SURFICIAL GEOLOGY OF SEATTLE CREEK CENTRAL YUKON (115 P/16)

PHYSIOGRAPHY

The map area is traversed by the South McQuesten and North McQuesten river valleys. The Secret/Red Creek drainage is an intermediate-scale east-west trending valley across the north half of the map area. Haggart Creek, a major tributary to the South McQuesten River, lies at the eastern edge of the map area. Uplands north of the South McQuesten River average 3900 feet elevation, which is below tree-line. Scheelite Dome, and the surrounding uplands south of the South McQuesten River, reach 5240 feet elevation. The deeply incised valleys of Johnson, Castnor, Seattle, and Morrison creeks drain the north side of the Scheelite uplands, and Highet and Bennett creeks drain the south side.

GLACIAL HISTORY

In central Yukon the Quaternary period is characterized by multiple glaciations and interglaciations. The build-up of ice in Yukon originated from accumulation zones in the Ogilvie, Wernecke, Selwyn, Pelly, Cassiar and St. Elias mountains. Ice from these centers merged and flowed toward the central Yukon plateau region. The map area was glaciated by ice originating in the Ogilvie, Wernecke and Selwyn mountains. From oldest to youngest the main glacial episodes were the pre-Reid, Reid and McConnell glaciations.

The pre-Reid represents multiple undifferentiated glaciations that occurred approximately between 2.5 million years ago and 400,000 years ago. Landforms from these glaciations have been subsequently eroded and are difficult to identify. In Seattle Creek map area evidence of pre-Reid Cordilleran glaciations is limited to remnant meltwater channels and erratics at 4900 feet on Scheelite Dome. Pre-Reid interglacial deposits have been identified in Seattle and Highet creeks. A pre-Reid cirque is also preserved at the headwaters of Harvey Gulch. All valleys were glaciated in the map area during the pre-Reid glaciations.

The Reid glaciation occurred at least 200,000 years ago (Berger, 1994) and presumably followed similar flow-lines to pre-Reid glaciations. Based upon the elevation of erratics on Scheelite Dome the Reid limit is at least 1000 feet below the pre-Reid limit. Reid glacial landforms are moderately preserved, enabling the glacial limit to be approximately delineated by air photo interpretation. Reid ice advanced into the map area from the east and north following the South McQuesten and North McQuesten river valleys.

Ice from Haggart Creek connected with the North McQuesten valley glaciers by advancing up Secret Creek and into Red Creek. Recessional moraines at the divide between Secret and Red creeks support this glacial flow pattern. The Reid ice in the north of the map area was estimated to reach 3800 feet elevation according to the limit of meltwater channels.

South McQuesten River valley acted as a major conduit for Reid ice into the area and supplied much of the ice that glaciated tributary valleys on the north side of Scheelite Dome. In the southeastern part of the map area the Reid limit reach approximately 4300 feet. This limit is based on outwash deposits preserved near the headwaters of Morrison Creek and the elevation of erratics in the headwaters of Seattle Creek. Ice glaciating the Scheelite uplands was a combination of ice from Minto Creek, which advanced up Highet Creek from the south, and ice from the South McQuesten River valley to the north, which advanced into the Morrison Creek drainage and merged with Highet Creek ice. This is supported by glacial lake sediments in upper Morrison Creek valley and eskers at the divide between Morrison and Highet creeks. South McQuesten ice glaciated the north slope of Scheelite Dome to 4300 feet where it combined with small alpine glaciers originating from Laska and Strike gulches. South McQuesten ice also advanced into Johnson Creek. The maximum elevation of Reid ice west of Johnson Creek is estimated at 4200 feet.

The McConnell glaciation advanced into the Mayo area approximately between 17,000 and 20,000 years ago (Bond, 1997). McConnell ice terminated to the east of Seattle Creek map area, north of Mount Haldane. McConnell outwash terraces are common in the South McQuesten River valley and also present in the North McQuesten River valley. Periglacial conditions and the resulting sedimentation processes induced by the nearby McConnell ice sheet had the most notable affect on the landscape. Numerous inactive alluvial fans (periglacial fans) mark the period of active sedimentation during the McConnell glaciation. These processes had significant effects on streams and placer gold deposits. As periglacial fans developed, they diverted streams and buried stream beds, preserving the interglacial deposits. Periglacial weathering and the resulting sedimentation also acted as a drainage flush that reconcentrated placers into lower parts of the drainage and into the periglacial fan.

