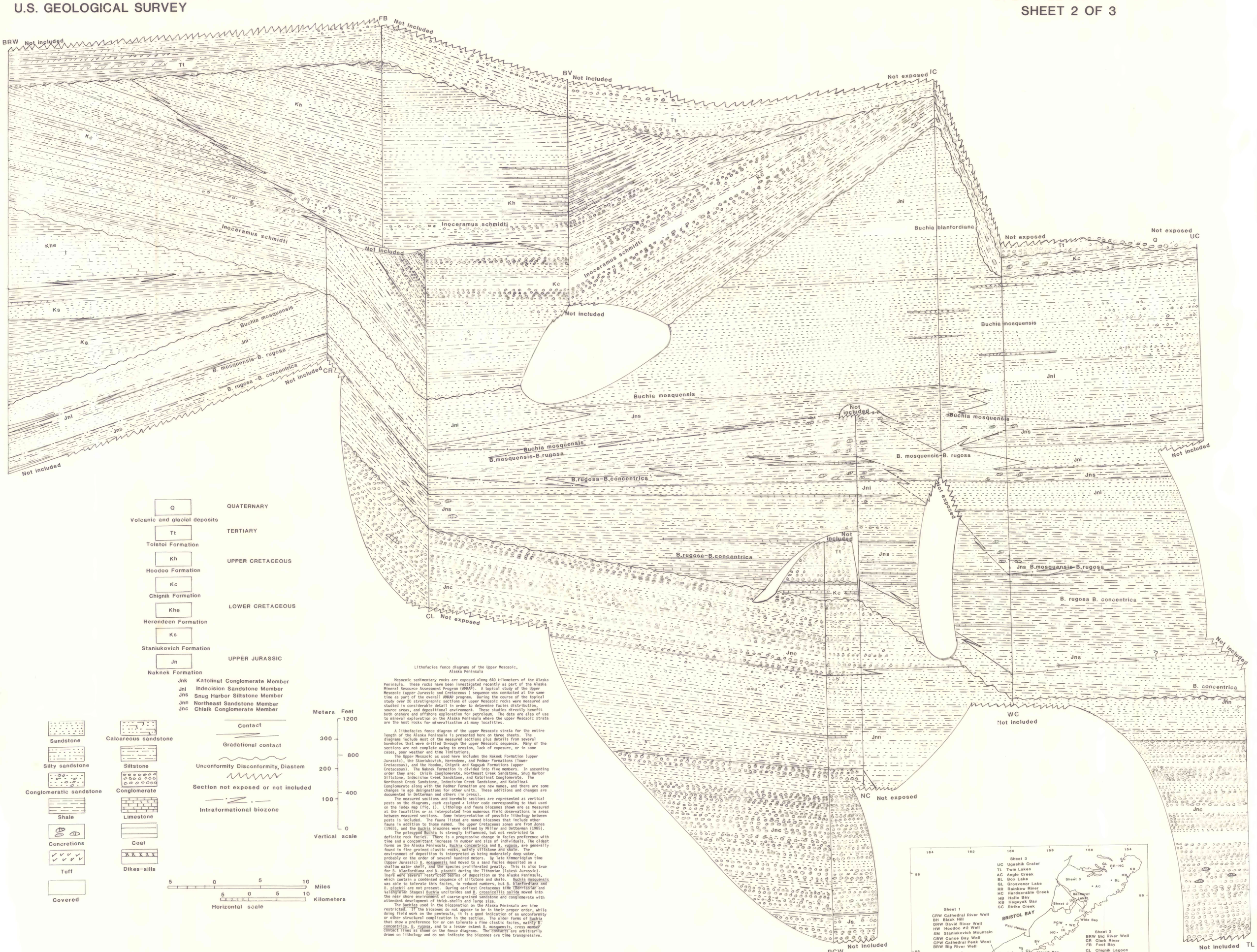

Index map of the Alaska Peninsula showing location of sections

Lithofacies fence diagrams of the Upper Mesozoic, Alaska Peninsula

Mesozoic sedimentary rocks are exposed along 640 kilometers of the Alaska Peninsula. These rocks have been investigated recently as part of the Alaska Mineral Resource Assessment Program (AMRAP). A topical study of the Upper Mesozoic (upper Jurassic and Cretaceous) sequence was conducted at the same time as part of the overall AMRAP program. During the course of the topical study over 20 stratigraphic sections of upper Mesozoic rocks were measured and studied in considerable detail in order to determine facies distribution, source areas, and depositional environment. These studies directly benefit both onshore and offshore exploration for petroleum. The data are also of use to mineral exploration on the Alaska Peninsula where the upper Mesozoic strata are the host rocks for mineralization at many localities.

A lithofacies fence diagram of the upper Mesozoic strata for the entire length of the Alaska Peninsula is presented here on three sheets. The diagrams include most of the measured sections plus details from several boreholes that were drilled through the upper Mesozoic sequence. Many of the sections are not complete owing to erosion, lack of exposure, or in some cases, poor weather and time limitations.

The Upper Mesozoic as used here includes the Naknek Formation (upper Jurassic), the Staniukovich, Herendeen, and Pedmar Formations (lower Cretaceous), and the Hoodoo, Chignik and Kaguyak Formations (upper Cretaceous). The Naknek Formation is divided into five members. In ascending order they are: Chisik Conglomerate, Northeast Creek Sandstone, Snug Harbor Siltstone, Indecision Creek Sandstone, and Katolinat Conglomerate. The Northeast Creek Sandstone, Indecision Creek Sandstone, and Katolinat Conglomerate along with the Pedmar Formation are new names, and there are some changes in age designations for other units. These additions and changes are documented in Detterman and others (in press).

