STRATIGRAPHIC LEGEND Road cut and soil auger borings; sands within the lower 5 m of section may Note: Not all stratigraphic units from the record lake formation in Indian River valley legend are present on stratigraphic logs Colluviated silt; angular pebbles with caliche; abrupt lower contact HOLOCENE (< 0.010 Ma)



Stratified sand and gravel; alluvial sediments LATE PLEISTOCENE TO EARLY HOLOCENE (<0.125 Ma) Silt (organic rich), peat, and organic detritus, and extensive interstratified and segregated ice; collectively called muck Massive to stratified diamicton; colluvial sediments (may locally date to Middle Pleistocene) Massive to stratified silt and fine sand; eolian sediments Stratified silt and sand; resedimented eolian sediments locally interstratified with alluvial fan sediments Stratified sand and gravel; alluvial sediments MIDDLE PLEISTOCENE (0.780 - 0.125 Ma) Paleosol developed in Reid and younger pre-Reid glaciofluvial Stratified sand and gravel; glaciofluvial sediments deposited during Reid glaciation Stratified sand and gravel: glaciofluvial sediments deposited during younger pre-Reid glaciations (includes non glaical fluvial sediments in the Dominion Creek basin (see Sections 5 and 6)) Massive to stratified silt and fine sand; primary and resedimented eolian sediments LATE PLIOCENE AND EARLY PLEISTOCENE (2.7 - 0.780 Ma) Paleosol developed in late Pliocene to early Pleistocene glaciofluvial and non-glacial sediments Stratified sand and gravel; glaciofluvial sediments deposited during older pre-Reid glaciations Stratified to massive diamicton; till deposited during one of several older pre-Reid glaciations Fine sand, silt and clay; lacustrine or slack water fluvial Stratified to massive sand and gravel: non-glaciofluvial sediments, may be graded to pre-Reid outwash PLIOCENE (pre-glacial, 5 - 2.7 Ma) Basalt and basalt breccia Stratified to massive gravel and sand; White Channel Gravel and equivalent clastic units predating regional glaciation, includes late Tertiary pediment sediments PRE-PLIOCENE (> 5 Ma) Mesozoic and Paleozoic bedrock Tephra - identification and age, if known, described Ice-wedge pseudomorph or sand wedge DESCRIPTIVE NOTES

Granville map area lies within the unglaciated region of the Klondike Plateau, an incised rolling upland predominantly underlain by Paleozoic schist and gneiss (Bostock 1942). It includes the placer-gold-producing basins of lower Dominion, Gold Run, Sulphur, Wounded Moose and Eureka creeks and the upper Indian River. North of the Indian northwest (Sulphur and Goldrun creeks). These are likely controlled by underlying northeast and northwest-trending lineaments. South of the Indian River valley, drainage is generally dendritic. The Indian River valley generally follows a major geologic discontinuity between two series of metamorphic rocks (Bostock, 1942). The surficial geology consists largely of colluvial cover of varying thickness on the uplands and valley margins, with alluvium preserved on terraces and in valley bottoms with colian and colluvial covers. The Indian River valley is one of the first order topographic features of the area and has likely been incised into the Klondike Plateau over much of the Tertiary. By early-to-mid Pliocene, the tributaries to Indian Rivers had cut the same valleys that exist today: Sulphur and Dominion creeks drained from King Solomon Dome divide north of the map area and Eureka and Wounded Moose creeks flowed north from divides with Stewart River drainage south of the map area. his pre-glacial drainage is recorded by quartzose gravels (>80% quartz) found on high terraces cut into bedro long the southeastern margin of Dominion Creek between Bullfrog Creek and the confluence with Sulphur Cre nd in scattered remnants upstream of Bullfrog Creek (Froese et al., 2001). They are also found underlying terraces long Eureka and Wounded Moose Creeks. Paleoflow directions determined on these deposits are in the direction of he existing valleys. These alluvial terrace gravels (Map Unit: At^T) are correlative to the White Channel gravel which 2001) and dates from 5 to 3 Ma (Westgate et al., 2003). Following or near the close of the sedimentation of the White Channel gravel, a complex of more than 20 m of sand (Map Unit: Lurs) and black chert-pebble bearing gravel (Gtrs) was deposited in the Indian River valley. The gravel originated as outwash from a Cordilleran ice sheet that reached the divide with the Stewart River basin along the upper Indian River basin to the east and south east of the Granville map area. Meltwaters spilled across depositing a ley train down the Indian River valley (Bostock 1965; Duk-Rodkin et al. 2001). This apparently occurred during the tregional glaciation ca. 3.1 to 2.6 million years ago (Duk-Rodkin et al. 2001; Froese et al. 2000, 2001). The cause the deposition of associated Lu^{ra} sand, which underlies and laterally grades into the valley train gravels (Nelson and lackson, 2003) is not unequivocally known. One hypothesis is that it was deposited in the arm of a glacially dammed Sheet during the late Pliocene. Alternatively, the growth of alluvial fans into the Indian River valley during this laciation may have created low energy fluvial environments within it. White Channel gravel apparently underlies uⁿ and Gt^{re} units at depth. Near the mouth of Montana Creek, the combined valley fill was thick enough to divert Indian River to the north side of the valley where it eventually cut the contemporary, anomalously narrow reach of Indian River valley across a bedrock spur. An extensive buried portion of preglacial Indian River valley is present beneath the extensive terraced fill in this area (immediately south of section 3).

