

DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

- Qa ALLUVIUM OF MODERN STREAM CHANNELS (Holocene)
- Qc UNDIFFERENTIATED ALLUVIUM (Holocene to Late Pleistocene)
- Qd ALLUVIAL-FAN DEPOSITS (Holocene to Late Pleistocene)
- Qe UNDIFFERENTIATED COLLUVIUM (Holocene to Pleistocene)
- Qf COLLUVIAL-ALLUVIAL-FAN DEPOSITS (Holocene to Late Pleistocene)
- Qg FINE GRAINED LOWLAND COLLUVIUM (Holocene to Pleistocene)
- Qh FINE GRAINED UPLAND COLLUVIUM (Holocene to Pleistocene)
- Qi DEBRIS FAN (Pleistocene to Late Tertiary)
- Qj UPLAND LOESS (Pleistocene)
- Qk REWORKED AND DISSECTED LOESS (Holocene to Pleistocene)
- Ql SWAMP DEPOSITS (Modern [Late Holocene])
- Qm PLACER-MINE TAILINGS AND ARTIFICIAL FILLS (Modern [Late Holocene])

IGNEOUS ROCKS

- T1 LAMPROPHYRE DIKE (Tertiary)
- Kc MONEY KNOB PLUTON (Cretaceous)
- Rc RUTH CREEK PLUTON (Cretaceous)
- Oc OLIVE CREEK PLUTON (Cretaceous)

MONZONITE TO SYENITE DIKES (Cretaceous) See "Map Symbols" for additional explanation of compositional variation.

GRANITE AND GRANODIORITE DIKES (Cretaceous) See "Map Symbols" for additional explanation of compositional variation.

METAMORPHOSSED SEDIMENTARY AND IGNEOUS ROCKS

NORTH OF VICTORIA CREEK FAULT

- Tp RAMPART GABBRO, QUARTZ GABBRO, AND MINOR CHERT (Triassic)
- Sd SANDSTONE, SHALE, AND CHERT (Triassic to Devonian)
- Pd SHALE (Permian to Devonian)

SOUTH OF VICTORIA CREEK FAULT

Cascaden Ridge Unit

- Dc SANDSTONE, SHALE, AND CONGLOMERATE (Middle Devonian)

Lost Creek Units

- Lc LOST CREEK LIMESTONE (Late Silurian)
- Ls LOST CREEK SANDSTONE, SILTSTONE, SHALE, AND CONGLOMERATE (Silurian)

Livengood Dome Unit

- Od LIVENGOOD DOME CHERT (Ordovician)

Amy Creek Assemblage

- Pa AMY CREEK DOLOMITE AND LIMESTONE (lower Paleozoic to latest Late Proterozoic)
Pattern indicates rare areas of limestone.
- Pm AMY CREEK METABASALT (lower Paleozoic to latest Late Proterozoic)
- Pn AMY CREEK SILICEOUS MUDSTONE AND CHERT (lower Paleozoic to latest Late Proterozoic)

Ophiolite Assemblage

- Cg GREENSTONE (Early Cambrian)
- Cl OLIVINE CLINOPYROXENITE DIKE (Early Cambrian)
- Cm METAGABBRO (Early Cambrian)
- Cs LAYERED METAGABBRO (Early Cambrian)
- Cx SERPENTINITE, METAGABBRO, AND GREENSTONE (Early Cambrian)

Wickersham Units

- Cw WICKERSHAM LIMESTONE (earliest Cambrian?)
- Cz WICKERSHAM SHALE (earliest Cambrian? to Late Proterozoic) Unit is not exposed in the map area.

