ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

REPORT OF INVESTIGATION 2016-5
Twelker and others, 2016
SHEET 1 OF 1
Explanatory report accompanies map
http://doi.org/10.14509/29665

Data Sources

A DGGS 2001-2003 fieldwork (Athey and others, 2004); Surficial mapping from Reger and Burns (2013)

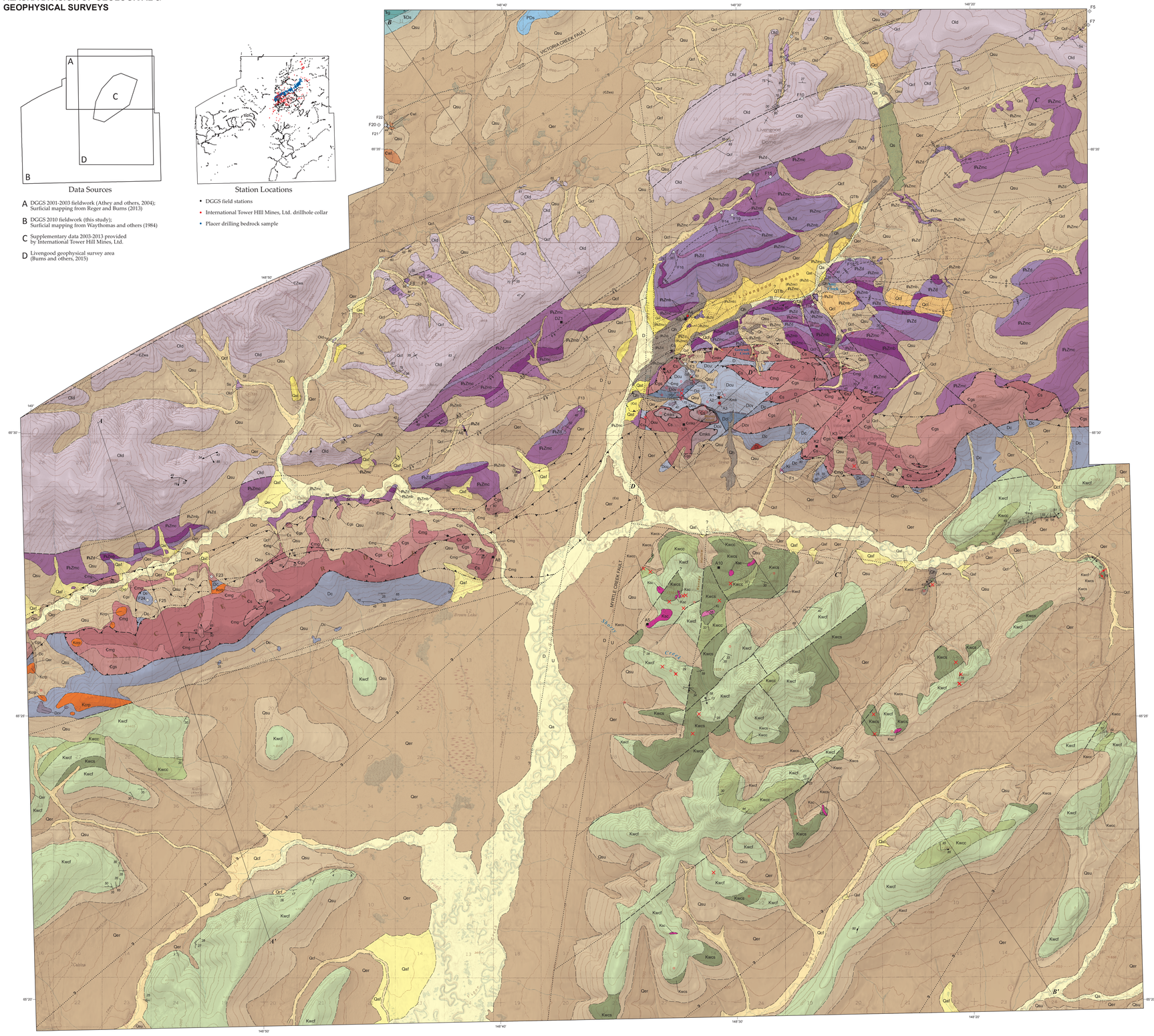
B DGGS 2010 fieldwork (this study); Surficial mapping from Waythomas and others (1984)

C Supplementary data 2003-2013 provided by International Tower Hill Mines, Ltd.