Early Pleistocene gravel (called 'Ross gravel') underlies the contemporary (prior to mining disturbance) flood plain gravels of Dominion, Sulphur, and Gold Run creeks and overlies bedrock. This is in contrast to the stratigraphy of the Bonanza and Hunker creek basins north of the King Solomon Dome divide (25 to 30 km north of the map area), where creek gravels rest on bedrock. Ross gravel is a light-grey to white, quartz-rich gravel that occurs below the modern creek level. On Dominion Creek this unit can be observed in mining exposures between the mouths of Sulphur and Jensen creeks and extends midway up Sulphur and Gold Run creeks (Froese et al., 2001). Pebble counts of Ross gravel on Dominion Creek are ca. 80 % quartz with remaining lithologies derived from local metamorphic and volcanic rocks. Sedimentologically, the Ross gravel consists mainly of massive and imbricated matrix-filled gravel which is interpreted as channel and bar deposits in a system with abundant bedload. The Ross gravel is sedimentologically similar to the older (early to middle Pliocene) Lower White Channel gravel. However, Ross gravel is reversely magnetized indicating an age > 780 ka, but post-dates White Channel gravel which occurs on Aoss gravel is reversely magnetized indicating an age > 780 ka, but post-dates White Channel gravel which occurs on errace remnants (section 7, map unit At') along the valley margin. The Ross gravel was deposited during an early Dominion Creek gravel directly overlies Ross gravel (Fig.1; section 5) and also occurs in contact with bedrock upstream of Jensen Creek and along the valley margins (e.g. section 4). The unit is strongly iron stained and nentologically it is characterized by low-angle lateral accretion facies, indicating a meandering to wandering schists and meta-volcanic clasts, and quartz represents only 20-30% of pebble counts suggesting regoli development on the surrounding landscape also decreased relative to the Ross gravel. The Dominion Creek gravel rmally magnetized and represents a composite unit of fluvial activity from the middle Pleistocene (< 740 ka; section Valley bottoms of the Klondike Plateau, particularly at tributary junctions and north-facing slopes contain thi currences of primary and retransported loess and colluvium over local valley gravel (Map Unit: CEa^{*}), locally called uck' (Fraser and Burn, 1997; Kotler and Burn, 2000). These units tend to contain thick ground ice, including ice wedges that are highly unstable once disturbed. Most of these deposits aggraded during the late Pleistocene (< 30 ka), but older remnants dating to at least the middle Pleistocene are present marked by the Sheep Creek tephra (ca. 190 ka) (Berger et al., 1996) at section 4 and Gold Run tephra (740 ± 60 ka, Westgate, 2004 personal communication) at section 5 (Westgate et al., 2003). The thickness of muck deposits is greatest within narrow valleys and along valley margins and sharply thins toward valley centres.

