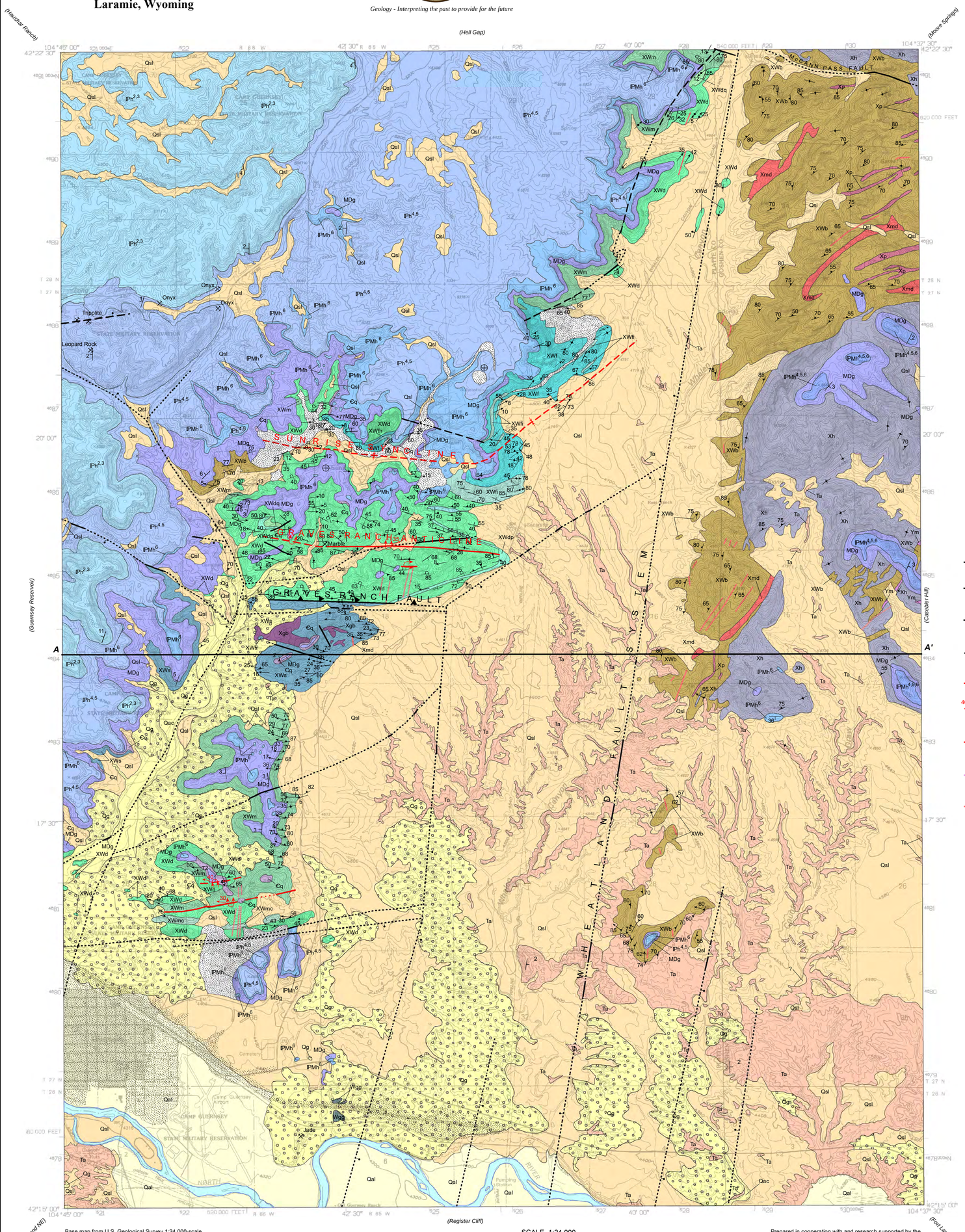
**WYOMING STATE GEOLOGICAL SURVEY**
**Ronald C. Surdam, State Geologist**
**Laramie, Wyoming**

*Geology - Interpreting the past to provide for the future*

Prepared in cooperation with the U.S. GEOLOGICAL SURVEY

# MAP SERIES 68
# Guernsey 1:24,000 - scale Geologic Map




Base map from U.S. Geological Survey 1:24,000-scale topographic map of the Guernsey, Wyoming 7½-minute Quadrangle, 1995.

Projection: Universal Transverse Mercator (UTM), zone 13
North American Datum of 1927 (NAD 27)
10,000-foot grid ticks: Wyoming State Plane Coordinate System, East zone

A digital version of this map is also available on CD-ROM.

