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This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.

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In the summer of 1955, the authors spent a week in reconnaissance mapping along the northwest side of Chignik Lagoon, on the southeast side of the Alaska Peninsula. The field work was part of a preliminary reconnaissance study to be used in the planning of detailed petroleum investigations in Alaska. In the course of the study, fossiliferous petroliferous marine sands of the Chignik formation of Late Cretaceous age were found along the shore of Chignik Lagoon.

The location of the stratigraphic section in which the petroliferous sands were found is shown on the accompanying map (fig. 1). The rocks exposed in this area consist of sandstone, siltstone, shale, and conglomerate of the Chignik and Naknek formations. The exposed rocks strike about N. 20° W. and dip about 10°-15° to the northeast. Reports discussing the general geology of the Chignik area have been written by Atwood (1911), Martin (1921), and Knappen (1929); none of these reports describes the petroliferous marine sands.

The stratigraphic section in figure 2 shows these marine sands, as well as the other units of the Chignik and Naknek formations exposed along the northwest shore of Chignik Lagoon. All thicknesses given in the section are approximate.

Porosity and permeability determinations for three samples were made by the Fuels Branch Oil and Gas Laboratory of the U. S. Geological

Survey. Sample numbers followed by the designation "PP" on figure 2 indicate the positions of the samples that were used. Sample No. 55AKe25PP had an effective porosity of 13.1 percent, and an air permeability of 1.4 millidarcies; sample No. 55AKe26PP had an effective porosity of 9.1 percent, and an air permeability of 0.1 millidarcies; sample No. 55AKe29PP had an effective porosity of 7.0 percent, and an air permeability of 0.4 millidarcies.

The positions of fossils collected from rocks of the measured section are shown on figure 2. The locations of other fossil lots collected by the authors in the area are shown on the index map (fig. 1). The fossils in all the collections were identified by R. W. Imlay, of the U. S. Geological Survey; his identifications are given below:

Fossil lots from the Cretaceous beds in Stratigraphic Section A

(Positions shown in the column in figure 2)

FOSSIL LOTS		IDENTIFICATIONS
55AKe15F	(Mes. loc. no. 25702)	*Canadoceras* aff. *C. newberryanum* (Meek)
55AKe11F	(Mes. loc. no. 25701)	*Inoceramus schmidti* Michael *I. balticus* Boehm in Nagao and Matumoto *Anomia* sp. *Glycymeris* sp. Gastropods undetermined
55AKe20F	(Mes. loc. no. 25703)	*Inoceramus* aff. *I. orientalis* Sokolow *Inoceramus schmidti* Michael *Anomia* sp.
55AKe24F	(Mes. loc. no. 25707)	*Canadoceras* aff. *C. newberryanum* (Meek)

FOSSIL LOTS		IDENTIFICATIONS
55AKe23F	(Mes. loc. no. 25706)	Canadoceras aff. C. newberryanum (Meek) Inoceramus balticus Boehm in Nagao and Matumoto
55AKe22F	(Mes. loc. no. 25705)	Canadoceras aff. C. newberryanum (Meek)
55AKe21F	(Mes. loc. no. 25704)	Canadoceras sp. Inoceramus balticus Boehm in Nagao and Matumoto

Fossil lots from the Jurassic beds in Stratigraphic Section A

(Positions shown in the column in figure 2)

FOSSIL LOTS		IDENTIFICATIONS
55AKe16AF	(Mes. loc. no. 25712)	Phylloceras sp.
55AKe16F	(Mes. loc. no. 25711)	Aucella concentrica (Sowerby)(equals A. bronni Roullier) Lima sp. Delphinula sp.
55AKe17F	(Mes. loc. no. 25713)	Phylloceras sp. Aucella concentrica (Sowerby)
55AKe18F	(Mes. loc. no. 25714)	Aucella concentrica (Sowerby) Ammonite fragment Gastropod fragment
55AKe19F	(Mes. loc. no. 25715)	Phylloceras sp. Aucella concentrica (Sowerby)
55AKe14F	(Mes. loc. no. 25710)	Phylloceras sp. Aucella concentrica (Sowerby)
55AKe13F	(Mes. loc. no. 25709)	Phylloceras sp.
55AKe12F	(Mes. loc. no. 25708)	Phylloceras sp. Aucella concentrica (Sowerby)

Other collections of Cretaceous age in Chignik Lagoon area

(Locations shown on index map)

FOSSIL LOTS	IDENTIFICATIONS
55AKe9F (Mes. loc. no. 25697)	Anomia sp.
55AKe10F (in part) (Mes. loc. no. 25699)	Inoceramus cf. I. schmidti Michael Anomia sp. Gastropods undetermined
55AKe23F (Mes. loc. no. 25700)	Brachiopods undetermined Crinoid columnal Crustacean fragments Lima sp. Anomia sp.

Other collections of Jurassic age in Chignik Lagoon area

(Locations shown on index map)

FOSSIL LOTS	IDENTIFICATIONS
55AKe3F (Mes. loc. no. 25696)	Phylloceras sp. Aucella concentrica (Sowerby) Crustacean fragment
55AKe10F (in part) (Mes. loc. no. 25698)	Belemnite fragment Aucella concentrica (Sowerby) Lima sp. Camptonectes sp. Crustacean fragment

Imlay states concerning these fossil collections:

"The collections from the Naknek formation contain the common species found elsewhere in the Naknek such as Aucella concentrica (Sowerby) and certain undescribed species of the ammonite Phylloceras, the pelecypod Lima and the gastropod Delphinula. The presence of Aucella concentrica is good evidence of a late Oxfordian to early Kimmeridgian age and indicates a position low in the Naknek formation....

"The Inocerami from the Chignik formation show that its age is late Late Cretaceous. The species Inoceramus schmidti Michael, I.

balticus Boehm of Nagao and Matumoto occur in the Matanuska formation directly above beds containing I. undulatoplicatus Roemer, which is a world-wide Santonian marker. In Japan I. schmidti, and I. balticus occur in the same relative stratigraphic positions and Japanese paleontologists assign them to the Campanian and early Maestrichtian. I doubt much whether these species are as late as Maestrichtian, but a Campanian age seems reasonable.

"The ammonite Canadoceras is a common associate of these Inocerami in Japan, in the Matanuska formation, and in the Chignik formation. The Japanese consider Canadoceras to be of late Campanian to early Maestrichtian age in Japan. However in Vancouver Island it occurs in beds of Santonian to Campanian age and does not occur in the highest fauna which is possibly of early Maestrichtian age. In the Redding area of California, Canadoceras has been found in beds that are identified confidently as Coniacian on the basis of the presence of the ammonite Peroniceras. It appears, therefore, that the presence of the genus Canadoceras does not permit as close an age determination as the Inocerami."

REFERENCES CITED

Atwood, W. W., 1911, Geology and mineral resources of parts of the Alaska Peninsula: U. S. Geol. Survey Bull. 467.

Knappen, R. S., 1929, Geology and mineral resources of the Aniakchak district, Alaska: U. S. Geol. Survey Bull. 797-F, p. 161-227.

Martin, G. C., 1921, Preliminary report on petroleum in Alaska: U. S. Geol. Survey Bull. 719.