D Livengood geophysical survey area (Burns and others, 2015)

Station Locations

- DGGS field stations
- International Tower Hill Mines, Ltd. drillhole collar
- Placer drilling bedrock sample



EXPLANATION OF MAP UNITS

Map units are identified by the symbols described below. Bedrock map unit labels enclosed in parentheses indicate concealed bedrock where the lithology is known from drilling.

ALLUVIAL DEPOSITS

- Qa — UNDIFFERENTIATED ALLUVIUM (Quaternary)
- Qaf — ALLUVIAL FAN DEPOSITS (Quaternary)
- Qat — TERRACE ALLUVIUM (Quaternary)
- QTfb — BENCH ALLUVIUM (Quaternary)

COLLUVIAL DEPOSITS

- Qcl — LANDSLIDE DEPOSITS (Quaternary)

MIXED DEPOSITS

- Qcf — MIXED COLLUVIUM AND ALLUVIUM (Quaternary)
- Qer — RETRANSPORTED SILT AND LOWLAND LOESS (Quaternary)
- Qsu — UPLAND SILT AND COLLUVIUM (Quaternary)

SWAMP DEPOSITS

- Qs — SWAMP DEPOSIT (Quaternary)

MANMADE DEPOSITS

- Qh — PLACER TAILINGS AND ARTIFICIAL FILLS (Quaternary)

INTRUSIVE ROCKS

- LAMPROPHYRE DIKE (Tertiary)
- Ksc — SHORTY CREEK INTRUSIVE SUITE (Late Cretaceous)
- Kmk — MONEY KNOB INTRUSIVE SUITE (early Late Cretaceous)
- Kcrp — CASCADEN RIDGE PLUTON (Cretaceous?)
- Ki — FELSIC TO INTERMEDIATE DIKES AND SILLS, UNDIFFERENTIATED (Cretaceous?)
- Di — OLIVE CREEK PLUTON (Devonian?)

WILBER CREEK UNIT

- Kwcf — WILBER CREEK FLYSCH (Cretaceous; Albian)
- Kwcc — WILBER CREEK CONGLOMERATE (Cretaceous; Albian)
- Kwcs — WILBER CREEK SHALE AND SILTSTONE (Cretaceous; Albian)

CASCADEN RIDGE UNIT

- Dc — CASCADEN RIDGE SANDSTONE, SHALE, AND CONGLOMERATE (Middle Devonian)
- Dcu — CASCADEN RIDGE SANDSTONE, SILTSTONE, AND CONGLOMERATE (Middle Devonian)
- Dcv — CASCADEN RIDGE PERALKALINE RHYOLITE FLOWS, BRECCIA, AND LITHIC TUFF (Middle Devonian)
- Dcl — CASCADEN RIDGE SHALE TO FINE SANDSTONE (Middle Devonian)

AMY CREEK UNIT

- PzZd — AMY CREEK DOLOSTONE, SILICEOUS DOLOSTONE, AND LIMESTONE (lower Paleozoic to Neoproterozoic)
- PzZmb — AMY CREEK METABASALT (lower Paleozoic to Neoproterozoic)
- PzZmc — AMY CREEK SILICEOUS MUDSTONE AND CHERT (lower Paleozoic to Neoproterozoic)

LIVENGOOD DOME UNIT

- Old — LIVENGOOD DOME CHERT (Ordovician)

LOST CREEK UNIT

- Sl — LOST CREEK LIMESTONE (upper Silurian)
- Ss — LOST CREEK SANDSTONE, SILTSTONE, SHALE, AND CONGLOMERATE (Silurian)

