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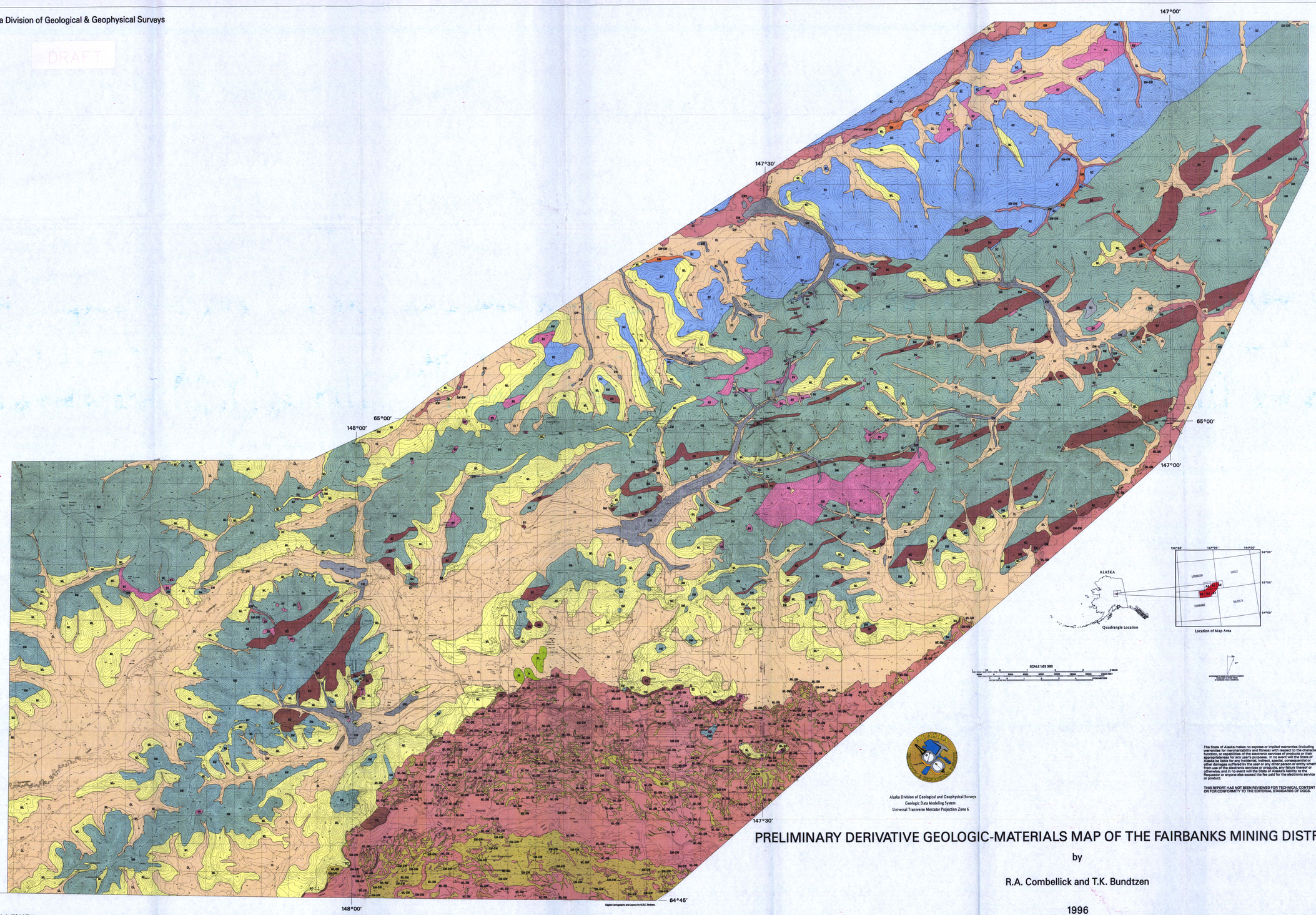

PRELIMINARY DERIVATIVE GEOLOGIC-MATERIALS MAP OF THE FAIRBANKS MINING DISTRICT, ALASKA

by

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Description of Geologic Materials

This map illustrates potential near-surface sources of geologic materials that may be useful for construction and other purposes. Field observations indicate that each geologic unit (for example, flood-plain alluvium) has a definite composition or range of composition. The map shows areas where these units are interpreted from the distribution of geologic units (Newberry and others, 1996). Assignment of Unified Soil Classes (Wagner, 1957) is based on visual observation and interpretation of the likely distribution of the materials; no grain-size analyses were performed. Descriptions of geologic units (Bundtzen and others, modified from Péwé and Bell (1978a-d) and Péwé and Bell (1976). This map is generalized and is not intended to show exact locations of specific materials. The purpose is to indicate areas where there is a high likelihood of finding the desired geologic materials. Local variations are common, especially near unit boundaries.

Precise economic evaluation of specific localities as sources of desired geologic materials will require detailed examination of each deposit, including areal extent, volume, grain-size variation, thickness of overburden, thermal state of the ground, depth to ground water, access, demand, and land ownership.

DV Tailings. Well graded gravels with little or no fines. Appears as steep imbricate gravel piles, locally bedded, 1 to > 25 m thick. Primarily gravel clasts 2-25 cm diameter and some cobbles to > 25 cm diameter. Low sand and silt content (<5 percent) as a result of dredging process. Only locally permanently frozen with low ice content.

