DESCRIPTIVE NOTES

PHYSIOGRAPHY

The map area is dominated by the broad South McQuesten River valley, which is bisected by the Mount Haldane massif. The South McQuesten River continues west on the north side of Mount Haldane and Haldane Creek occupies the valley to the east, which extends south toward Halfway Lakes and the village of Mayo. Mayo River valley enters the map area in the southeast corner and flows west and southwest towards the Stewart River. Haggart Creek valley parallels the South McQuesten valley in the northwest part of the map area. The surrounding uplands average 4000 feet and generally form a dissected plateau with flat to gently rolling summits and steeper valley sides.

GLACIAL HISTORY

In central Yukon the Quaternary period was characterized by multiple glacial and interglacial periods. The buildup of ice in Yukon consisted of glaciers originating from numerous accumulation zones in the Ogilvie, Wernecke, Selwyn, Pelly, Cassiar and St. Elias mountains. Ice from these centers combined as it flowed toward the central plateau region. The map area was glaciated by ice originating in the Ogilvie and Wernecke mountains. From oldest to youngest the main glacial episodes are the pre-Reid, Reid and McConnell glaciations.

The pre-Reid episode includes multiple undifferentiated glaciations that occurred approximately between 2.5 Ma and 400Ka. Landforms from these glaciations have been eroded and modified by subsequent glaciations and are difficult to identify. All the major valleys were glaciated by pre-Reid ice in the map area. The upper slopes of Mount Haldane would have been the only nunatak during the pre-Reid glaciations. No pre-Reid erratics or deposits were identified in the map area.

The Reid glaciation occurred at least 200,000 years ago (Berger, 1994) and likely followed similar flow lines to pre-Reid glaciations, but was at least 1000 feet thinner in the map area. Reid glacial landforms have moderate preservation, which has allowed the Reid limit to be approximately mapped throughout the study area. Reid ice advanced into the map area from the South McQuesten River valley and the Mayo River valley. Ice in Haggart Creek and Lynx Creek valleys originated in the South McQuesten River valley and flowed into Lynx Creek at its headwaters. The Reid limit is estimated to lie above the 4000 foot contour on Mount Haldane. Local ice accumulated in cirques on Mount Haldane at the headwaters of North Star Creek, Spire Creek, and Bighorn Creek. Reid ice overtopped Van Cleaves Hill and Field Hill and reached a minimum elevation of 4000 feet above Trail Creek. Reid outwash deposits, mapped between Williams Creek, Corkery Creek and Field Creek indicates the merging of meltwater systems that originated on both sides of Galena Hill. The pass between Black Creek and Ross Creek, west of Mount Haldane, provided a passage for ice and meltwater between the South McQuesten River valley and the Halfway Lakes area.

The McConnell glaciation is estimated to have advanced into the map area between 17,000 and 20,000 years ago (Bond, 1997). McConnell landforms and the glacial limit are easily recognized throughout central Yukon and in the map area. The last glaciation reached its western terminus in the Mount Haldane area marking the limit of three valley glaciers. McConnell ice, originating in the Ogilvie Mountains, entered the map area from the northeast. A large lobe of ice in the South McQuesten River valley terminated just east of Bighorn Creek and the end moraine for ice entering Haldane Creek valley terminated at Halfway Lakes. Ice in the Mayo River valley terminated 7 km into the map area. Local ice also formed in the Mount Haldane cirques, however, their extent would have been limited to the confines of the local valleys. Extensive moraine and outwash deposits are present in the valleys that contained McConnell ice and meltwater. Significant down-cutting has occurred into the glacial sediments in the Mayo River and Duncan Creek valleys since the McConnell glaciation.