SCALE 1:50,000

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

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Bedrock geologic field investigations by:
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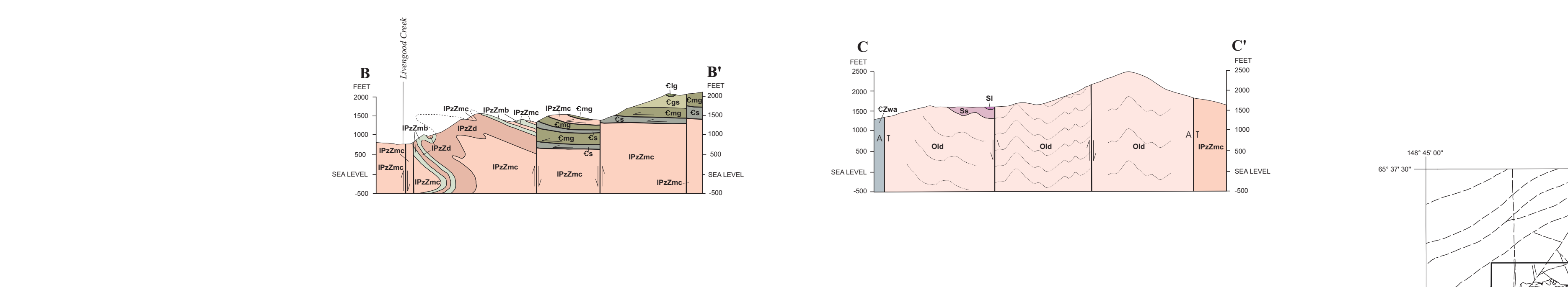
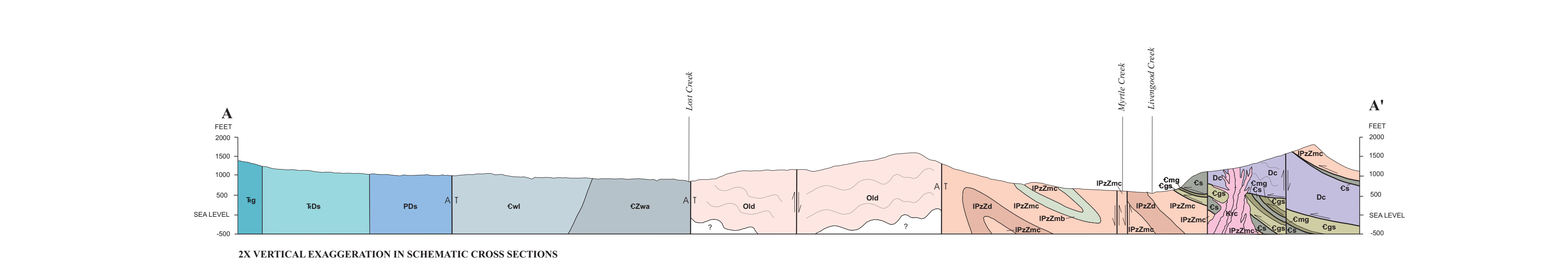
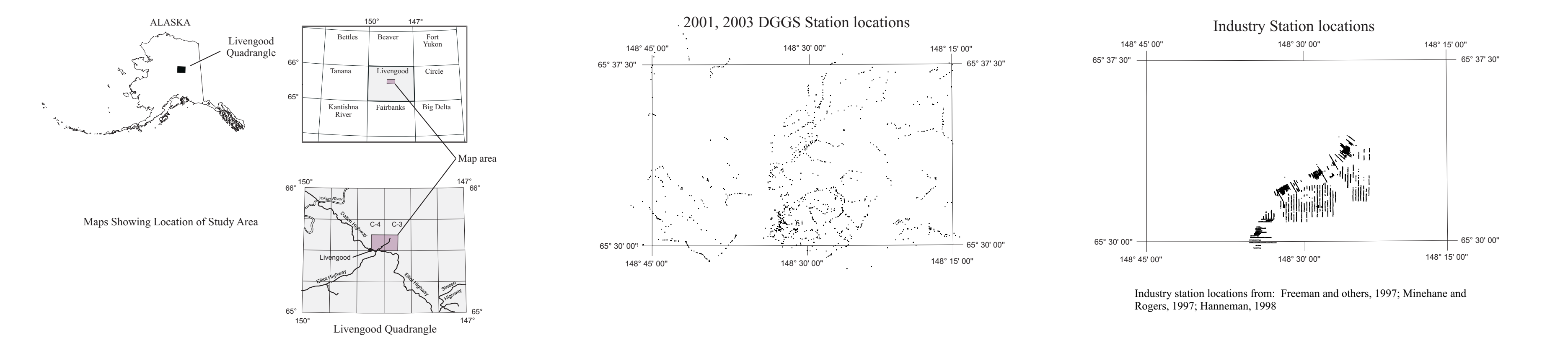
Technical reviews of bedrock geology by:
M.A. Wilson, L.E. Bero, and D.S.P. Stevens