PLACER POTENTIAL

The placer potential of Seattle Creek map area can be divided into those creeks south of the South McQuesten River and those north of the South McQuesten River. Drainages of interest around the Scheelite uplands include Seattle Creek, Castnor Creek and Bennett Creek. Drainages of interest north of the South McQuesten include Red Creek and Rodin Creek.

Seattle Creek is a north-flowing tributary east of Scheelite Dome and Morrison Creek is its main tributary. Placer gold has been mined on Morrison Creek and in the upper reaches of Seattle Creek. Pre-Reid interglacial gravel was identified in section in the upper part of the drainage and reportedly contained fine placer gold. No testing has been completed on bedrock in Seattle Creek. A pocket of coarse placer gold was mined from a Reid outwash that overlies the pre-Reid interglacial gravel. It appears that the gold was probably reworked from the bedrock contact further upstream. Seattle Creek should be drilled to test depths and grade on bedrock.

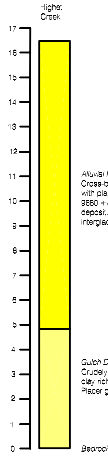
Castnor Creek is north of Scheelite Dome and flows westward into the South McQuesten River. The tributaries to Castnor Creek flow north off Scheelite Dome. The placer potential of the drainage is best rated by its proximity to favourable bedrock. Placer gold has been found in abundance on the south and west sides of Scheelite Dome in Highet and Johnson creeks and in mineable grades on the east side of Scheelite Dome in Morrison Creek. A stream sediment sample collected as part of this study from a right limit tributary to Morrison Creek, which headwaters on the north-slope of Scheelite Dome, was anomalous at 75 ppb gold. Prospecting on Castnor Creek should focus on the lower reaches where it has been deflected around a large alluvial fan from Laska Gulch. Paleo-Castnor Creek extends under the fan and interglacial deposits may be preserved. Cemented gravel was noted in Laska Gulch, which may present a problem for mining if it is widespread across the fan. Drilling should be a priority to determine the stratigraphy of the deposit and assess the cementation problem. Currently there is no road access to Castnor Creek.

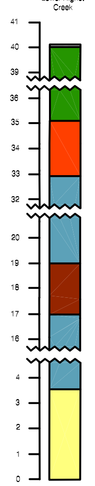
Bennett Creek is located east of Scheelite Dome and flows southward into Minto Creek. Hardrock gold anomalies have been noted on the west fork of the drainage, which include the Bennett mineral occurrence (Au vein - Yukon Minfile 115P033). An overgrown trail and an old cabin were noted at the lower forks of Bennett Creek and this area would probably be best for testing, with some focus on the left fork. Favourable hardrock anomalies also occur in tributaries to Seattle Creek that share the divide with Bennett Creek. There is access to lower Bennett Creek from the Minto Creek road but testing for placers on the lower reaches of the creek appears to be confined to glacial deposits that are typically barren of placers. Testing should focus within the confines of the Bennett Creek drainage.