PLACER POTENTIAL

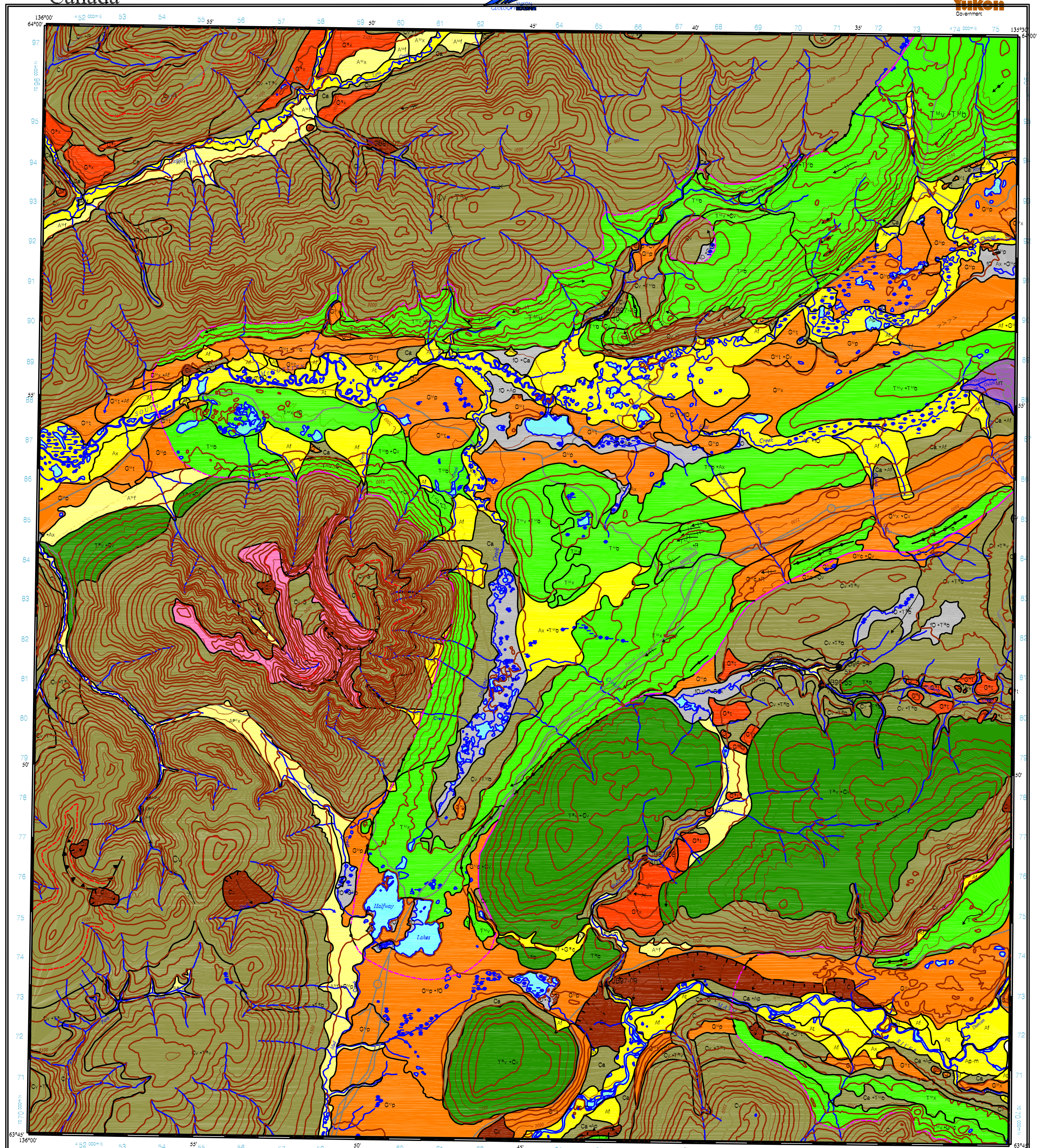
The placer gold potential of Mount Haldane map area is relatively unknown. There has been little historical interest in the area and only minor activity on Field Creek, Snowshoe Creek, lower Haggart Creek, and Ross Creek. In 1988 large-scale mining was attempted on Swede Creek and although there has been staking on Corkery Creek and Shanghai Creek no substantial testing is evident in either drainage.

