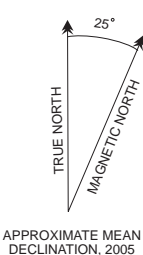


Base map from:
Fairbanks A-4 quadrangle
U.S. Geological Survey digital raster graphic images, 1997
Map projection: UTM zone 6
Datum: NAD 83



SCALE 1:50,000
0 1 2 3 4 MILES
0 5000 10000 15000 20000 21000 FEET

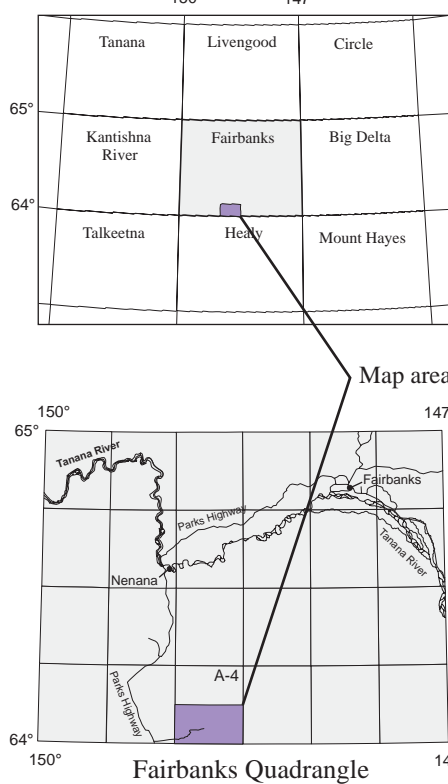
CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

Bedrock geologic field investigations by:
J.E. Athey (2005), M.B. Werdon (2005), D.J. Szumigala
(2005), R.J. Newberry (2005), and L.R. Freeman (2005)
GIS layers and digital cartography by:
J.E. Athey, R.L. Smith, and J.A. McNulty
Technical reviews of bedrock geology by:
R.W. Flinders and D.L. Lefan
Editorial review by:
P.K. Davis
Cartographic and GIS advice:
A.G. Surman