Placer exploration and development has occurred on most creeks in the Granville map area over the last century. The valley bottoms of Sulphur, Gold Run Dominion, and Eureka creeks and Indian River have been highly disturbed by several generations of placer gold production. However, large unmined stretches of valley bottom and terrace benches are still preserved, for example, along Dominion Creek above Gold Run Creek, along Indian River above Wounded Moose Creek and between lower Montana Creek and Indian River. The economic potential of these Modern permafrost is present and may be active on north-facing sites but is generally inactive or absent on well-drained south-facing sites. Once disturbed, permafrost may take a decade or more to stabilize through slumping and revegetation. Exploration geochemists should be aware that loess covers much of the valley bottoms and lower slopes of the map area. Its thickness is variable but it is thickest on north-facing sites. The loess is derived from local and distant sources. Consequently, the geochemistry of loess is a poor indicator of the geochemistry of the

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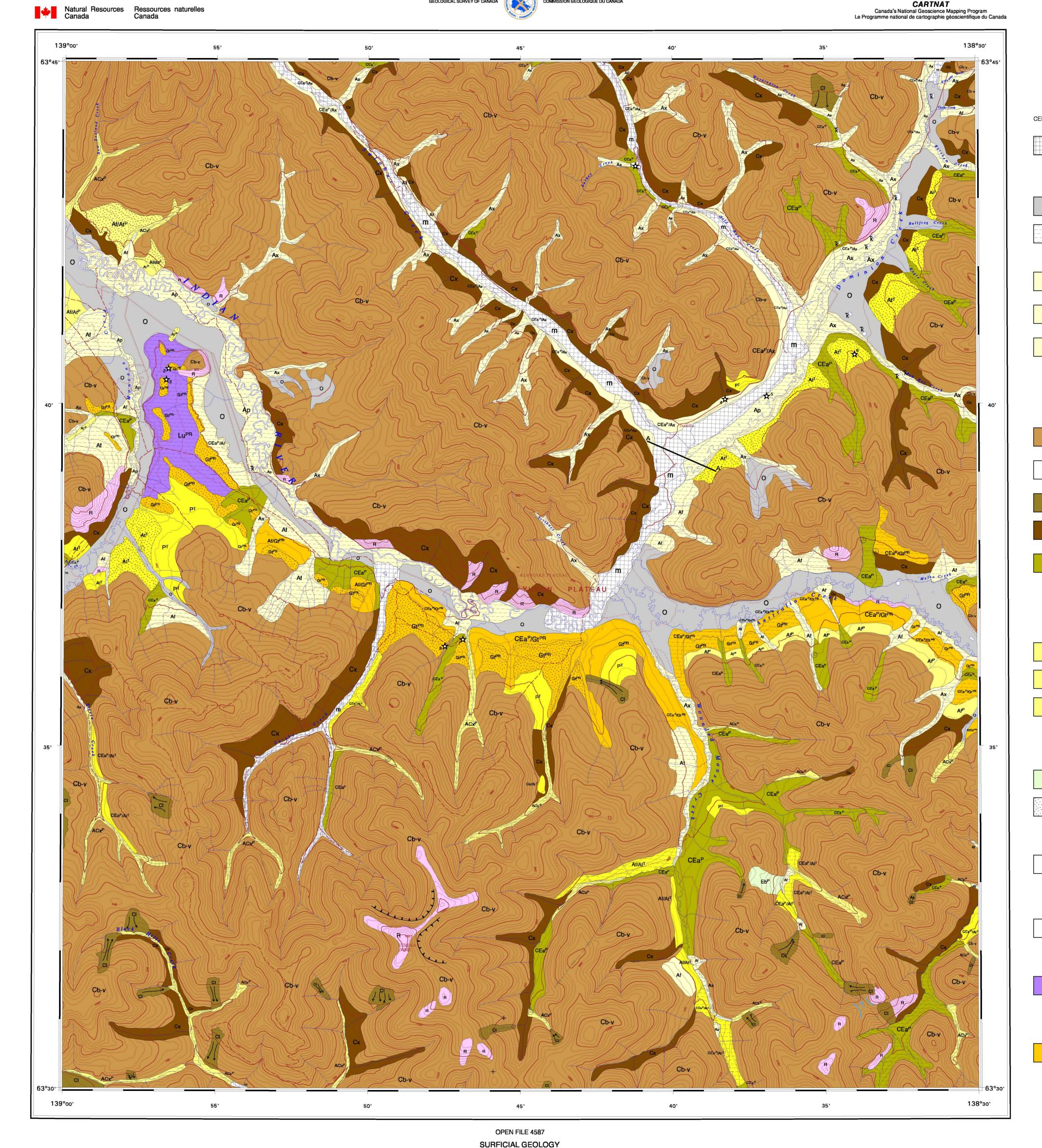
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GRANVILLE

