



CHUITNA COAL PROJECT GEOLOGY BASELINE INFORMATION

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INTRODUCTION

Background

Study of the geology in the Chuitna Coal Project area concerning coal resources and identification of mineable deposits began with fieldwork in 1961 and 1962 as described by Barnes, 1966. Geologic studies later focused on the proposed mine area and included several drilling programs that began in 1969 and continued through 1986 in several specific campaigns. Drilling work included several objectives:

- Determine presence, lateral extent, thickness, stratigraphy, structure, and quality of near surface coal seams;
- Determine characteristics of overburden and interburden materials overlying coal seams;
- Identify presence and levels of groundwater.

The general study area described in this report was bounded by the Chuit River and its northern tributaries, Lone Creek (2002) on the east and Drainage 2004 on the west. Geologic investigations have taken place throughout the proposed mine area. More intensive geologic investigations and overburden/interburden characterization have been concentrated in the Chuitna Coal Project proposed mine area. Additional information has been collected and reviewed for the surrounding Beluga Region mainly from the U.S. Geological Survey. Pertinent information from these reports is included in this document.

Physical Setting

The Beluga Region between the Beluga and Chakachtna Rivers consists mainly of a broad plateau of generally low to moderate relief. The region is mantled by deposits of glacial origin overlying Tertiary- aged sedimentary rocks. Streams have dissected these materials, creating valleys ranging from a few tens of feet to several hundred feet in depth. Elevations range widely from mean sea level to about 1,400 feet northwest of the proposed mine area. The study area has typical morainal topography, characterized by irregular ridges and depressions.

The land surface is flanked on the northwest by higher surfaces of the plateau and adjoining foothills, which rise westward toward the Alaska Range. To the southwest, estuarine and alluvial lowlands of the Chakachatna-McArthur embayment occur (Schmoll et al., 1981b). Adjoining the study area on the south and east are lowlands covered by extensive bogs and marshes in which numerous ponds and lakes are interspersed. Areas near the larger streams are freely drained. The Beluga Region is drained primarily by the Beluga and Chakachat rivers, which are glacier fed, and by the Chuitna, which is not. In addition, several streams such as Tyonek Creek, Old Tyonek Creek, Threemile Creek and Nikolai Creek drain directly into the Cook Inlet.

Vegetation in the project area consists of intermixed woodland, forest muskeg, shrub thicket, and shrub tundra. The forests and woodlands consist mainly of mixed birch and poplar and some spruce. Forested stands are most dense on the lowlands and become more open on the higher land. Muskeg vegetation, including mosses, grasses, sedges, heath shrubs, and scattered black spruce stands covers the floors of many of the poorly drained, abandoned glacial drainage channels and the flatter areas between the main streams.

The climate of the area is transitional between maritime and continental. Typically, heavy snowfall and below freezing temperatures occur from November through March. The most significant precipitation occurs in September and October with a dry period typically occurring in the spring and early summer months. The average annual precipitation for the Chuitna Basin is estimated to be about 48 inches (Scully et al. 1981). Temperatures range from a mean minimum of 1.5°F in January to a mean maximum of 64°F in July. Seasonal average temperatures at the proposed mine area range from a low of 21.0°F during winter to a high of 53.4°F during summer.

Regional Geology

Numerous geologic processes have interacted in the western Cook Inlet Region. The primary geologic features in the area involve plutonic and volcanic rocks and ash deposits, sedimentary rocks, and glaciated terrain. Mount Spurr, a volcano of the Alaska-Aleutian Batholith, lies about 30 miles west of the site. Its present elevation is about 11,000 feet. Mount Spurr or its ancestral volcano, has been active since at least Tertiary times. Tuffaceous siltstones of Eocene age are mapped within the West Foreland Formation in the area. Volcanic ash bedded within younger coal beds has recently been dated at about 15.8 million years; a period of more recent extensive deposition occurred from 3000 to 6000 years ago (Schmoll et al. 1981a). The latest historical deposition of tephra occurred in 1953.

To the south and west of the site, both extrusive and intrusive igneous rocks are exposed over extensive areas. These formations are primarily andesites and volcanic breccias of Jurassic and Tertiary ages, and granodiorites of similar ages (Detterman et al. 1976). Pyroclastics are a common lithologic component throughout the region.

The central part of the Beluga Region, including the project area, is characterized by a Tertiary age sedimentary plateau mantled by Quaternary glacial deposits. The sedimentary rocks consist of the West Foreland Formation and the overlying Kenai Group. The West Foreland Formation is thought to be of late Paleocene age. It consists mainly of sandstone and conglomerate in the Beluga Region. The formation is characterized by marked volcanoclastic deposits, and lacks coal seams (Schmoll et al. 1981a).

The Kenai Group of Oligocene to Pliocene age consists of four formations: the Hemlock Conglomerate and the Tyonek, Beluga, and Sterling formations. Some authors consider the Hemlock Conglomerate to be a member of the Tyonek Formation (Schmoll et al. 1981a).

The Kenai Group consists of interbedded claystone, siltstone, sandstone, and conglomerate. Numerous coal beds occur in the Tyonek Formation of late Oligocene to middle Miocene age; coal is also known to occur in the overlying Beluga Formation. The group's lithologic units are commonly light gray to buff-colored, but occasionally are dark gray, especially in the vicinity of coal beds. The occurrence of irregular bedding, abundant plant remains, and the absence of marine fauna attest to its non-marine origin (Barnes 1966).

Five major Pleistocene glacial advances have been recognized in the Cook Inlet Region (Karlstrom 1964). Of these, three are represented by existing surface deposits within the Beluga Region. During the so-called Eklutna glaciation, ice lobes originated at the base of the Alaska Range are believed to have coalesced with Kenai Peninsula lobes, filling the floor of the Cook Inlet Basin. The Eklutna retreat is believed to have begun 90,000 to