Wyoming State Geological Survey
P.O. Box 1347 - Laramie, WY 82073-1347
Phone: (307) 766-2286 - Fax: (307) 766-2605
Email: sales-wsgs@uwyo.edu

UTM GRID CONVERGENCE (GN)
1995 MAGNETIC DECLINATION (MN) AT CENTER OF SHEET
DIAGRAM IS APPROXIMATE

SCALE 1:24,000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Prepared in cooperation with and research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, USGS award Number 05HQAG0062. The views and conclusionscontained 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.

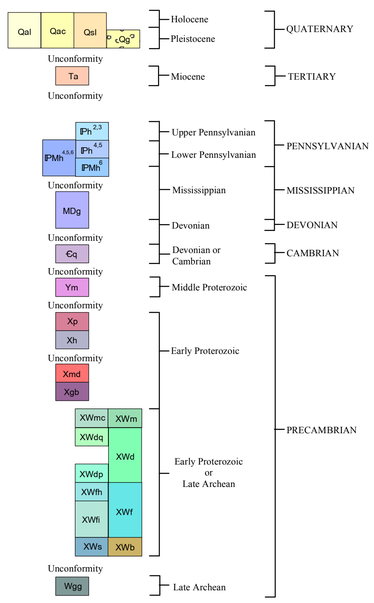
Prepared in cooperation with the U.S. Geological Survey, National\Cooperative Geologic Mapping Program, underCooperative Agreement\Number 03HQAG0097.

Digital cartography by James E. Stafford, David W. Lucke, and J. Fred McLaughlin.

People with disabilities who require an alternative form of communication in order to use this publication should contact the Editor, Wyoming State Geological Survey. TTY Relay Operator 1 (800) 877-9975.

## EXPLANATION

### CORRELATION OF MAP UNITS




### MAP SYMBOLS

**Contact** – May be approximately located in areas of poor exposures

**High-angle normal fault** – Dashed where covered or inferred, dotted where concealed; bar and ball on downthrown side

**High-angle reverse fault** – Arrow indicates dip of fault plane; dashed where covered or inferred; ball and bar on downthrown side

**Thrust fault of Early Proterozoic age**–Dashed where inferred, dotted where covered; arrows indicate relative horizontal movement on fault with oblique slip

**Downward-facing syncline**–Showing plunge of axis; dashed where approximately located

**Asymmetrical, downward-facing syncline**–Showing bearing plunge of axis; dashed where approximately located

**Asymmetrical, downward-facing anticline**–Showing bearing plunge of axis; shorter arrow indicates limb of fold with steeper dip; dashed where approximately located

**Metadiabase (Middle Proterozoic)**–See description below; shown as a line where outcrops are too narrow to be shown as a polygon

**Metadiabase (Early Proterozoic)**–See description below; shown as line where outcrops are too narrow to be shown as a polygon

**Inclined bedding**–Showing dip; direction of stratigraphic top not determined

**Vertical bedding**–Direction of stratigraphic top not determined

**Horizontal bedding**

**Overturned bedding**–Showing dip

**Inclined bedding**–Showing dip; ball and bar indicate stratigraphic top of beds

**Vertical bedding**–Ball and bar indicate stratigraphic top of beds

**Inclined foliation**–Showing dip

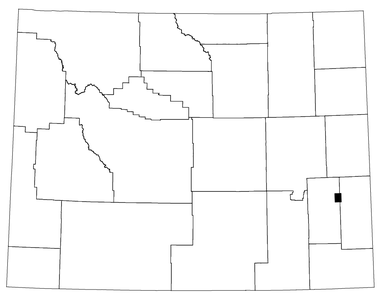
**Vertical foliation**

**Bearing and plunge of symmetrical fold**

**Bearing and plunge of asymmetrical fold**

**Mine, prospect, or mineral occurrence**

**Disturbed ground** – Area covered by urban or industrial development; geology is approximate or projected from nearby or adjacent outcrops



QUADRANGLE LOCATION

### DISCLAIMERS

Users of these maps are cautioned about using the data at scales different than those at which the maps were compiled —using this data at a larger scale will not provide greater accuracy, and in fact, it is a misuse of the data.

The Wyoming State Geological Survey (WSGS) and the State of Wyoming makes no representation or warranty, expressed or implied, regarding the use, accuracy, or completeness of the data presented herein, or from a map printed from these data; nor shall the act of distribution constitute any such warranty. The WSGS does not guarantee these digital data herein, or map printed from these data, to be free of errors or inaccuracies.