The measured sections and borehole sections are represented as vertical posts on the diagrams, each assigned a letter code corresponding to that used on the index map (fig. 1). Lithology and fauna biozones shown are as measured at the localities or as interpolated from numerous field observations in areas between measured sections. Some interpretation of possible lithology between posts is included. The fauna listed are named biozones that include other fauna in addition to those named. The upper Cretaceous zones are from Jones (1963), and the Buchia biozones were defined by Miller and Detterman (1985).

The pelecypod Buchia is strongly influenced, but not restricted to definite rock facies. There is a progressive change in facies preference with time and a concomittant increase in number and size of individuals. The oldest forms on the Alaska Peninsula, Buchia concentrica and B. rugosa, are generally found in fine grained clastic rocks, mainly siltstone and shale. The environment of deposition is interpreted as being moderately deep water, probably on the order of several hundred meters. By late Kimmeridgian time (Upper Jurassic) B. mosquensis had moved to a sand facies deposited on a shallow water shelf, and the species proliferated greatly. This is also true for B. blanfordiana and B. piochii during the Tithonian (latest Jurassic). There were several restricted basins of deposition on the Alaska Peninsula, which contain a condensed sequence of siltstone and shale. Buchia mosquensis was able to tolerate this facies, in reduced numbers, but B. blanfordiana and B. piochii are not present. During earliest Cretaceous time (Berriasian and Valanginian Stages) Buchia uncitoides and B. crassicollis solida moved into the near shore environment of coarse-grained sandstone and conglomerate with attendant development of thick-shells and large size.

The Buchias used in the biozonation on the Alaska Peninsula are time restricted. If the biozones do not appear to be in their proper order, while doing field work on the peninsula, it is a good indication of an unconformity or other structural complication in the section. The older forms of Buchia that show a preference for or can tolerate a fine clastic facies, mainly B. concentrica, B. rugosa, and to a lesser extent B. mosquensis, cross member contact lines as shown on the fence diagrams. The contacts are arbitrarily drawn on lithology and do not indicate the biozones are time transgressive.

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CENTRAL PART

LITHOFACIES FENCE DIAGRAM OF THE UPPER MESOZOIC, ALASKA PENINSULA

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