Placer potential lies in Field Creek, Swede Creek, Corkery Creek, and Shanghai Creek. Field Creek, is a right limit tributary to the Mayo River that lies beyond the McConnell limit. Prominent Reid terraces are preserved along the upper left limit of the creek and indicate that the drainage acted as a conduit for meltwater during the retreat of the Reid glaciation. Since Reid glaciation, Field Creek has incised through the terrace sediments in the mid to upper part of the drainage, while the lower end of the drainage has undergone a more complex history. Paleo-Field Creek probably drained west into the Halfway Lake area. Towards the end of the Reid glaciation an ice marginal channel was cut near the present mouth of the creek, resulting in the capture of Field Creek by the Mayo River valley. The present drainage, below the diversion, has incised into McConnell outwash and bedrock in response to post-McConnell downcutting by the Mayo River. This relatively recent canyon is apparent where the Duncan/Mayo Lake Road crosses Field Creek. If testing is positive in the upper reaches of Field Creek then the lower, abandoned channel, should be tested.

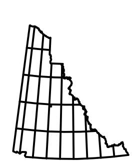
Swede Creek is a right limit tributary to Haggart Creek, 6.5 km downstream of the confluence between Lynx and Haggart Creeks, and lies within the limit of Reid glaciation. A low grade-bulk placer gold mine operated on the lower reaches of the stream and extracted approximately 3,230 ounces in 1988 (Kreft, 1993). Secret Creek is a left limit tributary to Swede Creek and heads in the uplands shared with Gill Gulch, Fisher Gulch, and Ironrust Creek. The orientation of Secret Creek transverse to glacial flow may have preserved placer deposits in this drainage. A comparison of gold geochemistry between Swede Creek, Secret Creek, Fisher Gulch, and Ironrust Creek may help identify a hardrock source and additional placers in this area.

Corkery Creek is a right limit tributary to Haldane Creek at the south end of Galena Hill. Corkery Creek was fully glaciated by Reid ice and McConnell ice glaciated the lower reaches of the drainage where it drops into Haldane Creek valley. When Haldane Creek valley was glaciated it dammed Corkery Creek at the mid-point of the drainage and diverted the stream to the west out of its pre-glacial drainage. The damming also caused upper Corkery Creek to accumulate fine-grained sediment, which has raised the water table in the drainage. Depths to bedrock may be extreme just upstream from the McConnell limit, however this may not be the case throughout the upper part of the drainage. The flat-bottomed morphology of a valley normally suggests deep ground in glaciated terrain. It appears the morphology of Corkery Creek valley was controlled by meltwater breaching into the drainage from Williams Creek during the Reid glaciation, which would give the valley a box-shape morphology or flat bottom. This could make the bottom sediment appear anomalously deep where in fact it is shallow to bedrock. Stream sediment geochemistry from the north tributary channel measures 55 ppb gold and 1190 ppm arsenic.

Shanghai Creek is a right limit tributary to the South McQuesten River northeast of Mount Haldane. The drainage was heavily glaciated during the McConnell glaciation and appears to contain thick glacial deposits in the mid-part of the drainage. The lower part of the drainage, in contrast, appears to have incised considerably into the glacial sediment and possibly to bedrock. This may provide a favourable area to prospect for placers. Approximately 10 colours were obtained from each pan of bar sediment in this part of the creek.



MOUNT HALDANE
YUKON TERRITORY
SCALE 1:50 000



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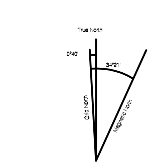
ONE THOUSAND METRE
Universal Transverse Mercator Grid
ZONE 8

Miles 1 0 1 2 3 Miles

Metres 1000 0 1000 2000 3000 4000 Metres

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 1970 FOR CENTRE OF MAP
Annual change decreasing 4.3'

116 A/1 Bond Geoscience Map 1998 -5	106 D/4 Bond Geoscience Map 1998 -6	106 D/3 McQuesten Lake
115 P/16 Bond Geoscience Map 1998 -2	105 M/13 THIS MAP	105 M/14 Bond Geoscience Map 1998 -4
115 P/9 Minto Lake	105 M/12 Mayo	105 M/11 Williamson Lake

QUATERNARY

HOLOCENE

ANTHROPOGENIC DEPOSITS: Human-made landforms or structures. Rarely forms a dominant unit. The Elsa mine tailings form the only mappable unit in the map area.

mine tailings- comminuted clay to gravel size quartzite, carbonate and greenstone with pyrite; partly flooded, behind rip-rap impoundment.