The WSGS and the State of Wyoming disclaims any responsibility or liability for interpretations from this digital data or map printed from these digital data, or decisions based thereon. The WSGS and the State of Wyoming retains and does not waive sovereign immunity.

The use of or reference to trademarks, trade names, or other product or company names in this product is for descriptive or informational purposes, or is pursuant to licensing agreements between the WSGS or the State of Wyoming and software or hardware developers/vendors, and does not imply endorsement of those products by the WSGS or the State of Wyoming.

Dedicated to Barbara Costopulos

## DESCRIPTION OF MAP UNITS

**Qal** — **Alluvial deposits (Holocene/Pleistocene)**—Sand, gravel, and clay deposited mainly along the North Platte River and smaller intermittent streams; includes alluvial terraces and adjoining colluvial deposits

**Qac** — **Alluvial and colluvial deposits (Holocene/Pleistocene)**—Gravel, sand and silt deposited along intermittent streams tributary to the North Platte River; may include some slope wash and small alluvial deposits

**Qsl** — **Silty loess (Holocene/Pleistocene)**—Brown to dark brown deposits of windblown silt with minor clay and very fine sand; includes reworked deposits of loess. Thickness may exceed 9 m (30 feet) in valley deposits in and tributary to Pleasant Valley, Webb Canyon, and Whalen Canyon. Locally called "blow dirt"

**Qg** — **Gravel deposits (Pleistocene)**—Boulder to pebble conglomerate deposited in a fluvial environment by the ancestral North Platte River. Contains fluvial cross-bedded sand zones. The boulders include many types of crystalline, metamorphic, and sedimentary rocks including but not limited to granite, monzonite, amphibolite, schist, quartzite, marble, limestone, and sandstone. One fragment of black jade measuring 5 cm x 5 cm x 7.5 cm (2" x 2" x 3") was found in a gravel pit east of Guernsey. Includes clasts from the Hartville uplift as well as clasts from the Laramie Mountains and farther west. Found mostly in the southern half of the map area, concentrated near north-south trending faults. The gravel deposits attain local thicknesses in excess of 46 m (150 feet)

**Ta** — **Arikaree Formation (Miocene)**—Light gray tuffaceous sandstone containing occasional limy concretions; vertebrate fossils common in some areas; and forms bluffs and narrow canyons with local areas of badland topography. Only the upper part of the Arikaree Formation (McGrew, 1963) occurs in the area

**IPh 2,3** — **Hartville Formation, divisions 2 and 3 (Pennslyvanian)**—Interbedded gray limestone, buff to chalky white limestone and dolomite, pink dolomite, buff Aeolian (Tom Ahlbrandt, U.S. Geological Survey, personal communication, 1995) gray, red, and maroon silt and claystones, and thin black shales. Divisions 2 and 3 are combined and mapped together following Denson and Botinelly (1949) because the dolomites in division 2 grade laterally to massive limestones like those in division 3. Brachiopods are common in limestone and dolomite layers and fissilinids are reported in fine-grained clastic layers (Denson and Botinelly, 1949). Forms ledged slopes and cliffs commonly covered with Mountain Mahogany. About 90 m (300 feet) thick in the area.

**IPh 4,5** — **Hartville Formation, divisions 4 and 5 (Pennslyvanian)**—Interbedded maroon, red, pink, and gray siltstones and claystones; gray, brown, and buff limestone, pink dolomite, and thin gray sandstones. Divisions 4 and 5 are combined and mapped together following Denson and Botinelly (1949). Forms smooth slopes with limestone outcrops; about 75 m (250 feet) thick in the area

**IPMh 6** — **Hartville Formation, division 6 (Pennslyvanian/Mississippian)**—Well-indurated maroon to red to locally white orthoquartzite; forms cliffs and rocky knolls; deposited on a well-developed karst surface, and fills sinkholes and caverns in the underlying Guernsey Formation; thickness 0 to 37 m (0 to 120 feet)

**IPMh 4,5,6** — **Hartville Formation, divisions 4, 5, and 6 (Pennslyvanian/Mississippian)**—Mapped together in the Haystack Hills where the Hartville division 6 occurs as a thin red band or is locally not present

**MDg** — **Guernsey Formation (Mississippian/Devonian)**—Gray limestone with local beds and zones of chert; brachiopods common; thickness 0 to 55 m (0 to 180 feet). Forms smooth to ledged slopes commonly covered with Mountain Mahogany. Sando and Sandberg (1987) considered all except the lowermost part of this unit equivalent to members at the Madison Limestone and rejected the use of Guernsey Formation as being superfluous