MAFIC AND ULTRAMAFIC ASSEMBLAGE

- Cgs — GREENSTONE (lower Cambrian)
- Cmg — METAGABBRO (early Cambrian)
- Cs — SERPENTINITE, METAGABBRO, AND GREENSTONE (early Cambrian)
- Cmks — MUDSTONE AND CHERT (lower Cambrian)

WICKERSHAM UNITS

- Cwl — WICKERSHAM LIMESTONE (lower Cambrian?)
- CZwa — WICKERSHAM SHALE (lower Cambrian? to upper Proterozoic)

ROCKS NORTH OF THE VICTORIA CREEK FAULT

- Trg — RAMPART GABBRO, QUARTZ GABBRO, AND MINOR CHERT (Triassic)
- TDs — SANDSTONE, SHALE, AND CHERT (Triassic to Devonian)
- PDs — SHALE (Permian? to Devonian)

CONTACTS

- CONTACT—Identity and existence certain, location approximate
- CONTACT—Identity and existence certain, location approximate
- CONTACT—Identity or existence questionable, location approximate
- CONTACT—Identity and existence certain, location concealed
- UNCONFORMABLE CONTACT (Correlation of Map Units)

FAULTS

- FAULT—Identity and existence certain, location accurate
- FAULT—Identity and existence certain, location approximate
- FAULT—Identity and existence certain, location concealed
- FAULT—Identity or existence questionable, location concealed
- STRIKE SLIP FAULT, RIGHT-LATERAL OFFSET—Identity and existence certain, location concealed
- STRIKE SLIP FAULT (in cross section)—A, away from observer; T, toward observer
- THRUST FAULT—Identity and existence certain, location accurate
- THRUST FAULT—Identity and existence certain, location approximate
- THRUST FAULT—Identity and existence certain, location concealed

FOLDS

- ANTIFORM—Identity and existence certain, location inferred
- OVERTURNED ANTIFORM—Identity and existence certain, location inferred
- SYNFORM—Identity and existence certain, location inferred
- OVERTURNED SYNFORM—Identity and existence certain, location inferred

BEDDING

- INCLINED BEDDING
- VERTICAL BEDDING
- INCLINED BEDDING, dip direction to left, for multiple observations at one locality
- VERTICAL BEDDING, for multiple observations at one locality

CLEAVAGE

- INCLINED CLEAVAGE
- INCLINED CLEAVAGE, dip direction to right, for multiple observations at one locality

JOINTS

- SMALL, MINOR INCLINED JOINT
- SMALL, MINOR VERTICAL OR NEAR VERTICAL JOINT
- SMALL, MINOR INCLINED JOINT, dip direction to right, for multiple observations at one locality
- SMALL, MINOR INCLINED JOINT, dip direction to left, for multiple observations at one locality

FOLIATION

- INCLINED METAMORPHIC OR TECTONIC FOLIATION

MINOR FOLDS

- SMALL, MINOR ANTICLINE, vertical or near-vertical axial surface

DIKES

- INCLINED DIKE
- LAMPROPHYRE DIKE (Tl)
- SHORTY CREEK INTRUSIVE SUITE (Ksc)
- MONEY KNOB INTRUSIVE SUITE (Kmk)
- FELSIC TO INTERMEDIATE DIKES AND SILLS, UNDIFFERENTIATED (Ki)

MISCELLANEOUS MAP ELEMENTS

- $^{40}Ar/^{39}Ar$ LOCALITIES—Numbers refer to Table 2
- K-Ar LOCALITIES—Numbers refer to Table 2
- U-Pb LOCALITIES—Numbers refer to Table 2
- DETRITAL ZIRCON LOCALITIES—Numbers refer to Table 2
- FOSSIL LOCALITIES—Numbers refer to Table 3

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Athey, J.E., Werdon, M.B., Newberry, R.J., Szumigala, D.J., Craw, P.A., and Hicks, S.A., 2004, Geologic map of the Livengood SW C-3 and SE C-4 quadrangles, Tolovana mining district, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2004-3A, 1 sheet, scale 1:50,000. http://doi.org/10.14509/3309

