NOTE:

The analysis of geologic data collected in 1947 has resulted in some revision in the stratigraphic picture of the Upper Cretaceous and early-Tertiary sequences of rocks. In connection with this revision it has become advisable to drop the use of the term "formation" as the time-rock unit designations A through I and instead to use the term "zone." Use of the term "formation" will be more appropriate in a more detailed tongue-member classification of the Upper Cretaceous rocks.

In these 1947 preliminary reports the time-rock units formerly called Formations E, F, G, H, and I are now called Zones E, F, G, H, and I. However, some changes in vertical limits have been made. These are discussed in the reports concerned.

As the term is used in the October 1947 reports, Zone A is, in general, the sequence of rocks formerly called Formation A. Exceptions are on the Oolamnagavik and Kurupa Rivers where Zone A is equivalent to Formations A, B, and C. Zone A is dominantly a marine section of thick sandstone members separated by siltstone and shale. The thickness is fairly consistent, ranging from about 2,000 feet to about 2,500 feet as measured along streams from the Sagavanirktok to the Utukok Rivers. Zone A has proved to be a very persistent unit laterally. It has been recognized in the field on the Utukok, Colville, Kurupa, Oolamnagavik, Killik, Chandler, Anaktuvuk, Nanushuk, and Sagavanirktok Rivers.

All rocks between the top of Zone A and the bottom of Zone E are now classified as Zone D. This sequence of rocks thickens from east to west ranging from about 2,500 feet on the Nanushuk to about 5,000 feet on the Utukok River. On the Nanushuk River it is mainly a marine shale section which becomes sandy and contains some coal near the top. Although marine tongues are present in the sections that have been studied to the west, deltaic-coastal, and terrestrial facies form a large part of the section. The units into which Zone D can be divided differ from river to river and are called d-1, d-2, etc. These divisions apply only to a particular river or area and are not to be considered correlative.

PRELIMINARY REPORT ON THE STRATIGRAPHY AND STRUCTURE OF THE AREA OF THE TITALUK AND UPPER IKPIKPUK RIVERS ALASKA

By

E. J. Webber

INTRODUCTION

Geological Survey Party No. 4 was assigned an investigation of the Ikpikpuk and Titaluk Rivers and East Fork of the Ikpikpuk River mainly for the purpose of obtaining stratigraphic information which would be of use in determining the parts of the Upper Cretaceous sequence that underlie the areas investigated by United Geophysical Company parties 43 and 46.

A total of five days were spent in geological investigations of the Titaluk River with a Cub plane equipped with pontoons. The party was composed of the geologist and Don Hulshizer, pilot of Wien Alaska Airlines. The geologist and Ronald K. Sorem, field assistant, traversed the Ikpikpuk River by boat from the junction of Maybe Creek and the Kigalik River to near the junction of the East Fork. From the northernmost point reached by boat traverse, the river was examined by plane to north of latitude 70° N., but no outcrops or rubble indicating bedrock were seen. The East Fork was also examined from the air but no outcrops or rubble were observed.

TITALUK RIVER

An anticline parallels the upper part of the Titaluk River. The dips on both limbs are low, mostly 1-3°, and the axis is thought to plunge gently east.

Numerous small outcrops on the south limb of this anticline expose sandstone, sublithographic limestone, and conglomeratic sandstone. Rubble of coal, plastic clay (probably fire-clay), and clay shale are found but beds of these do not crop out. The sandstones are of two general types: one is light to gray, weathering yellow-brown, very fine to fine grained, hard to slightly friable, calcareous, slabby and uneven bedded, and has low to high porosity; the other is very fine grained, greenish, weathering yellow-brown, dense, hard, siliceous, indistinctly bedded to massive, and has very low porosity. Clay ironstone galls, coalified parts of trees, and carbonaceous material are locally abundant. Insofar as known the rocks are unfossiliferous. These rocks on the upper part of the Titaluk River are thought to be Zone D.

At about longitude 155° 40' W. on the middle part of the Titaluk River a large collection of well-preserved pelecypods was obtained. This collection has been examined by George Gryc of the Geological Survey.

Gryc has identified the pelecypods as Roudiaria sp. R. L. Detterman of the Geological Survey found pelecypods on the Colville River, which Gryc has also identified as Roudiaria sp., associated with Inoceramus sp., chevron type which is restricted to Faunal Zone 2. Roudiaria sp., is tentatively assigned to Faunal Zone 2. Roudiaria is known from the Lower Cretaceous through the middle Upper Cretaceous. Except for the presence of bentonite, associated lithology is the same as described for the upper Titaluk River. Specimens of Roudiaria sp., and unidentified pelecypods were found also near latitude 69° 42' N. The rocks exposed on the middle part of the Titaluk River are believed to be Zone E.