**Єq** — **Quartzite of Devonian or Cambrian age**—Gray to red to cream-colored, coarse-grained cross-bedded orthoquartzite found in lenses locally throughout the area; possibly equivalent to the Deadwood Quartzite (Cambrian) or the lowermost part of the Englewood Formation and the Fremont Canyon Sandstone (Devonian), based on work by Sando and Sandberg (1987)

**Ym** — **Metadiabase (Middle Proterozoic)**—Dark-green, medium-grained diabase, with marginal chill zones; cuts Haystack Range Granite (x h). Description from Sims and others, 1997

**Xp** — **Pegmatite related to Haystack Range Granite (Early Proterozoic)**—White to gray, coarse-grained, zoned to unzoned feldspar-quartz-muscovite-tourmaline granitic dikes; contains accessory biotite, garnet, and beryl. Estimated thickness of unit 100 to 150 m (330 to 490 feet). Description from Sims and Others, 1997

**Xh** — **Haystack Range Granite (Early Proterozoic)**—Pink, coarse- to medium-grained, massive to foliated, inequigranular biotite granite and lesser fine-grained granite. Fine-grained phase grades into or forms dikes in the coarse-grained facies. Constitutes a granite dome in the Haystack Range, the type area of the granite. Rb-Sr whole-rock age 1.72 Ga (Snyder and Peterman, 1982). Description from Sims and others, 1997

**Xmd** — **Metadiabase (Early Proterozoic)**—Dark greenish-black, medium-grained hornblende-plagioclase-quartz metadiabase and lesser hornblende dikes; granular amphibolite east of Hartville fault. Dikes strike north-northeast except on north side of Haystack Range dome. Estimated age 2.0 Ga, based on mafic dikes in the Laramie Mountains being younger than a 2.05 Ga granodiorite body and dikes in the Hartville uplift beig older than the 1.98Ga granite of Flattop Butte (Snyder, 1993). Description from Sims and others, 1997

**Xgb** — **Metagabbro (Early Proterozoic)**—Dark grayish-green, variably fine- to coarse-grained, weakly layered, and weakly to strongly foliated metagabbro containing hornblende and chlorite. Foliation more distinct along border zones (from Sims and others, 1997)

**Whalen Group (Early Proterozoic or late Archean)**—As used by Sims and others 1997, whose descriptions of rock units are used below

**XWm** — **Metabasalt**—Dark-green, fine-grained actinolite-biotite-chlorite schist; flows are locally pillowed. Estimated thickness 100 to 150 m (330 to 490 feet)

**XWmc** — **Calc-silicate rock**—White to light-green pods, commonly 10 to 15 cm (4 to 6 inches) in diameter, form 30 to 50% of rock, and contain actinolite, diopside, talc, and epidote

**XWd** — **Metadolomite**—Gray, pink, white, and yellow, medium-grained dolomite and marble, tremolite dolomite, siliceous dolomite, and local limestone. Tremolite occurs as radiating blades resembling turkey tracks. Contains abundant concentrically layered algal stromatolitic mounds. Estimated thickness 300-500 m 1,000 to 1,600 feet)

**XWdq** — **Quartzite**—Common near stratigraphic top of dolomite unit (XWd) in area north of Chicago mine

**XWdp** — **Metapelite**—Thin, gray to brown, plagioclase-quartz-biotite-muscovite schist, interpreted as pelite; occurs near base of dolomite unit (XWd) in Graves Ranch anticline

**XWf** — **Ferruginous schist**—Includes biotite-chlorite schist, phyllite, and ferruginous quartzite

**XWfh** — **Hematite bodies**—Hematite bodies at top of ferruginous schist unit (XWf) were mined at the Good Fortune, Sunrise, and Chicago mines and consist of specularite and associated colloform hematite (Ebbett, 1956)

**XWfi** — **Banded iron formation**—of Lake Superior type

**XWs** — **Quartzofeldspathic schist**—West of Wheatland fault system; gray, medium- to fine-grained; locally contains chlorite and garnet; estimated thickness 1,000 m (3,000 feet)

**XWb** — **Quartzofeldspathic schist**—Primarily east of Wheatland fault system; contains garnet, sillimanite, and rare andaluste and pyrite. Graded beds common

**Wgg** — **Granite gneiss (Late Archean)**—Pink, medium-grained granite gneiss; mylonitic in map area; which has Rb-Sr whole-rock isochron age of 2.58Ga (Sims and others, 1997)

## REFERENCES

Denson, N.M., and Botinelly, T., 1949, Geology of the Hartville uplift, eastern Wyoming: U.S. Geological Survey Oil and Gas Investigations Preliminary Map 102, scale 1:48,000.