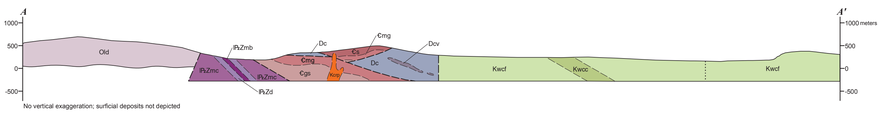
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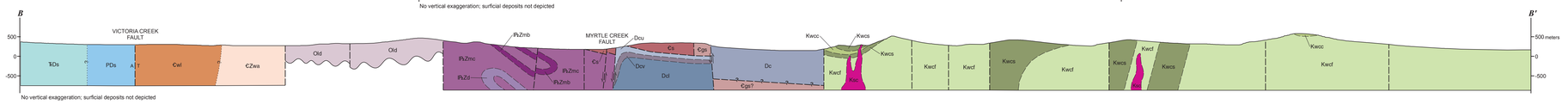
Waythomas, C.F., TenBrink, N.W., and Ritter, D.F., 1984, Surficial geology of the Livengood B-3, B-4, C-3, and C-4 quadrangles, Yukon Tanana Upland, Alaska: Alaska Division of Geological & Geophysical Surveys Report of Investigation 84-6, 1 sheet, scale 1:63,360. http://doi.org/10.14509/2365

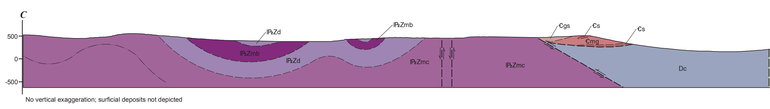
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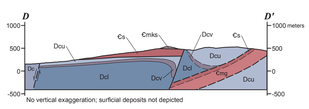
This project is part of the Alaska Airborne Geophysical/Geological Mineral Inventory Program funded by the Alaska State Legislature and managed by State of Alaska, Department of Natural Resources (DNR), Division of Geological & Geophysical Surveys (DGGS). Partial funding for the 2003 geologic mapping was also provided by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under STATEMAP award number 03HQAG0055. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. government.

Topographic base map from:
U.S. Geological Survey topographic maps
Livengood B-3 (1954 - photorevised 1975)
Livengood B-4 (1953 - photorevised 1975)
Livengood B-5 (1952 - minor revisions 1963)
Livengood C-3 (1954)
Livengood C-4 (1952 - photorevised 1975)
Livengood C-5 (1952 - photorevised 1975)
Projection:
Universal Transverse Mercator Zone 6N
Datum:
North American Datum of 1927

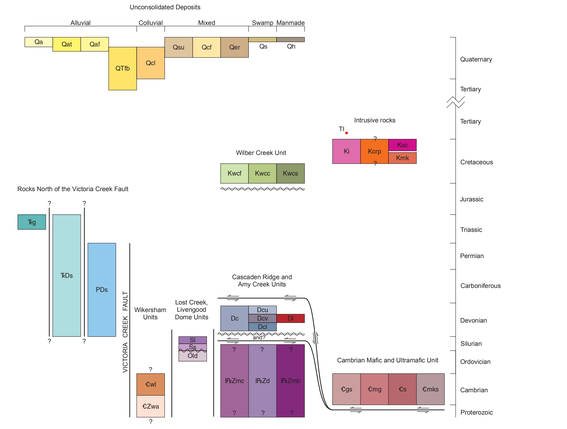








CORRELATION OF MAP UNITS



GEOLOGIC MAP OF PORTIONS OF THE LIVENGOOD B-3, B-4, C-3, AND C-4 QUADRANGLES, TOLOVANA MINING DISTRICT, ALASKA

by

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2016

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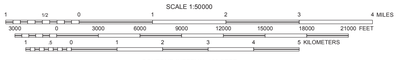
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Location of Map Area





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Surficial geologic field investigations:
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