Editorial review by:
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Cartographic and GIS artist:
A.S. Stearns and D.S.P. Stevens

Base map from:
Livengood C-3 and C-4 quadrangles,
U.S. Geological Survey digital raster graphics images, 1997
Map projection: UTM zone 6
Datum: NAD 83

Approximate mean elevation, 2003



MAP SYMBOLS

Contact - Dashed where approximately located or inferred
Bedrock unit contact, dotted where concealed
Surficial unit contact

Unconformable contact or thrust fault - Dashed where approximately located or inferred, dotted where concealed, queried since contact type is uncertain; regionally interpreted to be an unconformable contact (Foster, 1966; Weber and others, 1992); in the Money Knob area the contact is a thrust fault (this study)

Contact or high-angle fault - Dashed where approximately located or inferred, dotted where concealed, queried since contact type is uncertain; regionally interpreted to be an unconformable contact (Foster, 1966; Weber and others, 1992); in the Money Knob area the contact is a thrust fault (this study)

Fault - Dashed where approximately located or inferred, dotted where concealed, queried where location is uncertain. Arrows indicate apparent direction of relative movement. U, upthrown block; D, downthrown block
Showing relative motion in cross section, A, away from observer; T, toward observer

Permian thrust fault - Dashed where approximately located or inferred, dotted where concealed; bars on upper plate. Timing of Cambrian ophiolite assemblage emplacement over the lower Paleozoic to Late Proterozoic Amy Creek units may be constrained by "Ar" Ar ages reset to 200-250 Ma (map locations A5 and A6, and sample DF97-16 located 3.3 km south of the map area; Athey and others, 2004a)

Early Cretaceous thrust fault - Dashed where approximately located or inferred; dotted where concealed; bars on upper plate. In the Money Knob area, the Cascaden Ridge sedimentary unit (Dc) is thrust over the Cambrian ophiolite and Amy Creek assemblages. Emplacement of the Dc unit may be a later event, accommodating stresses related to compression of the Manley basin (located approximately 6 km south of Livengood)

Unconformable contact - Shown in "Correlation of Map Units"; queried where contact type is uncertain

Fold - Showing trace of axial surface; arrows located on the axial trace indicate direction of plunge

Antiform

- Overturned antiform, showing direction of dip of limbs
- Synform
- Overturned synform, showing direction of dip of limbs

Trace of bedding - Shown in cross section

Strike and dip of bedding

- Strike of vertical bedding
- Strike and dip of foliation
- Strike of vertical foliation

"Ar"/Ar localities - Numbers refer to map and figure 1

K/Ar localities - Numbers refer to map and figure 1; some localities occur outside the map area

Sr/Nd locality - Number refers to map and figure 1

Fossil localities - Numbers refer to map, figure 1, and table 1; some localities occur outside the map area

