

Surficial Geology

Frank W. Trusler /

The surficial drifts of the Chigmit River, Lake, Susitna River, Willow, and Cook Inlet are largely due to the action of glacial ice and streams. The prominent topographic features of the area are the coastal plain belt of ridges and depressions parallel to the Alaska Range, Cook Inlet, and the Gulf of Alaska; the broad, flat, coastal plain off Homer, nearly featureless in the south, but with some low hills in the north; the low, rolling hills of the interior basin areas; and the high, rugged mountain peaks of the Chigmit Range.

parallel and separated by lakes. West and southwest of Big Lake the morainal belt consists of irregular hills that lack ridge form. To the south, other ridges extend about 8 miles north from Knik arm near Anchorage.

The morainal ridges were probably formed by a combination of such processes as glacial push, sliding of rock debris from the ice, and collapse of deposits that lay on or against the ice, as melting proceeded. Where examined, the moraine consists of a thin deposit of mixed stones, sand, silt, and clay. In places the debris may have been sorted by running water, and the till may consist of either gravel or sand. In general, however, the material is relatively impermeable, and depressions in it frequently contain

The form of the land west of the lake and southwest of Big Lake suggests that masses of ice, formerly buried here beneath gravel and sand, melted and left the irregular hills and poorly drained depressions. This means in or beneath the hills is the old till, and probably the poor drainage is probably due to this till having been covered by the clay.

On the eastern side of the lake, the ground is mostly western till, which is composed of large

possibly to or beyond Little Susitna River, is part of this outwash plain. The western and northwestern boundaries of this plain have therefore been drawn tentatively in figure . The lake basins may be depressions left by the melting of buried blocks of ice; if so, they indicate that glacial ice extended this far west at some time before construction of the outwash plain.

The remainder of the area between the moraine and Susitna River is a nearly level surface that is generally marshy except near the small streams that cross it. Cuts along Susitna River and along Little Susitna River near its mouth expose 15 to 30 feet of clean, well-sorted sand, with well developed ridges and furrows, in contact with what appear to be coarse gravel channel deposits of marine. Susitna River, which has a well-defined bed, is a former floodplain.

On the south side of the river, a low terrace, 10 to 12 feet above the present water level, is composed of fine sand, with scattered gravel, and is covered with a thin layer of peat. This terrace is probably the result of a former floodplain, which has been cut down by the river. The terrace is about 100 feet wide and extends for several miles upstream. The river has cut through the terrace, creating a series of deep, narrow gorges. The water level in the river is now at a higher elevation than it was during the last major flood, which occurred approximately 100 years ago. The river has also cut through the bedrock, creating a series of deep, narrow gorges. The water level in the river is now at a higher elevation than it was during the last major flood, which occurred approximately 100 years ago.

end at a time when the relative levels of land and sea were different from those of the present. The clay is relatively impermeable, and springs and seeps occur along its contact with the overlying sand. Such springs and seeps may explain the presence of well drained land bordering the streams that cross the area west of the moraine. The poor surface drainage over the remainder of this tract suggests that the buried clay is more widely distributed than can be demonstrated by the few available exposures.

Hilltops, slopes, and even the flat land throughout the entire area described by this report are covered by a mantle of silt, in which soils have developed. The silt mantle is absent on low land, on gravel terraces, where gravel, sand, or older soil remains, and in places, in poorly drained areas, such as in swamps.

The silt mantle is composed of fine-grained material, the thickness of which varies greatly. It is thin on hilltops and on the flood plain of the stream, and it is thick on the lower slopes and in the swamps. The silt is often very fine, and it is difficult to distinguish it from the clay.

defined over silty till but in sections examined could be determined within a few inches.

This mantle of silt appears to be continuous to the east with a similar one which, in at least part of the Matanuska Valley, has clearly been deposited by wind (Tuck, 1938; Trainer, 1953, pp. 14-15). The writer believes the character of the silt deposit in the area described by this report—a mantle of relatively uniform thickness, continuous over irregular topography, and consisting of silt and sandy silt distinctly unlike the underlying materials—indicates that it, too, was deposited by wind. The mantle is somewhat thicker in the western part of the area than to the east, and much of the dust was therefore probably blown from source to the west, such as bare flats just west of the river. It is possible that some of the dust may also have been blown from flood-claims to the Matanuska River at the east. In case of the silt mantle, however, the source is glacial. The glacial deposit is a drift of sand and gravel, which, according to the writer, is believed to have been derived from the Matanuska (sic) River, located between the two lakes. The writer believes that the drift gave rise to the silt mantle, which, in turn, gave rise to the loess.

John C. Jackson

Alaska

Literature Cited

Karistrom, T. N. V., 1953, Upper Cook Inlet region, Alaska;
in Pewe, T. L., and others, Multiple glaciation in Alaska,
U. S. Geol. Survey Cir. 289, pp. 3-5.

Trainer, F. W., Preliminary report on the geology and ground-
water resources of the Matanuska Valley agricultural area,
Alaska, U. S. Geol. Survey Cir. 268.