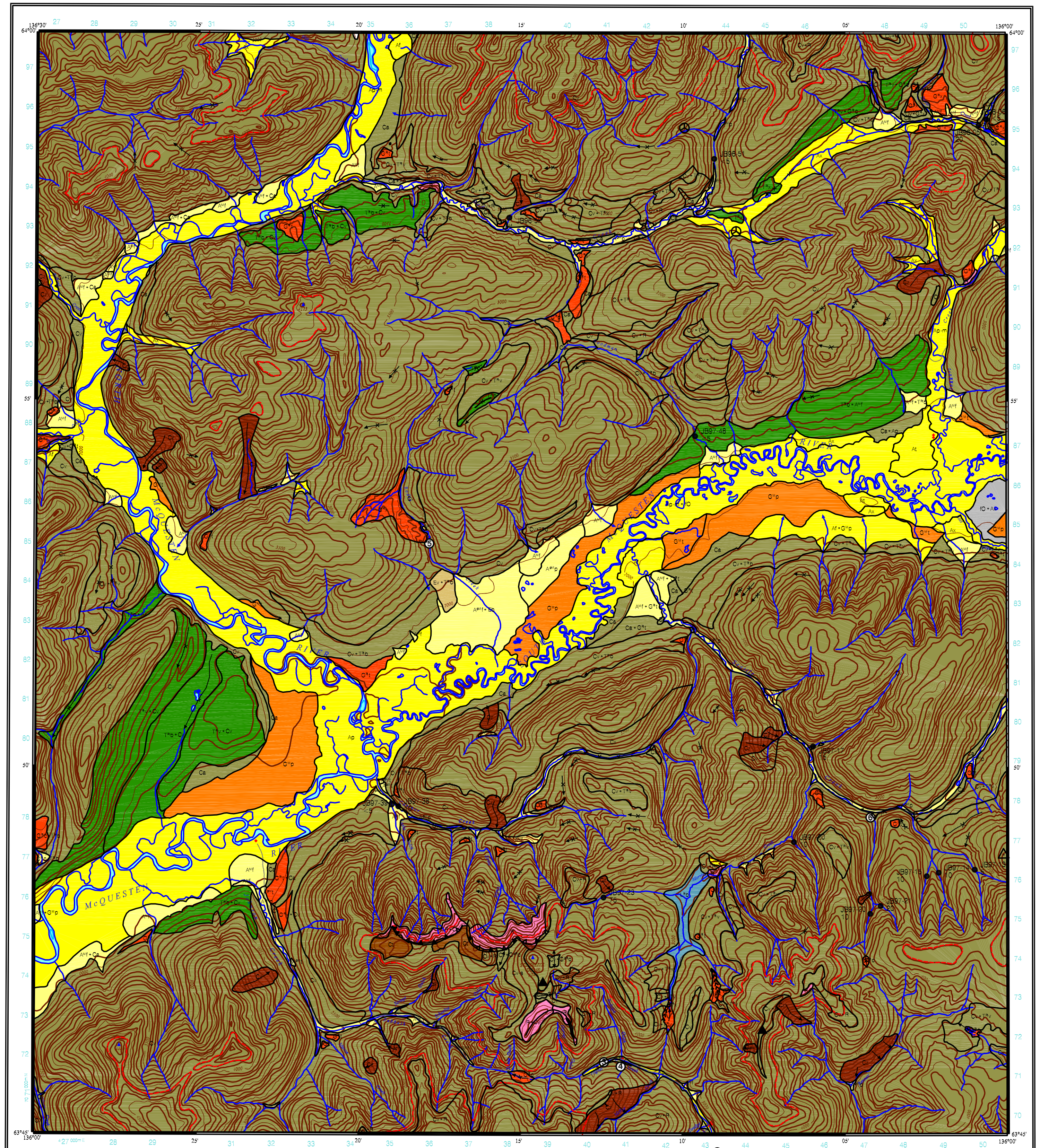
Upper Red Creek flows southward and it may have placer potential. Gold-bearing veins are present to the west and the upper part of Red Creek, which extends north of this map area, has a sizeable alluvial floodplain (Yukon Minfile 115P026). Much of upper Red Creek lies within Na Cho N'yak Dun settlement lands. The lower westward flowing section was actively glaciated during the Reid glaciation, however a canyon on this lower section, 3 km upstream from the mouth, may have placer potential.

Rodin Creek flows southeastward into the South McQuesten River and has been mined 4 km upstream from the mouth. Thick sand deposits that flank the west side of Rodin Creek will hinder exploration upstream, however, a low unmined bench about 200 meters upstream of the old working on the left limit of the creek was examined. The gravel and medium-sized boulders are approximately 1 m thick above bedrock and averages of 10 colours per pan were obtained from the bedrock surface.

Sections 1and 2 are on map sheet 115 P/9 and appear out side the boundaries of this map.







QUATERNARY
HOLOCENE

ORGANIC DEPOSITS: peat and woody material; occurring as flat to gently sloping plain or as a blanket; overlie lacustrine, moraine, or poorly drained glaciofluvial deposits but rarely form a dominant geologic unit. Most common in the backswamp areas of the North McQuesten and South McQuesten River valleys. Permafrost is commonly present within 1 m of the surface.

fO — fenland- consisting of woody sedge peat, variable thickness.

ALLUVIAL DEPOSITS: sand and gravel with minor silt and cobbles deposited in modern drainages. Common in the North and South McQuesten River valleys, Haggart Creek, Red Creek, and Seattle Creek.