Ebbett, B.E., Jr., 1956, Structure and petrology of the metasedimentary rocks of the Good Fortune mining area, Platte County, Wyoming: M.A. thesis, University of Wyoming, Laramie, 151 p.

Harris, R.E., 1997, Preliminary geologic map of the Guernsey Quadrangle, Platte and Goshen Counties, Wyoming: Wyoming State Geological Survey Preliminary Geologic Map 97-1, scale 1:24,000.

Love, J.D., Denson, N.M., and Botinnelly, T., 1949, Geology of the Glendo area, Wyoming: U.S. Geological Survey Oil and Gas Investigations Preliminary Map 92, 2 sheets.

McGrew, L.W., 1963, Geology of the Fort Laramie Area, Platte and Goshen Counties, Wyoming: U.S. Geological Survey Bulletin 1141-F, 39 p., map, scale 1:31,680.

McGrew, L.W., 1967, Geologic map of the Casebier Hill Quadrangle, Goshen County, Wyoming: U.S. Geological Survey Geologic Quadrangle Map GQ-621, scale 1:24,000.

Sando, W.J., and Sandberg, C.A., 1987, New interpretations of Paleozoic stratigraphy and history in the northern Laramie Range and vicinity, Southwest Wyoming: U.S. Geological Survey Professional paper 1450, 39 p.

Sims, P.K., Day, W.C., Snyder, G.L., and Wilson A.B. , 1997, Geologic map of Precambrian rocks along part of the Hartville uplift, Guernsey and Casebier Hill quadrangles, Platte and Goshen Counties, Wyoming: U.S. Geological Survey Miscellaneous Investigations Series Map I-2567, map, scale 1:24,000 and pamphlet, 18p.

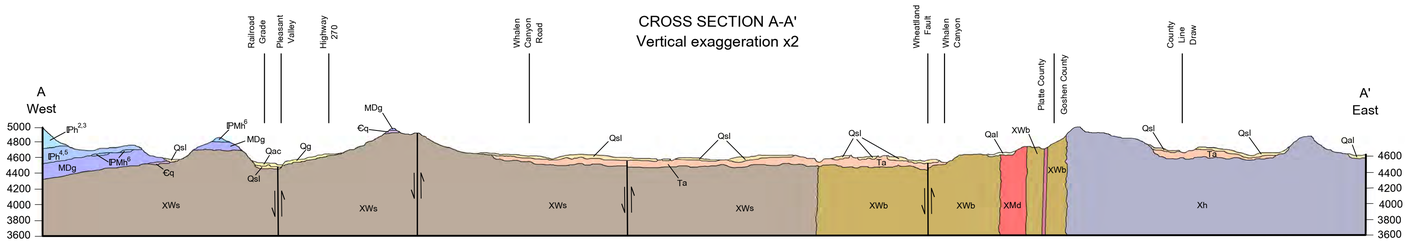
Snyder, G.L., 1993, Hartville uplift, in Houston, R.S. and others, editors, The Wyoming Province, in Reed, J.C. and others, editors, The Precambrian of the conterminous United States: Geological Society of America, Boulder, Colorado, The Geology of North America, vol. C2, P.147 – 149.

Snyder, G.L., and Peterman, Z.E., 1982, Precambrian geology and geochronology of the Hartville uplift, Wyoming: 1982 Archean Geochemistry Field Trip Guide, p. 64-94.

**NOTICE TO USERS OF WYOMING STATE GEOLOGICAL SURVEY INFORMATION**

Although most information produced by the Wyoming State Geological Survey (WSGS) is in the public domain and not copyrighted, and may be used without restriction, as a courtesy we ask that users acknowledge or credit the WSGS when using this information in whole or in part. This applies to published and unpublished materials, including maps, drawings, figures, other graphics, photographs, tables, and text in printed form or as computer files (including PowerPoint® slides). Contact the WSGS if you have questions on citing materials or preparing acknowledgements. Your cooperation is appreciated.

## CROSS SECTION A-A'
Vertical exaggeration x2




# GEOLOGIC MAP OF THE GUERNSEY QUADRANGLE, PLATTE AND GOSHEN COUNTIES, WYOMING

Compiled and mapped
by
Ray E. Harris, J. Fred McLaughlin, and Richard W. Jones
2005