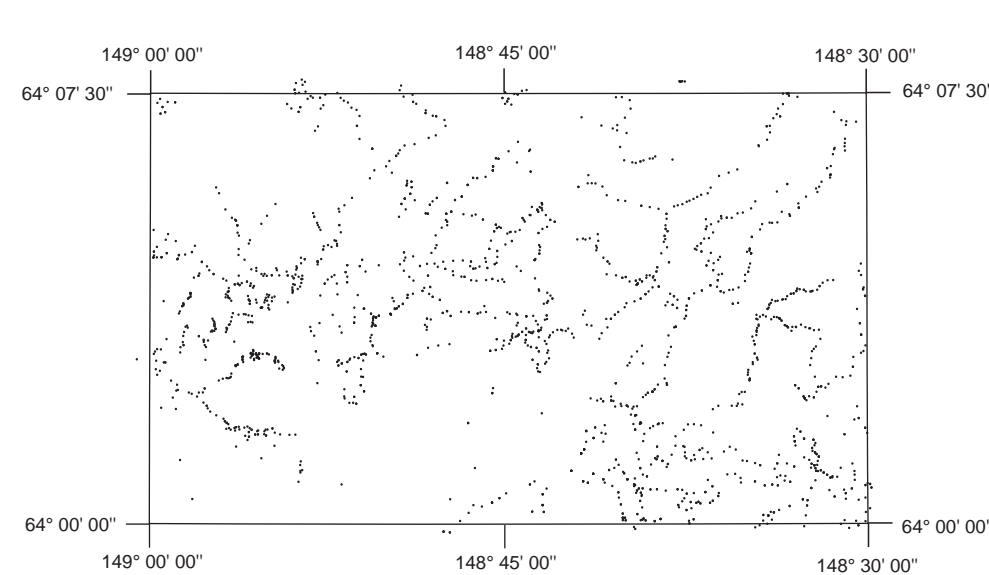
ALASKA

Fairbanks
Quadrangle

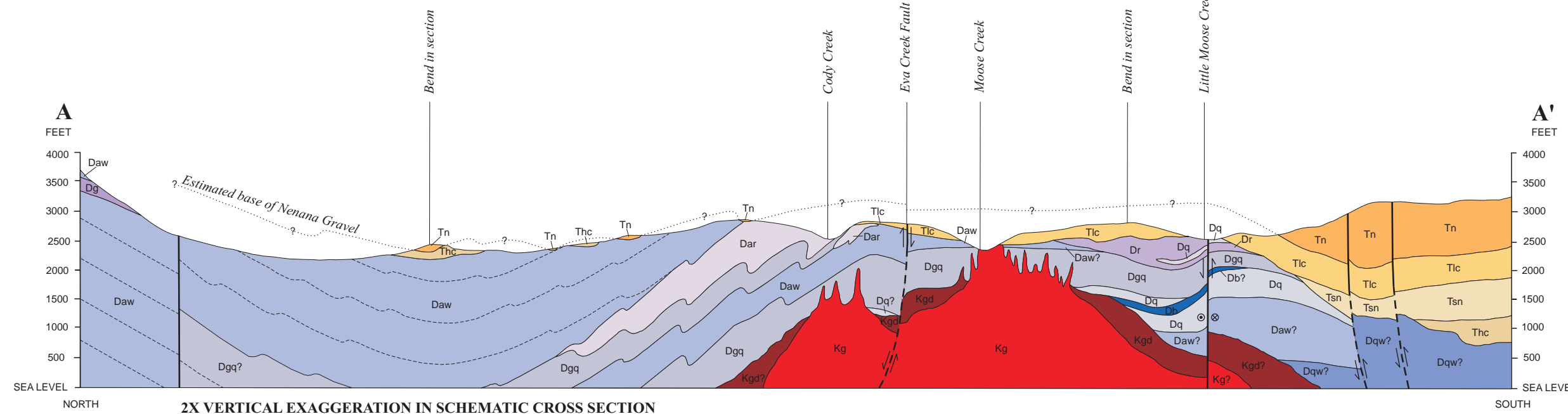
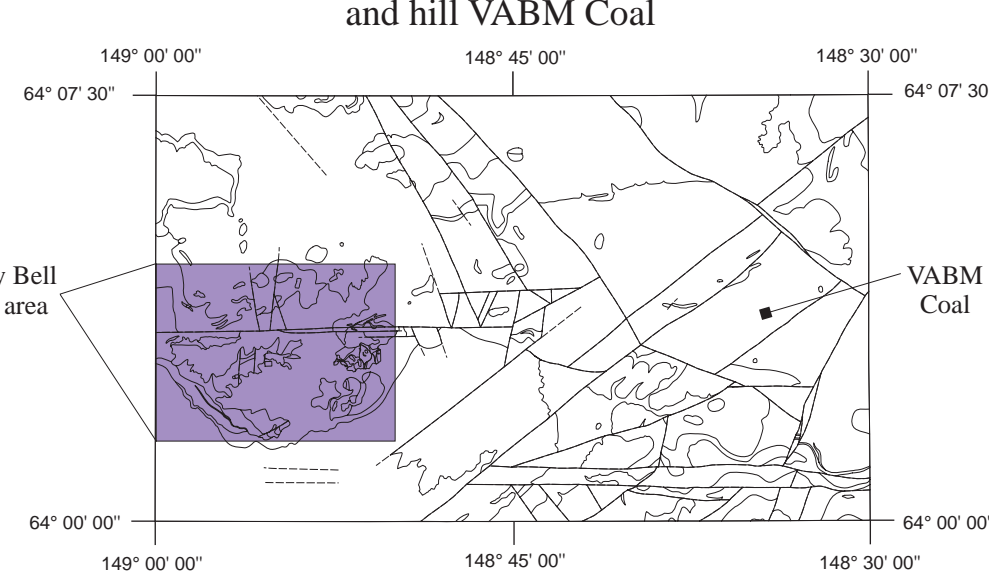
Maps Showing Location of Study Area