ORGANIC DEPOSITS: peat and woody material; occurring as a 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 South McQuesten River valley and Haldane Creek valley. Permafrost is commonly present within 1 m of 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 South McQuesten River, Haggart Creek, Mayo River, and Ross Creek valleys.

Ap At Ax Af — 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 postglacial post-McConnell sedimentation. 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.

Cv Ca — Cv- colluvium veneer that conforms to bedrock topography, <1 m thick. Ca- colluvium apron that conforms to bedrock topography, >1 m thick; located at the break in slope between the valley side and valley floor.

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. Observed on the end moraine northwest of Halfway Lakes.

Ev — Ev- aeolian veneer <1 m thick.

LATE PLEISTOCENE (WISCONSINAN) - McCONNELL GLACIATION

ALLUVIAL DEPOSITS: angular gravel with sand, organic silts, and minor cobbles deposited from streams 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 glacial periods.

A^Mf — A^Mf - alluvial fan; coarse sand lenses, gravel, cobbles, and mudflow deposits of resedimented Reid or local colluvial deposits, 1-40 m thick. Common beyond the McConnell limit where a narrow valley enters a larger valley.

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 between Mayo and Halfway Lakes, as a slumped bench above Mayo River, and in the South McQuesten River valley.

G^Mp G^Mt G^Mx G^Mc — G^Mp - glaciofluvial plain, 3-10 m thick; G^Mt - glaciofluvial terrace, >5-10 m thick. G^Mx glaciofluvial complex includes glaciofluvial deposition and minor deposition associated with ice contact environments. G^Mc - glaciofluvial channel deposit; includes glaciofluvial deposition associated with lateral melt-water channels.

GLACIAL DEPOSITS (till)- unsorted clay, silt, sand, and gravel with minor cobbles; deposited by or from glacier ice and occurs in a variety of different landforms (plains, hummocks, or rolling moraine surfaces). Common near the McConnell limit in Haldane Creek valley, Mayo River valley, and South McQuesten River valley.

T^Mv T^Mb T^Mx — T^Mv - till veneer that conforms to bedrock topography, 0-1 m thick; T^Mb - till blanket, gently to moderately sloping plain controlled by bedrock, >1 m thick. T^Mx- till complexes, hummocky or ridged till associated with ice contact sediments, 3-15 m thick. Also includes some veneer and blanket units, undifferentiated.

MIDDLE PLEISTOCENE - PRE-McCONNELL GLACIATION (UNDIVIDED)

ALLUVIAL DEPOSITS: stratified sand and gravel with minor silt and cobbles deposited by streams 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 when available lode sources are nearby.

$A^{pM}p$ $A^{pM}t$ $A^{pM}x$ — $A^{pM}p$ $A^{pM}t$ - alluvial plain and terraces; stratified coarse sand and gravel with minor silt and fine sand occurring as bars, overbank floodplain and low terrace sediments, 0-15 m thick; typically occur as buried deposits under recent or McConnell alluvium. $A^{pM}x$ - alluvium complex of $A^{pM}x$ and/or $A^{pM}p$ buried under Af deposits from possibly many climatic cycles, 1-30 m thick. Common southwest of Mount Haldane and in the Corkery Creek drainage.

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). Present in Haggart Creek valley, as high terraces above Field Creek and in Williams Creek.

G^Rt G^Rx — G^Rt - glaciofluvial terrace up to 60 m above modern drainages and <20m thick; G^Rx glaciofluvial complex, includes glaciofluvial deposition and minor deposition associated with ice contact environments such as buried ice, resedimented till, and glaciolacustrine (clay) sediments.

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 in Haggart Creek valley, on Van Cleaves Hill east of Field Creek, and north of Corkery Creek.