DM-DV Alluvium. Silty gravels and poorly graded gravel-sand-silt mixtures to well graded gravels and gravel-sand mixtures with little or no fines. Silty gravel clasts 2-25 cm diameter and some cobbles to > 25 cm diameter and minor silt, generally overlain by silt up to 1-4 m thick. Thickness of alluvium is 3 to > 120 m. Contains discontinuous permafrost to known depths of 84 m; permafrost absent under rivers and lakes. Alluvium along small upland streams is up to several meters thick and contains variable proportions of stratified silt, sand, and gravel, with silt and sand often dominant.

DM Colluvium. Silty gravels and poorly graded gravel-sand-silt mixtures. Crudely bedded, heterogeneous mixtures of angular gravel, sand, and silt in variable proportions up to several meters thick (up to several tens of meters thick in landslide areas, Qcl). May contain angular clasts up to several tens of centimeters in diameter. Locally permanently frozen with low ice content.

ML-DM Slough fillings. Inorganic silts to silty sands and poorly graded sand-silt mixtures. Contains 10-30 percent clay and minor organic material. Discontinuously frozen; permafrost may extend into underlying sand and gravel.

ML Loess and alluvial fan deposits. Inorganic silts and very fine sands with some plasticity. Contains < 10 percent clay and minor layers of sand and gravel and organic matter. Thickness 1-60 m thick in loess areas (Qeol), 1-15 m thick in silt fans (Qatb). Permafrost generally absent in loess areas except in isolated patches with low ice content on north-facing slopes. Silt-fan areas contain discontinuous permafrost with moderate ice content.

CL Recreated silt. Organic-rich silts with low plasticity. Contains 10-30 percent clay, locally contains minor lenses of sand and gravel. Thickness 10 to > 100 m thick. Perennially frozen with high ice content in valley bottoms and locally along lower hillsides. Very difficult to excavate unless thawed.

PI Peat. Spongy, wet, fibrous organic matter, 1 to > 6 m thick. Perennially frozen with high ice content. Very difficult to excavate unless thawed. Good source of raw peat in thawed areas but poor drainage usually requires dewatering of excavation pits.

BV Medium-jointed, fine- to medium-grained igneous rocks. Generally massive with evenly spaced joint sets and minor amounts of reactive minerals, such as feldspars and micas. In fresh exposures, BV rocks appear to be suitable for road-metal and structural-aggregate applications; however, these rocks are locally subjected to deep groundwater degradation and alteration of the reactive minerals potassium feldspar and plagioclase. This weathering can produce a sandy grus that significantly modifies or prohibits above-stated uses.

BC Medium-jointed, fine- to coarse-grained metasedimentary rock and marble. May be useful for crushed-aggregate applications, but heterogeneous composition and texture cause physical properties to vary greatly.

BM Medium-jointed, fine- to medium-grained quartzose metasedimentary rocks and metaconglomerate. Fresh exposures of massive quartz-rich lithologies may be suitable sources of riprap and other structural-aggregate applications. Other more schistose varieties contain reactive minerals, such as muscovite, calcite, and plagioclase, which degrade to noncompetent and deeply weathered materials.

BU Fissile, fine-grained metasedimentary rocks. Platy, fissile nature, coupled with existence of reactive minerals muscovite, calcite, and plagioclase in finely laminated layers, suggest that these rocks generally are noncompetent and extensively weathered, making them unsuitable for structural applications. May serve as crushed aggregate for road-metal uses.

SU Undifferentiated or variable rock lithologies. Heterogeneous unit that contains a wide variety of material properties. Main exposure on Fourth of July Hill is poorly lithified conglomerate and sandstone that exhibit properties similar to those found in placer-mine tailings (DV).

References

Newberry, R.N.; Bundtzen, T.K.; Pinney, D.S.; Combellick, R.A.; Clautice, K.H.; Reifenstuhl, R.R.; Solie, D.N.; Laird, G.M.; Liss, S.A.; and Douglas, T., 1996, Preliminary Geologic Map of the Fairbanks Mining District, Alaska: State of Alaska - Division of Geological and Geophysical Surveys, Public Data File 96-16, 18 pgs., 2 sheets, 1:63,360 scale.

Péwé, T.L., and Bell, J.W., 1978a, Map showing construction materials in the Fairbanks D-2 NW Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-688C, scale 1:24,000, 1 sheet.

Péwé, T.L., and Bell, J.W., 1978b, Map showing construction materials in the Fairbanks D-2 SE Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-689C, scale 1:24,000, 1 sheet.

Péwé, T.L., and Bell, J.W., 1978c, Map showing construction materials in the Fairbanks D-2 NE Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-690C, scale 1:24,000, 1 sheet.

Péwé, T.L., and Bell, J.W., 1978d, Map showing construction materials in the Fairbanks D-1 SW Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-677C, scale 1:24,000, 1 sheet.

Péwé, T.L., and Bell, J.W., 1976, Map showing construction materials in the Fairbanks D-2 SW Quadrangle, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-929D, scale 1:24,000, 1 sheet.

Wagner, A.A., 1957, The use of the Unified Soil Classification system by the Bureau of Reclamation, in Proceedings of the 4th International Conference on Soil Mechanics and Foundation Engineering: London: v. 1, p. 125.

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