2005 DGGS Station locations



Location Map for Liberty Bell Mine area
and hill VABM Coal

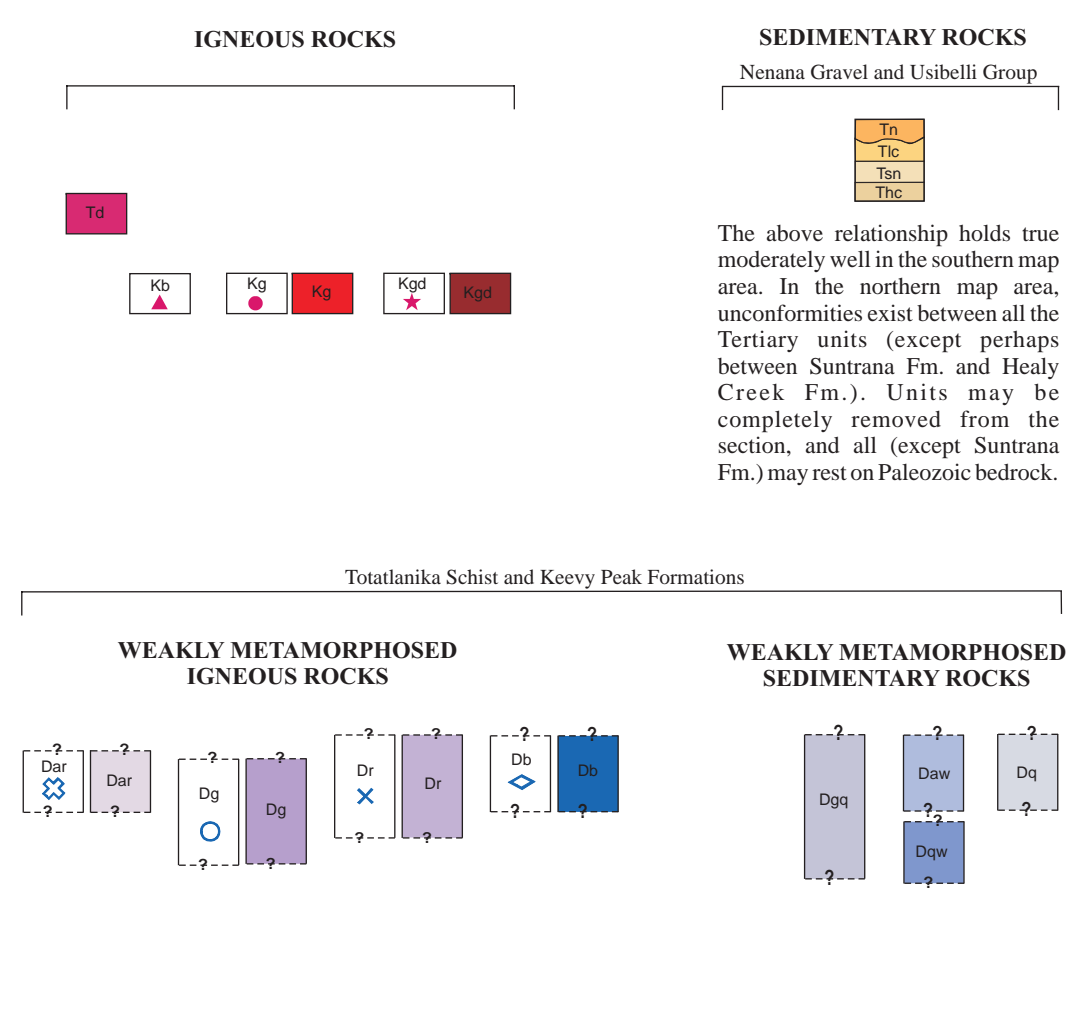


BEDROCK GEOLOGIC MAP OF THE LIBERTY BELL AREA, FAIRBANKS A-4 QUADRANGLE, BONNIFIELD MINING DISTRICT, ALASKA

by
J.E. Athey¹, R.J. Newberry², M.B. Werdon¹, L.K. Freeman¹, R.L. Smith¹, and D.J. Szumigala¹
2006

Affiliation:
¹ Alaska Division of Geological & Geophysical Surveys
² University of Alaska Fairbanks, Department of Geology & Geophysics

CORRELATION OF MAP UNITS



MAP SYMBOLS

- Contact** - Dashed where approximately located or inferred, queried where location is uncertain
Unconformable contact (Correlation of Map Units)
Estimated base of Nenana Gravel (cross section)
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
Fault, where significant motion is unknown or location is unknown or uncertain
Fault, interpreted from aerial photography and (or) geophysical data (Burns and others, 2002), queried where existence or location is uncertain
Vertical fault
High angle fault, ball on downthrown side
Fault, where motion is toward (t) or away (a) from the observer (cross section)
Fold - Showing trace of axial surface; arrows located on the axial trace indicate direction of plunge
Antiform
Synform
Fold, trace of axial surface as interpreted from aerial photography or observed from a distance
Fold axis, outcrop or smaller scale
Axial plane of isoclinal or open fold, outcrop or smaller scale (symbol arms indicate direction of dip)
Bedding
Strike and dip of bedding
Strike of vertical bedding
Horizontal bedding
Bedding interpreted from aerial photography
Foliation
Trace of foliation (cross section)
Strike and dip of foliation
Strike of vertical foliation
Horizontal foliation
Foliation observed from a distance
Joint (inset map)
Vertical joint (inset map)
Vein (inset map)
"Ar"/Ar localities - Numbers refer to map, Appendix B, Table 1
Pollen localities - Numbers refer to map, Appendix E, Table 5
Coal localities - Numbers refer to map, Appendix F, Table 7
Dikes - Shown on geologic map as lines where orientation was recorded
Gabbro, equivalent to Kb (Cretaceous)
Granite, equivalent to Kg (Cretaceous)
Granodiorite, equivalent to Kgd (Cretaceous)
Metagabbro, equivalent to Dg (Devonian)
Metadiorite, equivalent to Dr (Devonian)
Aphyric metagabbro, equivalent to Dar (Devonian)
Metabasite, equivalent to Db (Devonian)
Area containing burnt sedimentary rocks [referred to as "clinker"]
Extent of subsurface pluton as delineated by aeromagnetic geophysical data and occurrences of hornfels and Cretaceous intrusives, queried where uncertain
Area of hornfels or other alteration related to the hydrothermal mineralizing system