Ap At Af Ax — Ap At - alluvial plain and terraces; coarse sand and gravel with minor silt and fine sand occurring as bars, overbank floodplain and low terrace sediments, 0-10m thick; floodplain deposits subject to periodic floods. Small valley alluvial plains may not be mapped at this scale. Af - alluvial fan; coarse sand, gravel, cobbles, and mudflow deposits, up to or >10m thick. Appear as vegetated, often peat covered, landforms developed during post-glacial sedimentation. The Rodin Creek alluvial fan consists mainly of sand and minor gravel Ax - complexes of Ap, At, and Af undivided.

PLEISTOCENE AND HOLOCENE (UNDIVIDED)

COLLUVIAL DEPOSITS: diamicton, gravel, shattered bedrock, and lenses of sand and silt derived from bedrock and surficial materials by a variety of physical and chemical weathering processes. Transport of dislodged debris occurs as surface creep, sheetwash or by mass wasting processes. Common on all slopes in the map area. Numerous landslides were mapped in the North McQuesten River Valley, Castnor Creek valley, and around Scheelite Dome.

Cv Cx — Cv- colluvium veneer that conforms to bedrock topography, <1m thick. Ca- colluvium apron that conforms to bedrock topography, >1m thick; located at the break in slope between the valley slide and valley floor.
Cx- colluvial complex of Cv, Ca and Cz undivided.

AEOLIAN DEPOSITS: fine to medium grained sand transported and deposited by wind-blown processes. Typically consists of glaciofluvial sands that were remobilized by katabatic (glacial) winds. Aeolian deposits are common near Rodin Creek.

Ev Eb — Ev - aeolian veneer <1 m thick. Eb - aeolian blanket >1m thick.

LATE PLEISTOCENE (WISCONSINAN) - McCONNELL GLACIATION

ALLUVIAL DEPOSITS: angular-rounded gravel with sand, organic silt, and deposited by and minor cobbles deposited from streams that are outside the McConnell limit. Slope and stream sedimentation is enhanced by the increase in precipitation, frost weathering, and lack of vegetation in the unglaciated terrain during glaciations.

$A^{M}f$ — $A^{M}f$ - alluvial fan, coarse sand lenses, angular gravel, cobbles, and mudflow deposits of resedimented Reid till or local colluvial deposits, 1-30m thick. Common throughout the map sheet $A^{M}x$ - complexes of $A^{M}f$ and $A^{M}p$ undivided.

GLACIOFLUVIAL DEPOSITS: stratified to massive; poorly to well sorted; gravel and sand with minor silt and cobbles; deposited by meltwater originating from glacial ice; locally with a veneer of aeolian silt (loess). Common in the South McQuesten valley near the mouth of Seattle Creek.

$G^{M}p$ $G^{M}t$ $G^{M}x$ $G^{M}c$ — $G^{M}p$ - glaciofluvial plain, 3-10m thick; $G^{M}t$ - glaciofluvial terrace, >5-10m thick. $G^{M}x$- glaciofluvial complex, includes glaciofluvial deposition and minor deposition associated with ice contact environments. $G^{M}c$- glaciofluvial channel deposit; includes glaciofluvial deposition associated with lateral meltwater channels.

MIDDLE PLEISTOCENE - PRE-McCONNELL GLACIATION (UNDIVIDED)

ALLUVIAL DEPOSITS: angular - rounded gravel with sand, organic silt, and minor silt and cobbles; deposited from streams that are outside the McConnell limit. May include several cycles of alluvial sedimentation that pre-dates the McConnell glaciation and minor sediment input from McConnell periglacial alluvium. Commonly contain placer gold in favourable bedrock settings.

$A^{pM}p$ $A^{pM}t$ $A^{pM}f$ — $A^{pM}p$ $A^{pM}t$ - alluvial plain and terraces; coarse sand and gravel with minor silt and fine sand occurring as bars, overbank floodplain and low terrace sediments, 0-10m thick; $A^{pM}f$ typically occur as buried deposits under recent or McConnell alluvium.

MIDDLE PLEISTOCENE - REID GLACIATION

GLACIOFLUVIAL DEPOSITS: stratified to massive; poorly to well sorted; gravel and sand with minor silt and cobbles; deposited by meltwater originating from glacial ice; locally with a veneer of aeolian silt (loess). Found as isolated terraces in South McQuesten, North McQuesten, Red Creek, Haggart Creek, and Seattle Creek valleys. Eskerine deposits and a glaciofluvial terrace are also present at the headwaters of Morrison Creek. A complex of glaciofluvial deposits was identified at the confluence of Secret and Swede Creeks.

