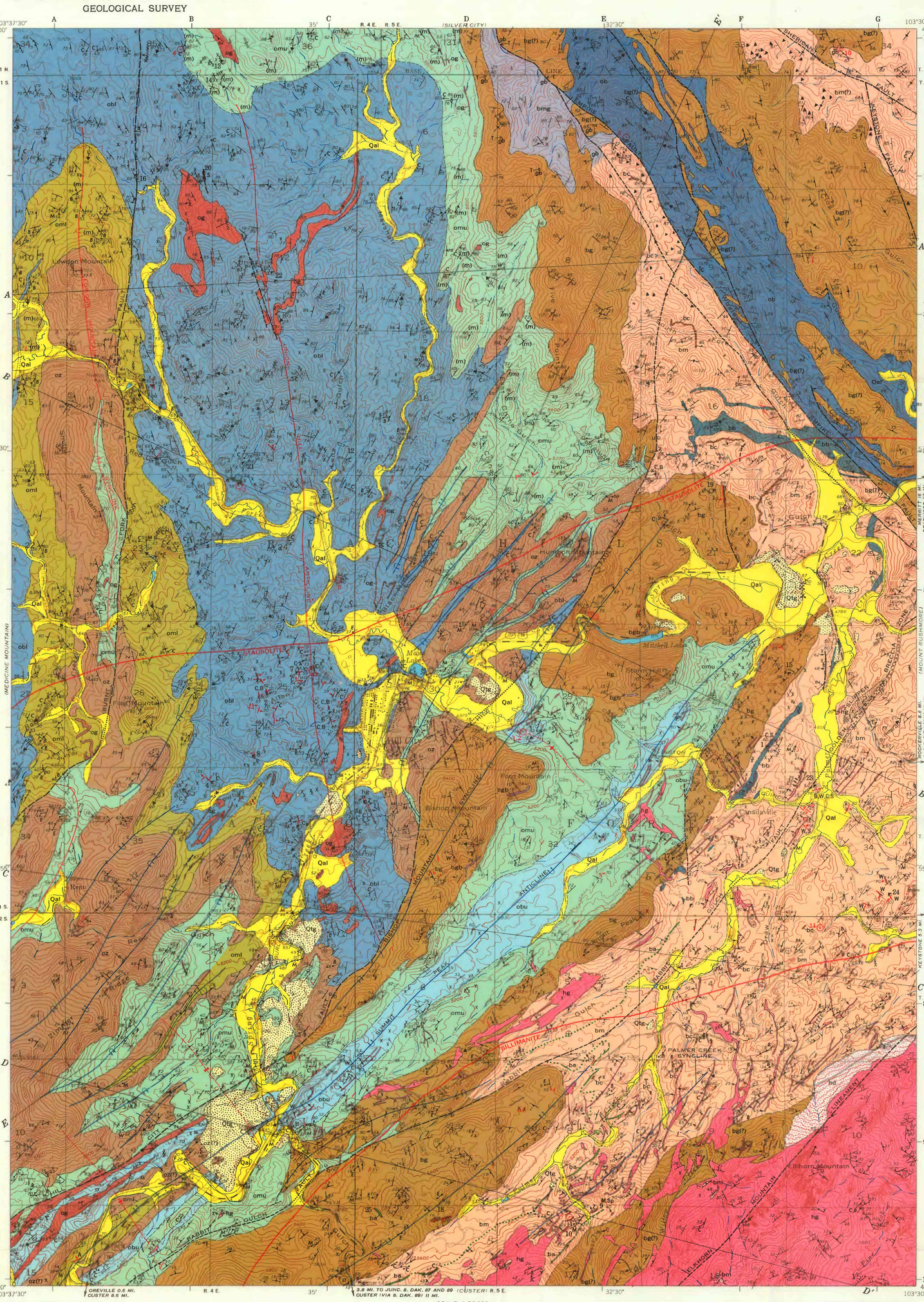


Base from U.S. Geological Survey, 1954
Roads modified, 1967

TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1969

SCALE 1:24 000

1 ½ 0 1 MILE

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Geology by J. C. Ratté, 1959–62, and R. G. Wayland, 1954–57

EXPLANATION

Symbols for map units queried where correlation uncertain; structure symbols in areas of alluvium represent bedrock outcrops too small to be shown on map

QUATERNARY

Qal — Alluvium

Qtg — Terrace deposits
Largely gravels; occur 0–200 feet above present streambeds

Holocene

Pleistocene(?)