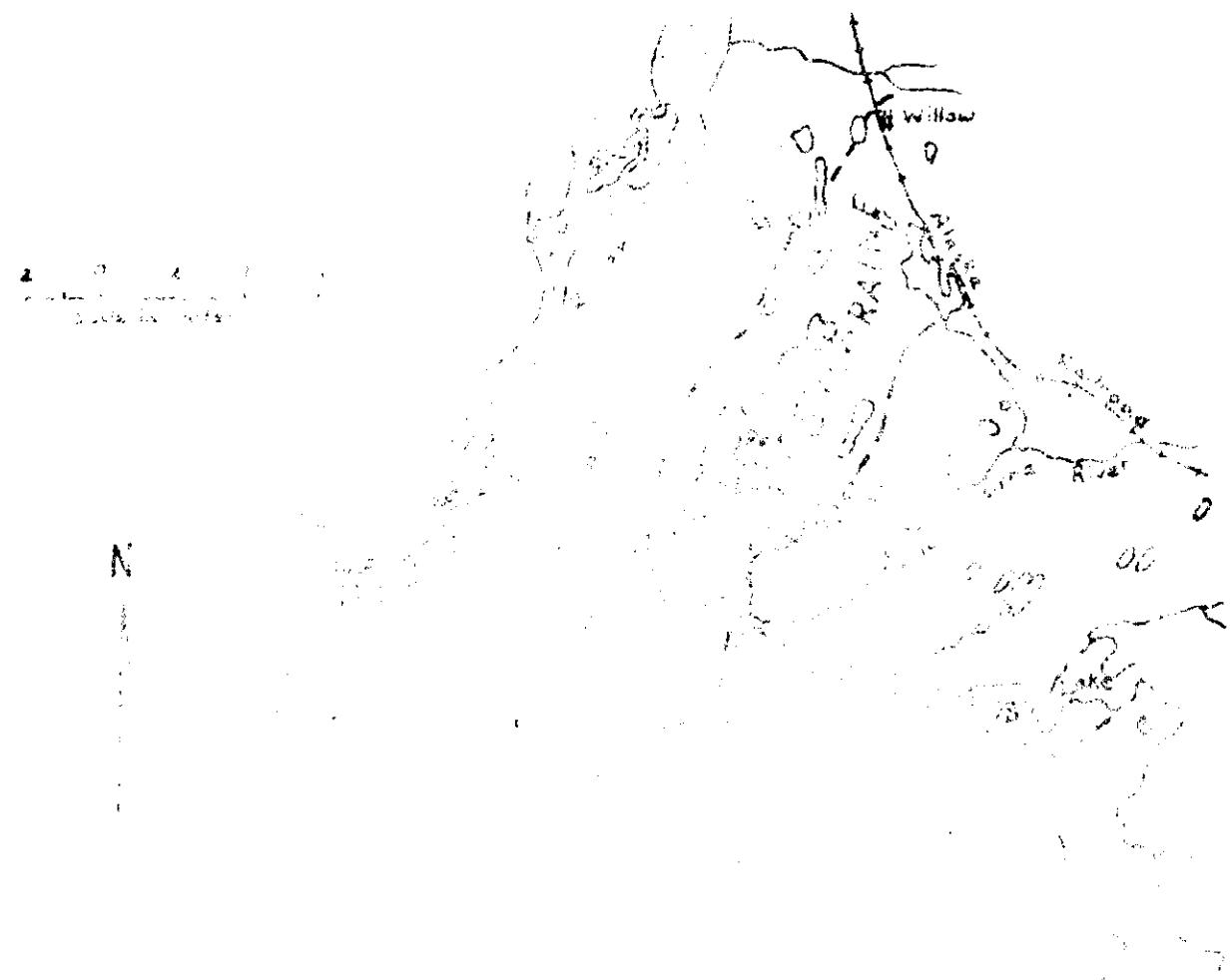
Tuck, G. C., 1922, The loess of the Matanuska Valley: Jour.
Geol., Vol. 40, No. 4, pp. 477-509.

Unpublished Reports

Leiby, R. J., 1953, Geology of the Matanuska River area, Alaska, 1950, Descriptive
Report, U. S. Geol. Survey, 1:250,000, 1 sheet, 1950, Geol.

Map of low-

order streams



N

Mr. D. J. Cederstrom, Charlottesville,
Virginia

February 10, 1955

F. W. Trainer, Anchorage, Alaska

Geologic Information for Soil Conservation report

References: Your memorandum, November 4, 1954, and
Mr. Foyre's memorandum, November 9, 1954, code 45040,
on the same subject.

Enclosed you will find a short summary of the geology of an
area adjoining the Alaska State Highway Matanuska Valley as described in
Circular 242. This circular was written in response to a request from
Mr. George Woodruff, Alaska Soil Conservation Service, Palmer, Alaska.
Mr. Woodruff asked for a detailed geological section in a report
describing the soil conditions present. He will, of course, make
the report available to you.

The information contained in this circular is, as I know, not
finally set up in a formal report which will be submitted to the
Department of Agriculture and included in the later series of
Circulars.

Mr. George Woodruff, Alaska Soil Conservation Service,
Service Bureau, Anchorage, Alaska, has asked the Bureau of Land
Management, Anchorage, Alaska, to furnish him a copy of the report which
(a former employee) I prepared for the Bureau. This report would not
be a formal report, but would be a short one designed to be used by the public.

It is my opinion that the report which you have requested is
probably not available at the present time. It is being prepared
presently.

Very truly yours, *[Signature]*

Frank W. Trainer
Alaska State Soil Conservation Service



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

b5d0

March 3, 1955

Memorandum

To: Director
 From: Chief, Water Resources Division
 Subject: Approval of paper

Enclosed is a brief paper by G. H. Trainer on the surficial
geology of an area adjoining the Yukon River in the Utukuska Valley,
Alaska, which was prepared at the request of the Soil Conservation
 Service for inclusion as a chapter in the proposed volume of the area.
 This paper has been reviewed in the Water Resources Branch and appears to
 be in good order. It contains no recommendations. It is suggested that
 you approve the paper for return to the author, G. H. Trainer, Soil
 Conservation Service, Denver, Colorado, where it will be
 copied and distributed.