$G^{R}t$ $G^{R}x$ $G^{R}c$ — $G^{R}t$ - glaciofluvial terrace up to 60 m above modern drainages and approx. 20 m thick; $G^{R}x$ - glaciofluvial complex, includes glaciofluvial deposition and minor deposition associated with ice contact environments such as buried ice, resedimented till, and glaciolacustrine (clay) sediments.

GLACIAOLACUSTRINE DEPOSITS: laminated clay, silt and fine sand with minor snad and gravel lenses. Deposited in glacial lakes; found locally with a veneer of aeolian sand. Common at the head waters of Morrison Creek.

$L^{R}b$ — glaciolacustrine blanket >5m thick.

GLACIAL DEPOSITS (till): unsorted clay, silt, sand, gravel and cobbles, with minor boulders; deposited by or from glacier ice and occurs as subdued veneer and blanket deposits. Common on the lower slopes of South McQuesten valley, at the confluence of the South and North McQuesten valleys and at the confluence of Red Creek and the North McQuesten River. Till deposits were also mapped at the divide between Red Creek and Swede Creek.

$T^{R}v$ $T^{R}b$ $T^{R}x$ — $T^{R}v$ - Till veneer that conforms to underlying topography, <1m thick; $T^{R}b$ - Till blanket, gently to moderately sloping plain controlled by bedrock or underlying surficial deposits, >1m thick. $T^{R}x$ -till complex, includes till deposition and minor deposition of outwash and glaciolacustrine (clay) sediments.

EARLY PLEISTOCENE - PRE-REID GLACIATION

GLACIOFLUVIAL DEPOSITS: stratified to massive; poorly to well sorted; gravel and sand with minor silt and cobbles; deposited by meltwater originating from glacial ice; locally with a veneer of aeolian silt (loess), and colluvium. Found as buried meltwater channel deposits on Scheelite Dome.

$G^{pR}c$ — - glaciofluvial channel deposit, 1 -15 m thick.

PLEISTOCENE UNDIVIDED

COLLUVIAL DEPOSITS: landslides and cryoplanation terraces. Diamicton and rubble derived from bedrock and surficial materials by a variety of colluvial and sheetwash processes.

Cz — - mass wasting includes slumping, debris slides, and rockfalls. Sporadic rockfalls and slumping in the North McQuesten river valley, in Castnor Creek and around Scheelite Dome. Recent mudflows in Castnor Creek are attributed to instabilities created by recent forest fires.

Ct — - rubble and/or diamicton occurring as tepped or fan shaped deposits. Formed through nivation processes on bedrock at/near mountain summits. Found west of Scheelite Dome.

PRE-PLIO-PLEISTOCENE

BEDROCK: dominated by Selwyn Basin rocks that include upper Proterozoic Hyland Group rocks of the Narchilla and Yusezyu formations (Murphy & Heon, 1995). Yusezyu formation consists of foliated meta-sandstone, muscovite-chlorite phyllite, psammite, siliceous peltic hornfels near intrusions, and rare cals-silicate marble (Murphy & Heon, 1995). Narchila formation consists of phyllite, meta-sandstone, and pebbly sandy limestone. Mississippian Keno Hill quarzite borders the north side of the Robert Service thrust near and to the east of the mouth of Seattle Creek (Murphy & Heon, 1995). Early late Cretaceous Tombstone intrusions outcrop at Scheelite Dome and in Morrison Creek. The intrusions consist of granite, quartz monzonite, and granodiorite (Murphy & Heon, 1995).

R — - bedrock, primarily prominant ridges, escarpments, and mountain summits.

COMBINED MAP UNITS AND AGE DESIGNATORS

The surficial geology unit(s) are shown first followed by the terrain hazard indicator(s). Combined surficial geology units are used where for reasons of scale, two or more deposits cannot be delineated individually. The dominant unit (>50%) is shown first and the subordinate units (<50%) are shown second and third. A dot seperates the surficial unist and a dash seperates the terrain hazard unit from the surficial geology.