YUKON TERRITORY

Scale 1:50 000/Échelle 1/50 000

Projection transverse universelle de Mercator

Système de référence géodésique nord-américain, 1983

© Sa Majesté la Reine du chef du Canada 2005

Universal Transverse Mercator Projection

North American Datum 1983

© Her Majesty the Queen in Right of Canada 2005

Note: Map units listed below occur within one metre of the surface. Where organic or eolian sediments < 1 m thick overlie these, a pattern is overlaid upon the map unit. Along some valleys, colluvial or alluvial sediments > 1 m thick overlie older alluvial gravels that could contain placer gold. In order to accentuate these potentially exploitable deposits, a compound map unit is presented, e.g., Cx/At^T. This means that colluvial complex sediments overlie alluvial terrace sediments thought to be late Tertiary in age. This legend is part of a larger regional study hence coloured boxes indicate units that appear on this map. In addition, not all symbols in the legend are represented on this map.

LEGEND

HOLOCENE Made Land: placer mines, roads, and airstrip

collapse is common.

Organic Blanket: undivided; thickness > 1 m to 5 m

Organic Veneer: blanket bog generally < 1 m thick ALLUVIAL DEPOSITS: gravel to silt size sediments, well stratified, deposited by

Floodplain Sediments: gravel, cobble to pebble; massive to well stratified, capped by Ap sand and silt; flat lying; includes lacustrine and organic deposits in abandoned channels and backswamp areas; subject to periodic inundation and reworking by floods; thickness 1 to 5 m

ORGANIC DEPOSITS: peat and organic silt formed predominantly by the

accumulation of vegetative material in bogs, fens, and swamps situated on valley

bottoms; permafrost is commonly encountered within 1 m of the surface. Thermokarst

Alluvial Fan Sediments: gravel, sand, silt, and diamicton, massive to well stratified; Af sediments form fan-shaped landforms or complexes of coalesced fan-shape landform at the confluence of tributary streams, may be subject to flooding accompanied by sudden stream migration and inundation; thickness up to 10 m

Alluvial Sediments Complex: sediments forming floodplains, fans, and terraces that

HOLOCENE AND PLEISTOCENE (UNDIVIDED) COLLUVIAL DEPOSITS: stony diamicton resulting from the physical and chemical breakdown of bedrock and subsequent reworking and transportation by creep, solifluction, and landsliding; colluvial deposits may contain reworked glaciofluvial and morainal sediments within the limits of pre-Reid ice-cover and reworked eolian sediments: colluvial deposits are products of formation and reworking over a significant part of the Pleistocene and Holocene epochs; surface is commonly hummocky or undulating

Colluvial Blanket and Veneer Sediments: diamicton, stony with a sandy matrix; massive to poorly stratified: colluviated blankets generally conform to underlying bedrock and exceed 1 m in thickness; veneers are < 1 m in thickness and are commonly discontinuous over bedrock

cannot be subdivided at this map scale

up to 5 m or more in the thickest part of the apron Landslide Sediments: silt loam to boulders, poorly sorted to unsorted; massive; clasts are subangular to angular and are locally derived; thickness varies greatly

Colluvial Complex Sediments: areas of intergrading colluvial and alluvial sediments which are too complex to subdivide at the scale of mapping; unit may include colluvial and alluvial fan, colluvial blanket, landslide sediments and colluviated drift within the mits of glaciation; the unit commonly occurs along the lower slopes of valley margins Colluvial/Eolian Apron (muck): primary deposits of eolian fine sand and silt resedimented and interstratified with organic silt, and detritus, alluvial fan gravel and

> pottoms through resedimentation of eolian sediments from valley sides to valley floor commonly preserved on north-facing slopes; thickness 1 to 20 m; commonly contains segregated bodies of ice and buried ice wedges MIDDLE TO LATE PLEISTOCENE (UNDIVIDED) ALLUVIAL DEPOSITS: gravel and sand deposited by streams that were not fed by glacial meltwater; sediments may have experienced several cycles of alluviation and erosion, but are now inactive due to burial or fluvial incision; basal gravels within these

sand and variable amounts of stony colluvial diamicton; forms aprons along valley