T^Rv T^Rb — T^Rv - till veneer that conforms to underlying topography, <1m thick; T^Rb - till blanket, gently to moderately sloping plain controlled by bedrock or underlying surficial deposits >1 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 — Cz- mass wasting includes slumping, debris slides, and rockfalls. Large slump blocks of glaciofluvial deposits are present on the right limit of the Mayo River and debris slides were noted west of Halfway Lakes. Sporadic rockfalls occur on the north-facing headwalls of Mount Haldane.

PRE-PLIO-PLEISTOCENE

BEDROCK: dominated by Hyland Group rocks of the Selwyn Basin that include psammite, phyllite, carbonate, and meta-clastic rocks. The Robert Service Thrust, a Jura-Cretaceous thrust that has emplaced the Hyland Group over Mississippian Keno Hill quartzite, parallels the South McQuesten River which can be traced south and west of Mount Haldane (Hunt et al., 1996). The upper Proterozoic Hyland group rocks are represented by the Yusezyu Formation, which consists of foliated tan to grey meta-sandstone, muscovite chlorite phyllite, quartzofeldspathic and micaceous psammite, meta-sandstone (grit), pebble meta-conglomerate, and rare calc-silicate rock and marble. The Mississippian Keno Hill quartzite outcrops along the Robert Service Thrust and consists of foliated and lineated, light to dark grey, locally mottled vitreous quartzite, dark grey carbonaceous phyllite, and calcareous quartzite (Hunt et al., 1996). Earn Group sediments outcrop on the flanks of Mount Haldane and consist of foliated green phyllite, grey carbonaceous phyllite, and siliceous carbonaceous meta-sandstone (Hunt et al., 1996).

R — R- bedrock, primarily prominent ridges, escarpments, and mountain summits. Prominent outcrops on Mount Haldane.

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 percent) is shown first and the subordinate units (<50 percent) are shown second and third. A dot separates the surficial units and a dash separates the terrain hazard unit from the surficial geology.

The age of glacial deposits are designated by the following superscripts: McConnell Glaciation, e.g. A^Mf Reid Glaciation, e.g. G^Rt , Pre-McConnell Glaciation, e.g. $A^{pM}p$

SYMBOLS

- Geological boundary
- Glacial limit of McConnell Glaciation (defined, approximate)
- Glacial limit of Reid Glaciation (defined, approximate)
- Crique (McConnell, Reid, Pre-Reid)
- Glacial erratic (McConnell, Reid, Pre-Reid)
- Moraine ridge
- Esker
- Glacial meltwater channel
- Tors
- Aligned landform
- Stream sediment (-80 mesh) gold assay (ppb) — JB97-06 15

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

BERGER, G.W., 1994.; Age of the Alaska/Yukon Sheep Creek tephra from thermoluminescence dating of breacketing loess at Fairbanks. "Bridges of the Science between North America and the Russian far east." 45th Arctic science conference, 25-27 August, 1994, Anchorage, Alaska, and 29 August -2 September, 1994, Vladivostok, Russia.

BOND, J.D., 1997.; The Glacial History and Placer Gold Potential of the North McQuesten River (116 A/1), Dublin Gulch (106 D/4) and Keno Hill (105 M/14) map areas, Mayo Mining District, Central Yukon. In: LeBarge, W.P. and Roots, C.F. (editors), 1997. Yukon Quaternary Geology, Volume 2, Exploration and Geological Services Division, Northern Affairs Program, Yukon Region, p.30-43.

HUNT, J.A., MURPHY, D.C., ROOTS, C.F. AND POOLE, W.H., 1996. Geological map of Mt. Haldane area, Yukon (105 M/13). Exploration and Geological Services Division, Yukon, Indian and Northern Affairs, Canada. Geoscience Map 1996-4, 1:50,000-scale map.

RECOMMENDED CITATION

BOND, J.D., 1998. Surficial geology of Mount Haldane, Central Yukon, NTS 105 M/13. Exploration and Geological Services Division, Indian and Northern Affairs, Canada, Geoscience Map 1998-3, 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.

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This map was released May, 1998, subsequent revision dates are:

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SURFICIAL GEOLOGY OF MOUNT HALDANE CENTRAL YUKON (105 M/13)

by

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