UNCONFORMITY

PRECAMBRIAN

hd — Granitic debris
Obscures contact between granite and country rock

hg — Harney Peak Granite
Largely pegmatitic albite-muscovite granite. Some fine- to coarse-grained granite
Z, zoned pegmatite, showing dip
Some minerals identified in pegmatites during this study:
B, *beryl* — M, *mica*
C, *cassiterite* — Sp, *spodumene*

A, W — Quartz veins, showing dip
Veins range from virtually pure quartz veins to those having a greisenized selvage containing muscovite, cassiterite, and beryl. Some veins probably predate Harney Peak Granite and are related to the regional metamorphism
Some minerals identified during this study:
A, *andalusite* — S, *sulfide*
B, *beryl* — W, *tungsten minerals*
C, *cassiterite*

bc, bm, ba, bb, bmg, bg, bgb — Bugtown Formation
bm, *quartz-mica, staurolite, and sillimanite schists interlayered with thick-bedded quartz schist and metagraywacke in southeast part; quartz phyllite interlayered with thick-bedded quartzose rocks in northeast part. Black glassy quartzite beds common only in northeast corner of quadrangle*
ba, *heterogeneous beds consisting of coarse-grained amphibole rock generally less than 1 foot thick; amphibole and pyroxene-bearing calc-silicate rocks, black and white banded quartzite, and graphitic quartz schist. Colored dots indicate inferred trace between outcrops and float blocks*
bb, *mainly thin-bedded graphitic quartz schist and quartz-biotite-garnet schist; similar to thin-bedded rocks of Oreville Formation; commonly contains abundant tourmaline needles*
bc, *discontinuous conglomerate beds a few feet thick*
bmg, *thin- to thick-bedded graphitic quartz phyllite and quartz-biotite-garnet phyllite; similar to graphitic biotite-garnet rocks of Oreville Formation*
bg, *mainly thick-bedded metagraywacke; locally interlayered with thin layers of phyllite and schist, which are most common in northeast part of quadrangle*
bgb, *quartz-biotite-garnet schist beds of Oreville type interlayered near lower contact of formation*

ob — Oreville(?) Formation
Mainly thin-bedded quartz-biotite-garnet phyllite and schist. Some uncertainty of correlation with Oreville Formation despite identical lithology. In northeast part of quadrangle

(m), omu, obu, oz, oml, obl, a, og — Oreville Formation
Upper part:
omu, *muscovite facies: mainly quartz-mica phyllite or schist; may include quartz-biotite-garnet schist; rocks may contain staurolite*
(m), *local zones as much as a few tens of feet thick that contain tiny magnetite octahedra and pyrite metacrysts with maximum dimensions of about ½ inch. Shown in* omu *and* oml *only*
obu, *biotite facies: mainly thin-bedded to laminated quartz-biotite-garnet schist*
oz, *Zimmer Ridge Member (psammite facies); mainly thick-bedded massive metagraywacke*
Lower part:
oml, *muscovite facies: mainly quartz-mica phyllite or schist; rocks may contain staurolite and (or) andalusite*
obl, *biotite facies: thin-bedded to laminated quartz-biotite-garnet phyllite or schist*
a, *amphibole rock in beds a few inches thick; occurs locally in biotite-garnet rock throughout the quadrangle, but shown only where it outlines folds northwest of Hill City*
og, *psammite facies: thin- to thick-bedded massive metagraywacke and quartz schist interlayered throughout the formation*

Contact, showing dip
Dashed where approximately located; short dashed where gradational or indefinite; dotted where concealed

Fault, showing dip
Dashed where approximately located; short dashed where inferred or doubtful; dotted where concealed. Arrows show relative horizontal movement. U, *upthrown side;* D, *downthrown side*

Small fault or shear zone, showing dip

Probable fault
Marked by topographic lineament on map and on aerial photographs

Breccia zone
Stipple indicates silicified rock

Tectonic breccia
Areas of interlayered competent and incompetent metamorphic rocks where the competent layers have been sheared into breccia and pseudo-conglomerate

FOLDS

Anticline — **Syncline**
Overturned regional folds
Showing generalized trace of axial plane. Plunge believed to be low to moderate with original south-southwest trend