Two exposures within a few miles of each other on the lower part of the Titaluk River at about latitude 69° 48' N. are lithologically similar to those on the middle and upper parts of the river. At a third exposure of about 40 feet of strata the sandstones are loosely consolidated and contain irregular pockets of moderately to well consolidated rock. One of these beds of sandstone has a petroliferous odor. No fossils were found in these beds. The degree of consolidation of beds exposed on the Colville and Nanushuk Rivers can be used to distinguish between Zone I and Upper Cretaceous rocks: the beds of Zone I are loosely consolidated with pockets of better consolidated material whereas beds of Upper Cretaceous rocks are usually well consolidated. It is believed that Zones E and I are present on the lower part of the Titaluk River.

The thickness of the section on the Titaluk River is probably measurable in hundreds of feet.

At the northernmost outcrop on the Titaluk River a small anticline striking northwest is exposed in a cutbank. Dips on the limbs are about 10°. The strata are horizontal 40 feet from the axis.

IKPIKPUK RIVER

Outcrops are mostly small but rather numerous. At Little Supreme Bluff and at Last Chance Bend there are rather large and excellent exposures. Three lithologic units were recognized.

The lowermost unit is Zone E. Its lithology is similar to that described on the upper and middle parts of the Titaluk River. Roudiaria sp., was found at a number of localities. Fragments of Inoceramus sp., were found at two localities; one, about two miles north of the Valley of Willows, and the other, about halfways between Camp August 24 and Camp August 25. Gryc has examined the fragments and thinks that at the first locality the fragments are Inoceramus sp., sub-round or chevron type, probably the latter. Those from the second locality are too small to be identified. Numerous specimens of other unidentified pelecypods were obtained at Last Chance Bend associated with Roudiaria sp. At Last Chance Bend a bed of sandstone six feet thick containing thin interbeds of sublithographic limestone is stained brownish and has a petroliferous odor. The sandstone is very fine grained, clean, very friable, and has a porosity

of 25.8%. About a quarter of a mile northeast the same bed has a porosity of 27.2%. Zone E extends from near the junction of Maybe Creek and the Kigalik River to near the junction of the East Fork.

The next higher unit is thought to be Zone F. It is poorly exposed and its lithology determined largely from rubble slides. It is composed of siltstone, sandstone, bentonite, bluish clay, which in some places is bentonitic, and black "paper" shale containing thin veinlets of bentonite. The sandstone is very fine to fine grained, greenish, dense, hard, siliceous, and has almost no porosity. Rubble of sandstone, which is very fine to fine grained, very friable, porous, and has a petroliferous odor was seen at a number of localities between Camp August 17 and Camp August 22. It could not be determined whether this sandstone belonged in Zone E or Zone F. No megafossils were found in the rocks referred to Zone F. Zone F is exposed from the junction of Maybe Creek and the Kigalik River to the Valley of Willows.

The uppermost unit is thought to represent Zone I. About 90 feet of strata assigned to Zone I are well exposed at Little Supreme Bluff. Here the lithology consists of sandstone, clay, shaly coal, and bentonite. The sandstone is light colored, very fine grained, rather argillaceous to clean, even-bedded to massive, and loosely consolidated with pockets of better consolidated material. These beds are referred to Zone I on the basis of consolidation as discussed in the description of the rocks on the lower Titaluk River. No fossils were found. Zone I is exposed at Little Supreme Bluff and for about four miles to the north. Several of the uppermost beds exposed at the northern part of Last Chance Bend are rather loosely consolidated and possibly may represent Zone I. However, there is no marked break in consolidation between the lowermost and uppermost of the exposed beds. Roudiaria sp., is found in the lower beds.

At Little Supreme Bluff the loosely consolidated beds referred to Zone I rest comformably about eight feet above the river level on well consolidated beds of Zone E, which contain Roudiaria sp.

The anticlines at Last Chance Bend are minor structures and similar to the one described on the lower part of the Titaluk River.

The thickness of the Upper Cretaceous and Early Tertiary sequence on the Ikpikpuk River is believed measureably in hundreds of feet.

TENTATIVE CONCLUSIONS

(1) Dips are mostly very low in the southern part of the area and mostly horizontal in the northern part.

(2) The thickness of the total section is probably measureable in hundreds of feet.

(3) Paleontologic evidence indicates that most of the area is underlain by rocks of Zone E.

(4) A disconformity between Zones E and I is indicated.

(5) Indications of petroleum were found in rocks assigned to Zones E and I and possibly Zone F and were observed in all parts of the area except the upper and middle parts of the Titaluk River.

(6) The high point on the Oumalik anticline is probably not higher than Zone E and is probably well below Zone E.

(7) Favorable reservoir beds are in Zones E and I and possibly Zone F.