MAP UNITS (see accompanying booklet for descriptions)

TERTIARY SEDIMENTARY ROCKS

- NENANA GRAVEL (Pliocene)
LIGNITE CREEK FORMATION (Late Miocene)
SUNTRANA FORMATION (Middle Miocene)
HEALY CREEK FORMATION (Early Miocene—Early Oligocene/Late Eocene?)

TERTIARY—CRETACEOUS IGNEOUS ROCKS

- DACITE FLOWS (Tertiary)
GRANITE DIKES AND STOCKS (Cretaceous)
GRANODIORITE DIKES AND STOCKS (Cretaceous)
GABBRO DIKES (Cretaceous)

PALEOZOIC UNITS

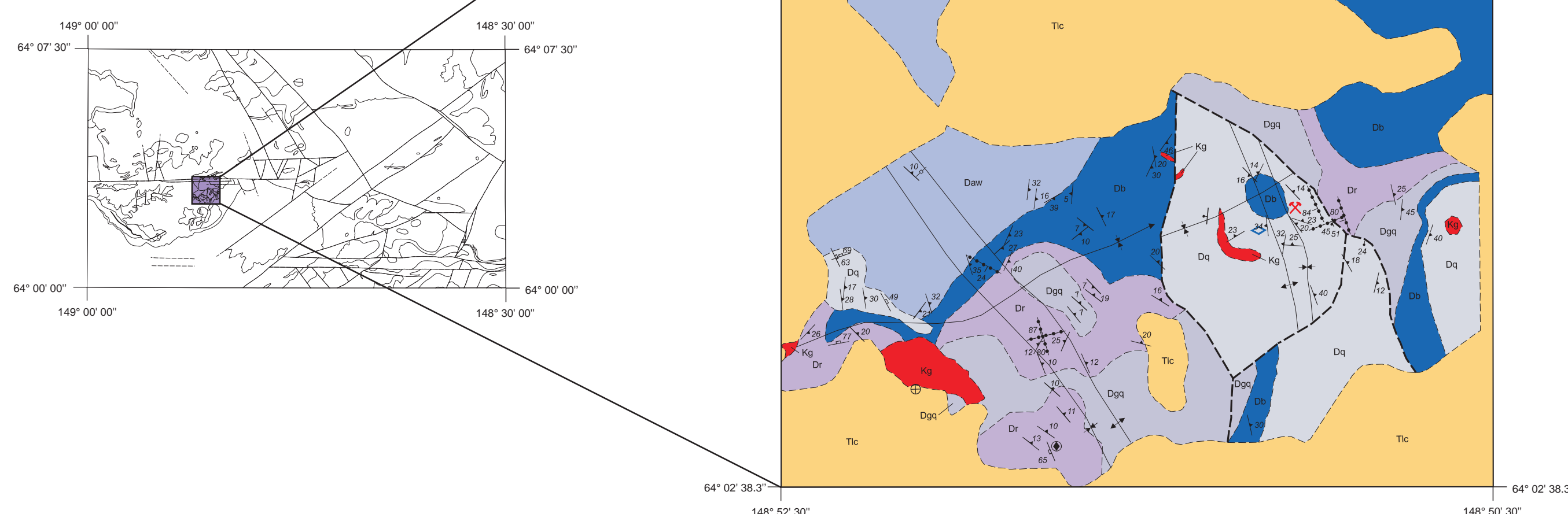
- METAGRANITE (Devonian)
METARHYOLITE (Devonian)
APHYRIC METARHYOLITE (Devonian)
METABASITE (Devonian)
ARKOSIC METAWACKE (Devonian)
QUARTZITE AND METAPELITE (Devonian)
GRAPHITIC QUARTZITE (Devonian)
QUARTZ METAWACKE AND META-ARENITE (Devonian)

ACKNOWLEDGMENTS

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Modified from Freeman and others, 1987
Liberty Bell Mine headframe location



State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys