of Prince of Wales Island in the Tuxekan Island area were studied in the first half of the season. Later the same party investigated magnetite deposits in the Tah and Hunter Bay area of Prince of Wales Island; finally they prepared cross sections of Prince of Wales Island along Klakas Inlet and the South Arm of Cholmondeley Sound. The chartered boat *Oseejo* was used for transporting the party.

*Petroleum investigations:*

(8) A party continued stratigraphical and paleontological studies on the west side of Cook Inlet northeast from Chinitna Bay to Tuxedni Bay.

(9) A reconnaissance was made of the Mesozoic rocks in the Alaska Peninsula—Cook Inlet—Bristol Bay region, and the same geologist carried out additional stratigraphical studies in the Katalla-Yakataga area on the Gulf of Alaska.

(10) In northern Alaska a party mapped in the area of Maybe Creek,



*Photo: U.S. Geol. Surv. by J. C. Reed*

Partially winterized rig at a test hole site in Naval Petroleum Reserve No. 4.

the upper Ikpikpuk River, and Titaluk River looking for possible "highs" on structures as potential drilling sites for oil.

(11) Another party mapped the geological structure in the area of Carbon Creek and the upper Meade River, and identified possible drilling sites.

(12) Structural studies were made of the Lisburne limestone in selected areas between the Sagavanirktok and Chandler River basins as well as structural and stratigraphical studies of Cretaceous outcrops in the upper Colville River basin.

(13) A party was engaged in the stratigraphical and structural study of Lower Cretaceous and associated rocks

in the area of the Kiruktagiak and Killik Rivers. The primary objective was the subdivision of the Lower Cretaceous strata to determine total thickness and contact relationships of the underlying and overlying rocks.

(14) Stratigraphical and structural studies were made of the Etivluk and Kuna River areas and of the Colville River between these rivers.

(15) Another party mapped the geology in the vicinity of the Kukupruk and Kokolik Rivers with particular attention to the geological structures and possible closures on them.

(16) The Fairbanks office and petroleum geology laboratory, established to carry on certain parts of the Survey's responsibilities in regard to Naval Petroleum Reserve No. 4, continued to operate with a staff of about four geologists with their assistants.

(17) Certain aspects of the work pertaining to Naval Petroleum Reserve No. 4 are performed in Washington. Projects (16) and (17) continue throughout the year.



Photo: U.S. Geol. Surv. by J. C. Reed

Landslide area along the Alaska Railroad between McKinley Park Station and Healy. Track maintenance is difficult in this area underlain by frozen, but otherwise unconsolidated, materials.

*Permafrost and terrain investigations:*

The permafrost and terrain analysis program of the Geological Survey (Military Geology Branch) is facilitated by a small office in Palmer and includes projects in the following general localities:

- (18) In the vicinity of Knik Arm near Anchorage.
- (19) In the Bristol Bay area near Naknek.
- (20) In the Kuskokwim region, downstream from McGrath.
- (21) In the Fairbanks and Dunbar areas.
- (22) In the Yukon Flats area between Circle and Fort Yukon and downstream.
- (23) Along the southwest and northern margins of the Seward Peninsula. This was a reconnaissance project with the centre of operations at Nome.
- (24) A project of permafrost research has been initiated at the Arctic Research Laboratory of the Office of Naval Research at Point Barrow with principal interest in the mineralogy of ice as related to permafrost, including the microscopic study of ground ice.

*Geophysics:*

- (25) A geophysical investigation of permafrost, largely thermal and resistivity studies, has been going on since April as a year-round project at

the Arctic Research Laboratory at Point Barrow. Projects (24) and (25) are closely coordinated.

(26) In connection with the Aleutian investigations outlined below, the Branch of Geophysics has been maintaining a seismic observatory on Adak Island. This observatory is supplemented by another on Great Sitkin Island.

*Aleutian investigations:*

The program of volcano investigations and related military engineering studies being carried out in the Alaska Peninsula-Aleutian Island region since October 1945 was continued in the 1949 field season. This program is financed jointly by the Geological Survey and the three military services.

(27) A party, using the Survey-owned motor vessel, *Eider*, performed geological mapping and investigations on Attu Island.

(28) Geological mapping and investigations were carried on in the Rat Islands. Transportation was by air and by boat through the cooperation of the U.S. Coast and Geodetic Survey.

*Engineering Geology:*

(29) General engineering geology studies were conducted in the Anchorage area with particular emphasis on the distribution, availability, and quality of construction materials.

*Other investigations:*

Additional miscellaneous geological studies were made (30) in southeastern Alaska, (31) in the Ruby-Kuskokwim area, and (32) in the region from Fairbanks east to the border.

(33) Several small mineralized areas were investigated west of Cook Inlet in the general vicinity of Iliamna Lake.

(34) The head of the San Francisco office, and general field supervisor for the Alaskan Section, inspected a number of the projects, planned future activities and personally supervised (35) an investigation of the gypsum deposits at Sheep Mountain.

(36) A party made reconnaissance studies of shales in the vicinity of Mount McKinley National Park in the early part of the season. Subsequently this party initiated a project of investigation of the geology of the park.

(37) In addition to the specific projects listed above, a few more were carried on in Alaska for other federal agencies. Most of these were supported by funds made available by those agencies.

#### TOPOGRAPHIC DIVISION

*Alaska Reconnaissance Map Series:*

(38) During the past year the Barrow, Nushagak Bay, Fort Randall, False Pass, Pribilof, Ugashik and St. Lawrence 1:250,000 sheets were drafted. Some of these sheets have been published and others will be

available shortly. It is anticipated that about 20 additional maps of this series will be processed during the 1950 fiscal year. These maps eventually will cover all of Alaska and are being prepared in the office of the Topographic Division's Rocky Mountain Region at Denver from all existing source data including ground control, older maps, aerial photographs and navigation charts.

*Mile-to-the-inch series of maps:*

The small-scale quadrangles of the Reconnaissance Map Series have been further subdivided into smaller quadrangle units on the mile-to-the-inch scale. In a north-south direction four 15' sheets fall within the 1° 1:250,000 scale sheet. In the east-west direction, the reconnaissance map is subdivided into from five to eight units depending on latitude. During the 1948 season the Navy Department took air photographs of southeastern Alaska and of a small part of the Interior. During the same season field parties established horizontal and vertical control so that more than 30 topographical maps will be published or in reproduction stages by the end of 1950.

(39) Additional aerial photography for mapping was accomplished in the 1949 season by the Navy and by the Air Force. The Topographic Division assigned a field liaison officer between the military photographic units and the Geological Survey.

(40) A party of eight field engineers, with two helicopters, established control and performed operations required for photogrammetric compilation of a substantial number of quadrangles, already covered by vertical photography, in the Glenn and Tok Highway areas from near Sheep Mountain to Tok Junction.

(41) A party of five field engineers, with one helicopter, established control and performed operations similar to (40) above, for quadrangles from Glacier Bay to Juneau and northward to Skagway.

(42) Four field parties performed similar operations for another group of quadrangles in the Craig-Petersburg area.

(43) Field completion and accuracy surveys were conducted for several quadrangles on Kodiak Island. Cartographical operations for these quadrangles will follow late in 1949.

*Northern Alaska Planimetric Maps:*

(44) The office compilation of maps of northern Alaska on a scale of 1:48,000 was continued. This series of reconnaissance planimetric maps is largely for the use of the Navy Department in exploring the oil possibilities of Naval Petroleum Reserve No. 4.

*Aeronautical Chart Service Pilotage Charts:*

(45) The Survey is engaged in the revision of pilotage charts of Alaska on a scale of 1:500,000 for the Aeronautical Chart Service of the Department of the Air Force. The work is supported by Aeronautical Chart Service funds. The project is now more than 65% complete.



### WATER RESOURCES DIVISION

Water resources investigations in Alaska by the Geological Survey, which were renewed in 1946, have developed into a regular and fairly well established program.

#### *Surface water investigations:*

(46) A district engineer at Juneau, is responsible for the Survey's surface water investigations throughout the Territory including operation of existing stations, reconnaissance, and establishment of new gauging stations, interpretation of stream flow data, and liaison in connection with the programs and operations of other agencies and units. A hydraulic engineer, at Juneau, is engaged on both field and office phases of the investigations, principally in southeastern Alaska. A hydraulic engineer at Palmer is assigned to the Alaska Railroad Belt and the adjacent coastal and interior regions.

The Water Resources Division has acquired a 76-foot boat for use principally for surface water investigations in southeastern Alaska.

#### *Ground water investigations:*

(47) The Survey's ground water program in the Territory includes reconnaissance for municipal water supply investigations throughout the Territory, test well drilling at Fairbanks, Kotzebue, and in the Matanuska Valley, and drilling and establishment of observation wells and related work as the needs of the Survey and other agencies require and as personnel and funds permit.

#### *Quality of water investigations:*

(48) A chemist has been detailed to Palmer and has set up a quality of water laboratory. In cooperation with the surface and ground water personnel of the Water Resources Division he has established an orderly program of quality and sediment observations.

### CONSERVATION DIVISION

#### *Mineral classification:*

(49) Funds for obtaining data for mineral land classification in the field were spent for the purpose by the Geologic Division through inter-division administrative arrangement as indicated under project (1).

#### *Water and power classification:*

Water and power classification was carried on by two field parties during the season as follows:

(50) A party completed the survey of Ship Creek near Anchorage and made surveys of two dam sites on Eagle River near Anchorage.

(51) Another party made surveys in the vicinity of Scenery Cove and Ruth Creek at Thomas Bay near Petersburg and dam site surveys on the outlets of Grant and Ptarmigan Lakes near Seward on the Kenai Peninsula.