Alluvial Terrace Sediments: gravel, cobble to pebble with a sandy matrix; massive to AtP well stratified; capped by sand and silt; sediments are of flood plain origin now isolated from flooding by stream incision; thickness 1 m to 10 m

Alluvial Fan Sediments: single fans or aprons of coalesced fans formed of gravel and AfP sand, poorly to moderately sorted, now isolated from water and debris floods due to fluvial incision; sediments disturbed by cryoturbation; thickness up to 10 m Alluvial/Colluvial Complex Sediments: silt, sand and gravel, poorly to moderately ACXP sorted; thin to thick bedded, interstratified with colluvial diamicton; sediments underlie the floors and margins of narrow upland valleys and grade laterally up slope into colluvial blankets; sediments may represent several depositional cycles; thickness may exceed 10 m in mid-valley locations

sediments commonly contain placer gold

EOLIAN DEPOSITS: well sorted medium sand to silt initially transported and deposited by wind action during glaciations and commonly resedimented through fluvial and colluvial processes; deposits of very fine sand and coarse silt < 1 m thick are distributed discontinuously throughout low lying areas **Eolian Blanket:** fine sand and silt, well sorted; massive; may form crescent-shape and Eb^P linear dunes and featureless or gently undulating inter-dune eolian plains; thickness 1

Eolian Veneer: thin deposits of very fine sand and coarse silt distributed discontinuously throughout low lying areas, thickness < 1 m

LATE PLEISTOCENE - McCONNELL GLACIATION GLACIOFLUVIAL DEPOSITS: gravel and sand deposited by streams flowing away from glacial ice; deposits display poor soil development with rare cryoturbation Glaciofluvial Terrace Sediments: gravel and sand, unweathered, forming one or more

MIDDLE PLEISTOCENE - REID GLACIATION GLACIOFLUVIAL DEPOSITS: gravel and sand deposited by streams flowing away from glacial ice; deposits display moderate soil development with signs of cryoturbation; soil thickness < 0.5 m

Glaciofluvial Terrace Sediments: gravel and sand, moderately weathered, forming one or more terraces LATE PLIOCENE TO MIDDLE PLEISTOCENE - pre-Reid GLACIATIONS (UNDIVIDED) GLACIOLACUSTRINE DEPOSITS: well stratified sand, silt, clay, deposited in lakes ponded by glacial ice

Glaciolacustrine Undivided: sand, silt, and clay; undifferentiated at this scale of GLACIOFLUVIAL DEPOSITS: gravel and sand deposited by streams flowing away from glacial ice in meltwater channels and outwash plains; massive to well stratified. frequent signs of cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical weathering

Glaciofluvial Terrace Sediments: gravel and sand, deeply weathered; incised into flights of terraces; thickness 1 to > 5 m

115 N/15 115 N/16 115-0/13 115-0/14 115-0/15 115-0/16

OF4579 OF4580 OF4590 OF4591 OF4592 OF4593

115 N/10 115 N/9 115-0/12 115-0/11 115-0/10 115-0/9

OF4578 OF4577 OF4589 OF4588 OF4587 OF4586

115 N/7 115 N/8 115-0/5 115-0/6 115-0/7 115-0/8

OF4575 OF4576 OF4582 OF4583 OF4584 OF4585

115 N/2 115 N/1 115-0/4 115-0/3 115-0/2 115-0/1 OF4574 OF4573 OF4581 OF4349 OF4348 OF4347

115 K/15 | 115 K/16 | 115 J/13 | 115 J/14 | 115 J/15 | 115 J/16

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

OF4344 OF4345 OF4346

Geology by D.G. Froese and L.E. Jackson, Jr. (1999 - 2002) Co-ordinated through the auspices of the Ancient Pacific Margin NATMAP Digital cartography K. Shimamura, Terrain Sciences Division

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada Digital base map from data compiled by Geomatics Canada, modified by Parm Dhesi, Earth Sciences Sector Information Division (ESS Info)

Magnetic declination 2005, 25°44' E, decreasing 19.2' annually Elevations in metres above mean sea level Contour interval 20 metres

in size; deposited either directly from glacial ice or by gravity flow from glacial ice; surface soils may extend to 2 m depth with well developed clay skins on clasts, frequent signs of cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical weathering Till Blanket: diamicton, stony, silty-sand matrix; massive; conforms to underlying topography, thickness > 1 m; extensively colluviated on slopes