Anticline or antiform — **Syncline or synform**
Major overturned northeast-trending folds and cross folds
Showing generalized trace of axial plane. Plunge moderate to subhorizontal; decreases toward Harney Peak Granite

Antiformal — **Synformal**
Major warps
Showing inferred trace of axial plane

Inclined — **Vertical** — **Horizontal**
Strike and dip of axial planes of minor folds
May be combined with arrow showing direction and plunge of axis and symbol showing form or movement sense of fold

PLANAR STRUCTURES

Inclined — **Vertical** — **Horizontal**
Strike and dip of beds
Although most folds in the quadrangle are overturned, a symbol for overturned bedding is not used because numerous tight minor folds make determination of tops of beds uncertain

Top of beds shown by sedimentary structures
gb, *graded beds*
lc, *load casts*

Vertical — **Inclined**: *Foliation parallels bedding*
Inclined — **Vertical**: *Relation between foliation and bedding uncertain or shown by adjacent bedding symbol*
Inclined — **Vertical**: Slip cleavage
Strike and dip of foliation in metasedimentary rocks
Includes schistosity, foliation in massive rocks, and cleavage. Symbols within granite apply to schist screens too small to be shown on map

Strike and dip of foliation in Harney Peak Granite
Ball at end indicates strong compositional or textural layering

Inclined — **Vertical**
Strike and dip of joints
Solid symbol indicates joint parallel to bedding

LINEAR STRUCTURES

Synform — **Antiform** — *Showing movement sense*
Axis of minor folds
May show form or movement sense

Inclined — **Horizontal**
Letter indicates type of lineation
B, *intersection of bedding and other S planes*
C, *axis of crinkle or very small fold*
F, *fluting or mullion structure in massive rocks*
M, *mineral orientation or streaking*
E, *axis of calc-silicate ellipsoid or boudin*
W, *broad warp in bedding or foliation*

SILLIMANITE

Approximate mineral isograd for pelitic rocks
Based primarily on field observations. Index minerals sillimanite and staurolite occur on side of isograd as shown

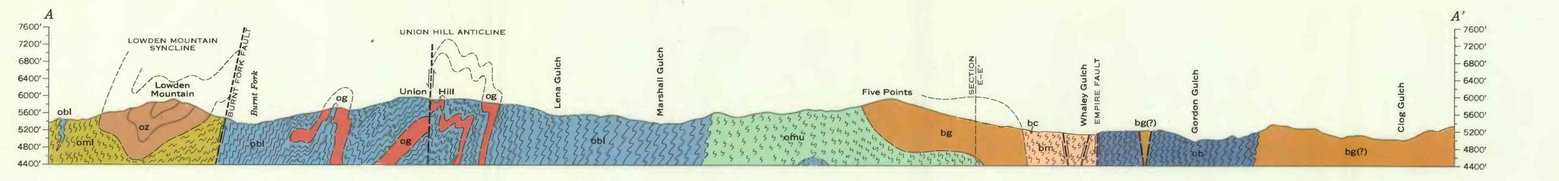
Shaft, showing dump — **Adit** — **Prospect pit or shallow shaft**
Gravel pit — **Trench or open pit**
Surface openings and explorations

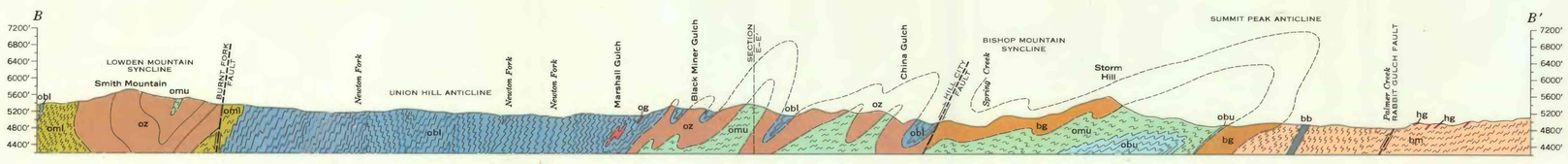
KEY TO LOCATION OF NUMBERED MINING PROPERTIES

