DESCRIPTIVE NOTES

The Moody Creek (84 M/02) surficial geology map was produced as a part of a collaborative research project by the Geological Survey of Canada (Natural Resources Canada) and the Alberta Geological Survey (Alberta Energy and Utilities Board). This collaborative project also extends into northeast British Columbia (94 I and 94 P) with the participation of the British Columbia Ministry of Energy, Mines and Petroleum Resources. Other surficial geology maps within the 84 M map area include Andriashek (1985), Fox et al. (1987), Edwards et al. (2004), Paulen et al. (2006a; 2006b), Plouffe et al. (2006), and Smith et al. (in press).

The Moody Creek map area encompasses the hamlet of Zama City and the main infrastructure for the Zama oil and gas fields. This area is experiencing rapid growth and activity in both the mature oil pools and the newly emerging shallow gas fields.

The map area straddles the transition from the Fort Nelson Lowland to the south with an elevation varying from 350 to 450 m above sea level (asl) and the Alberta Plateau to the north (Bostock, 1967) which reaches an elevation of 620 m (asl) at the map border. Permafrost is discontinuous in the map area, and typically underlies peat accumulations and other organic bog deposits. The permafrost is easily disturbed and vulnerable to melting due to anthropogenic acitivities, such as road, seismic line, and drill pad construction.

This surficial geology map was produced from the interpretation of 1:20 000 scale black and white air photographs (Alberta Sustainable Development, 1994) and from field investigations conducted during the summers of 2004 and 2005. Stratigraphy within this region was observed in borrow pits, pipeline trenches, gravel pits, hand-dug pits, and with an Oakfield soil probe. To provide an indication of ice-flow direction in a region where glacial striations on bedrock are absent, till fabrics were measured at a number of sites. The till fabrics depicted on the map represents the mean orientation of 25 to 50 prolate (a:b:c = 1:1: > 2) clasts observed within till.

During the last glaciation (Late Wisconsinan), the Laurentide Ice Sheet advanced over the area in a general westward direction. During both advance- and retreat-phases, proglacial lakes formed as ice blocked the eastward drainage from the Cordillera (Mathews, 1980; Lemmen et al., 1994; Smith et al., 2005). In the low-lying areas along the southern portion of the map, till is overlain by a discontinuous glacial lake sediment veneer. A thin diamicton overlying contorted glaciolacustrine sediments observed in a number of borrow pits is interpreted as a surge into the north margin of glacial Lake Hay. Alternatively, it could represent the grounding of floating ice, as numerous iceberg scours are observed in the map area. The flat topography of the area and lack of natural sediment exposures will require the use of subsurface data (e.g. drill logs and drilling) in future stratigraphic studies.

Bedrock in the map area is only exposed in gullies incised into the slopes of the Alberta Plateau. The map area is extensively mantled by fine grained (clay rich) till (glacial sediment directly deposited by glacier ice) reworked from the regional weakly indurated Cretaceous shale bedrock of the upper Fort St. John Group (Shaftesbury Formation). Erratics found in till include Canadian Shield granitic and metamorphic lithologies, Devonian limestones and dolostones, and Proterozoic Athabasca sandstone.Till is the most common surficial material and is generally clay rich with clast concentrations of 5 to 15%. The high clay content of the till is a consequence of the reworking of advance-phase glacial lake sediments and shale bedrock. Till occurs as a veneer or a blanket, with the latter being further subdivided based on surface expression: blanket, ridged, and hummocky. Uplands in the northern portion of the map area reflect bedrock topography and are draped by a blanket of till between 1 and 10 m thick. In flat lowland areas, till is at least 8 m thick, and likely much thicker.

Glaciolacustrine sediments are also clay-rich, and form a veneer 1 to 4 m thick above till in low-lying areas in the south. These sediments form a continuous cover at elevations below 410 m, and occur discontinuously above this elevation. Glaciolacustrine sediments occur as massive silt and clay, contorted beds of sand, silt and clay, and as interstratified sand and clayey-silt. Where they are continuous they represent deposition in glacial Lake Hay, and where they are discontinuous, they are likely the result of local ponding.

Glaciofluvial sediments are rare. Gravel at surface was found at only one location in association with a meltwater channel (59°12'N 118°39'W). Two other glaciofluvial gravel deposits were likely deposited in subglacial conduits as they occur below the regional till (Smith et al., 2005); one is abandoned (59°09'N 118°47'W) while the other is still active (59°09'N 118°49'W). Their location is marked by a gravel pit symbol. Granular aggregate is in short supply in the region and most roads are surfaced with the same fine-grained till that is used for their foundations. Fine-grained till provides a good impermeable base in areas of permafrost and water saturated bog and fen deposits, however, only roads that are surfaced with gravel can be used during wet weather conditions. Gravel associated with the aforementioned meltwater channel may be a new source of local aggregate in the area. Alluvial sediments generally consist of fine sand and silt rich in organic detritus. Organic sediments include fibric bog material and water saturated mesic fen material that is commonly mixed with fine grained sediments. Large fens occupy the southeast portion of the map area and overlie glaciolacustrine sediments.

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