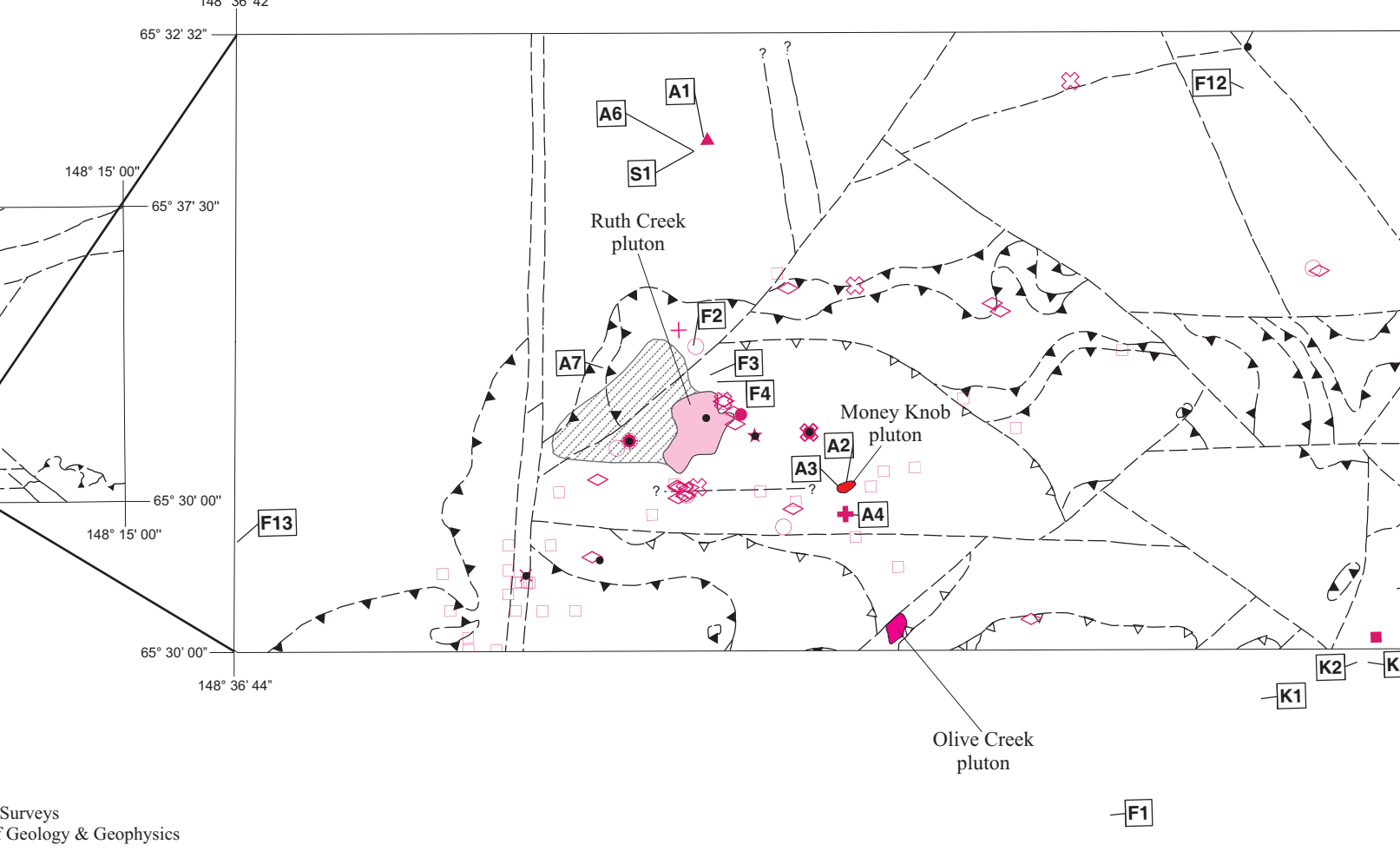
Drill hole collar (Minchane and Rogers, 1997)

Dikes - Shown on geologic map as lines where orientation recorded

- Lamprophyre; unit T1 (Tertiary)
- Granite; equivalent to Kc (Cretaceous)
- Undifferentiated calc-alkaline; equivalent to Kc (Cretaceous)
- Quartz monzonitic; equivalent to Ka (Cretaceous)
- Quartz monzonitic; equivalent to Ka (Cretaceous)
- Quartz syenitic; equivalent to Ka (Cretaceous)
- Syenitic; equivalent to Ka (Cretaceous)
- Undifferentiated alkalic; equivalent to Ka (Cretaceous)
- Undifferentiated felsic; equivalent to Ka or Kc (Cretaceous)
- Undifferentiated felsic(?); some samples were collected from colluvial units dominated by periglacial mass wasting processes; these samples may not represent bedrock units present directly beneath surficial units (Hite, 1977; Freeman and others, 1997; Minchane and Rogers, 1997; Hanemann, 1998; Freeman, 2003)
- Olivine clinopyroxenite; unit Ce (Early Cambrian)

Area containing an anomalously high number of undifferentiated felsic(?) samples; some samples were collected from colluvial units dominated by periglacial mass wasting processes; these samples may not represent bedrock units present directly beneath surficial units (Minchane and Rogers, 1997; Hanemann, 1998; Freeman, 2003)

Figure 1. Inset map of Money Knob-Amy Dome ridge area. Inset map shows dike locations and compositions, igneous rocks, faults, age data, fossil locations, and drill hole collars.



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

by
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2004

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