MORAINAL DEPOSITS (TILL): glacial diamicton, mainly till, generally consisting of a

matrix ranging from sand to clay that supports clasts ranging from boulders to pebbles

Till Veneer: diamicton, stony, silty-sand matrix; massive; discontinuous and may

contain extensive areas of thin (< 1 m) colluvium

ALLUVIAL DEPOSITS: Gravel and sand deposited by streams that were not fed by glacial meltwater; sediments may have experienced several cycles of alluviation and erosion, but are now inactive due to burial or fluvial incision; basal gravels within these sediments commonly contain placer gold

having a fluvial source but graded to the margins of pre-Reid glaciers or glacial drainage; thickness 1 to 5 m UNDIFFERENTIATED DRIFT: diamicton, gravel, sand, silt and clay deposited from glacial ice, glacial streams, and glacially damned lakes; extensive weathering, poor exposure and permafrost make differentiation into component glacial sediments difficult; thicknesses commonly exceed 10 m and mask underlying bedrock topography; commonly colluviated and intergraded with colluvium; surface soils may extend to 2 m depth with well developed clay skins on clasts, frequent signs of

cryoturbation (ice wedge pseudomorph and sand wedges), and strong chemical

Alluvial Terrace Sediments: sandy pebble and cobble gravel deposited by streams

Drift: flat to gently sloping

weathering

DIPR Drift Modified by Landsliding: drift translated along failure plains into irregular steps and sub parallel scarps

Fluvially Incised Drift: formerly extensive areas of drift incised by closely spaced stream Basalt: columnar alkaline olivine basalt and flow breccia; erosional remnants of

Pediment and Baiada Sediments: inclined fluvial surfaces which are found at a

formerly valley filling flows underlying terraces along lower Rosebud Creek; thickness PLIOCENE AND LATE MIOCENE ALLUVIAL DEPOSITS: preglacial gravel and sand; highly dissected and deeply

midslope position in unglaciated drainage systems; usually thinner than 5 m; formed as a result of limited agradation of stream gravel and significant colluviation; composed of thin, poorly sorted gravel that contains both locally derived subangular stream gravel deposits and angular bedrock fragments High Level Terrace Sediments (includes White Channel Gravel and equivalent sediments): weathered pebble to cobble gravel > 1 m thick; surface soils may extend

Colluvial Apron Sediments: bouldery diamicton and bouldery sandy gravel, poorly to 2 m depth with well developed clay skins on clasts, frequent signs of cryoturbation Ca sorted; massive; sediments form a wedge-like slope-toe complex of small steep debris (ice wedge pseudomorph and sand wedges), and strong chemical weathering; within flow and solifluction deposits; thickness is < 1 m at the upper and lower slope limit to the Yukon River valley, terraces above the 500 m contour may be remnant features from the southward-flowing paleo-Yukon River drainage system PALEOZOIC AND MESOZOIC

Bedrock: schist, gneiss, ultramafics, granodiorite, monzonite, marble, and basalt; R includes areas of thin colluvial cover, blockfields, and sorted stone polygons in alpine

SYMBOLS

Geologic contact; defined, approximate, inferred . Open system pingo, collapsed open system pingo Thermokarst collapse activity Landslide movement direction in bedrock and colluvium Scarps created by widespread landslide movement in drift Terrace scarp (ticks on sloped side) . Degraded Cirque: active during pre-Reid Glaciations Degraded Arête: active during pre-Reid Glaciations Meltwater channel: flow direction, unknown flow direction Large meltwater channel All time (pre-Reid) glacial limit; defined, inferred Cryoplanation terrace . Landform Streamlined by glacial ice . Vertebrate fossil locality Lineaments (fault, fracture, joint system) defined by linear drainage courses, aligned gaps in ridges, or aligned breaks in bedrock slopes Abandoned valley: paleoflow defined Abandoned valley: paleoflow undefined Paleoflow, suspected buried valley .

> OPEN FILE DOSSIER PUBLIC that have not gone through the GSC formal 2005

Recommended citation: Froese, D.G. and Jackson, L.E., Jr. 2005: Surficial Geology, GRANVILLE, Yukon Territory; Geological Survey of Canada, Open File 4587, scale 1:50 000.