The age of glacial deposits are designated by the following superscripts; McConnell Glaciation, e.g. $A^{M}f$; pre-McConnell Glaciation, e.g. $A^{pM}t$; Reid Glaciation, e.g. $G^{R}c$; pre-Reid Glaciation, e.g. $G^{pR}c$.

SYMBOLS

Geological boundary (defined, approximate)

McConnell Glacial Limit (defined, approximate)

Reid Glacial Limit (defined, approximate)

Cirque (McConnell, Reid, Pre-Reid)

Glacial erratic (McConnell, Reid, Pre-Reid)

Moraine ridge

Esker

Glacial meltwater channel (McConnell, Reid, Pre-Reid)

Aligned landform

Stream sediment (-80 mesh) gold assay (ppb) — JB96-09 48

Location of vertical sections

TERRAIN HAZARDS

Mass Movement:

- slow to moderate failure (ie. creep or slump).
- moderate to extreme failure (ie. slides and avalanches).

Arctic, Alpine, and Periglacial Processes:

Pf - permafrost within 1 m of surface.
K - thermokarst
S - Solifluction
- Pingo

Fluvial Processes:

B - braided; multiple unstable channels, prone to rapid changes (flooding)
A - anastomosing; multiple stable channels, gradual changes in channel/bar morphology.
M - meandering; 1-2 channels, gradual channel changes caused by meander migration (scrolled).

Erosional Processes:

P - piping; subsurface channel erosion.
G - gullying; areas of rapid surface erosion.

REFERENCES

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RECOMMENDED CITATION

BOND, J.D., 1998. Surficial geology of Seattle Creek, Central Yukon, NTS 115 P/16. Exploration and Geological Services Division, Indian and Northern Affairs, Canada, Geoscience Map 1998-2, 1:50,000-scale map.

Digital cartography and drafting by Will van Randen, Yukon Geology Program.

Any revisions or additional geological information known to the user would be welcomed by the Yukon Geology Program.

Copies of this map, the accompanying report and Yukon Minfile may be purchased from Geoscience Information and Sales, Exploration and Geological Services Division, Indian and Northern Affairs Canada, Room 102-300 Main St. Whitehorse, Yukon Y1A 2B5 Ph. 867-667-3264 Fax 867-667-3267.

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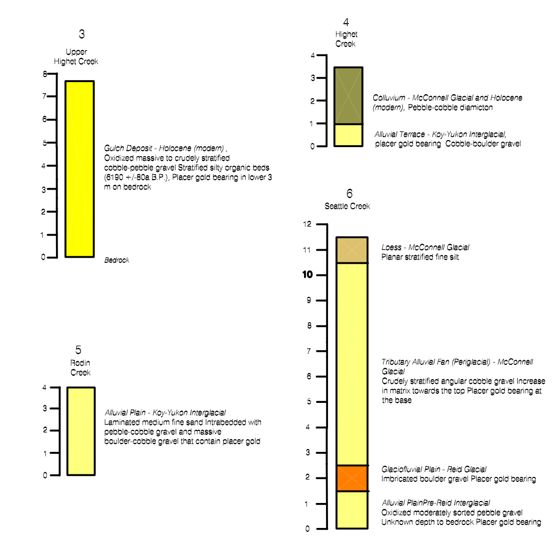
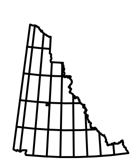


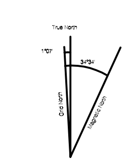


Topographic base produced by SURVEYS AND MAPPING BRANCH, DEPARTMENT OF ENERGY, MINES AND RESOURCES.

ONE THOUSAND METRE
Universal Transverse Mercator Grid
ZONE 8

SEATTLE CREEK
YUKON TERRITORY
SCALE 1:50 000

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Transverse Mercator Projection



Use diagram only to obtain numerical values APPROXIMATE MEAN DECLINATION 1961 FOR CENTRE OF MAP
Annual change decreasing 4.0'

116 A/2 Larsen Creek	116 A/1 BOND Geoscience Map 1998-5	106 D/4 BOND Geoscience Map 1998-6
115 P/15 BOND Geoscience Map 1998-1	115 P/16 THIS MAP	105 M/13 BOND Geoscience Map 1998-3
115 P/10 Moose Creek	115 P/9 Minto Lake	105 M/12 Mayo

Indian and Northern Affairs Canada
Exploration and Geological Services Division
Yukon Region

Geoscience Map 1998-2

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