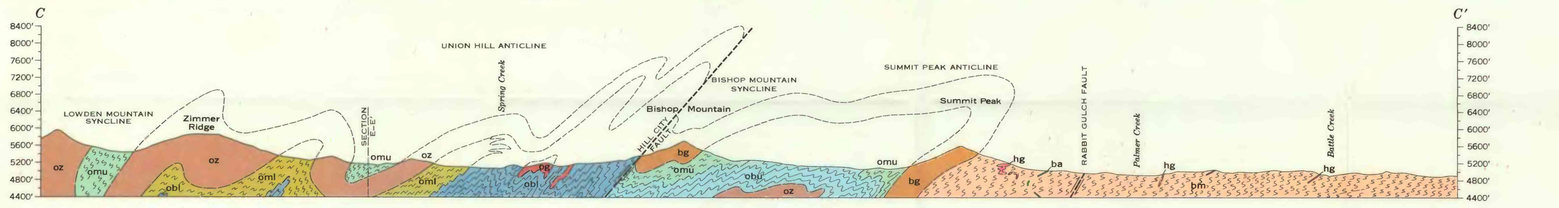
No.	Name	Location
	Tin	
1.	Addie	F-6
2.	Campaign	C-6
3.	Coats	B-6.5
4.	Cowboy	B-6.5
5.	Gertie	C-7
6.	Mohawk	C-6
7.	Tin Boom	C-6
8.	Tin Chance	B-6
	Mica pegmatite	
9.	Dewey	E-9.5
10.	Monkey Lode	E-9.5
	Spodumene pegmatite	
11.	Mateen	C-6.5
	Gold	
12.	Antler	C-4
13.	Burlington	B-1
14.	Crain	B-1
15.	Eldorado	F-5.5
16.	Gold Mountain	B-2
17.	Golden Summit	F-7
18.	Grizzly Bear	D-9.5
19.	J.R.	F-4.5
20.	O. K. Lode	B-2
21.	Sunnyside	B-4
22.	Union Hill	C-3
	Empire[1]	G-5
	Tungsten properties	
23.	Goodluck	G-6.5
24.	Heart of the Black Hills	G-7
25.	Reinbold	C-9.5

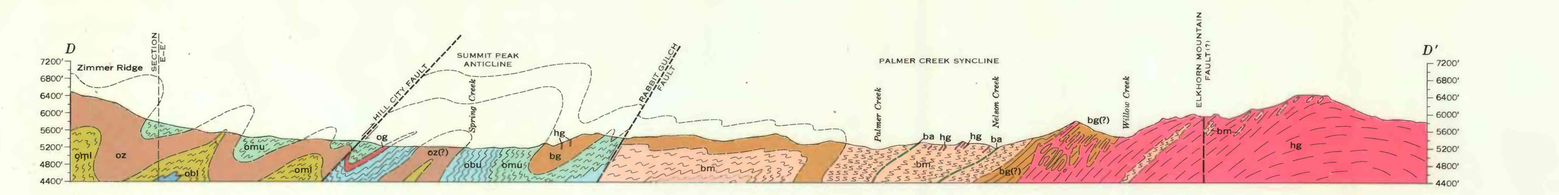
[1]The Empire mine, including the Golden Slipper and Forest City shafts, is in the Mount Rushmore quadrangle.

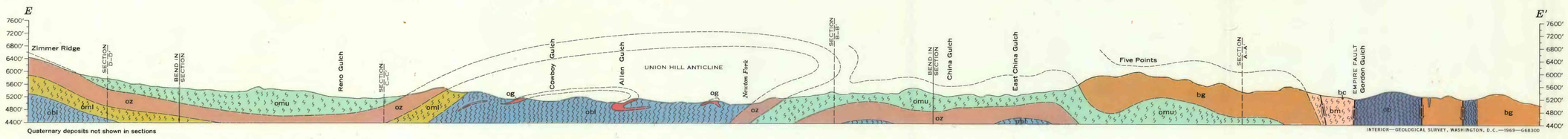
6 — Sample locality of chemically analyzed rocks
Number corresponds to analysis number in tables in text



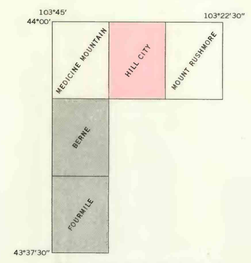








Quaternary deposits not shown in sections



STATUS OF GEOLOGIC MAPPING
Stipple indicates published report; no pattern, geologic mapping in progress

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1969—G68300

GEOLOGIC MAP AND SECTIONS OF THE HILL CITY QUADRANGLE, PENNINGTON COUNTY, SOUTH DAKOTA