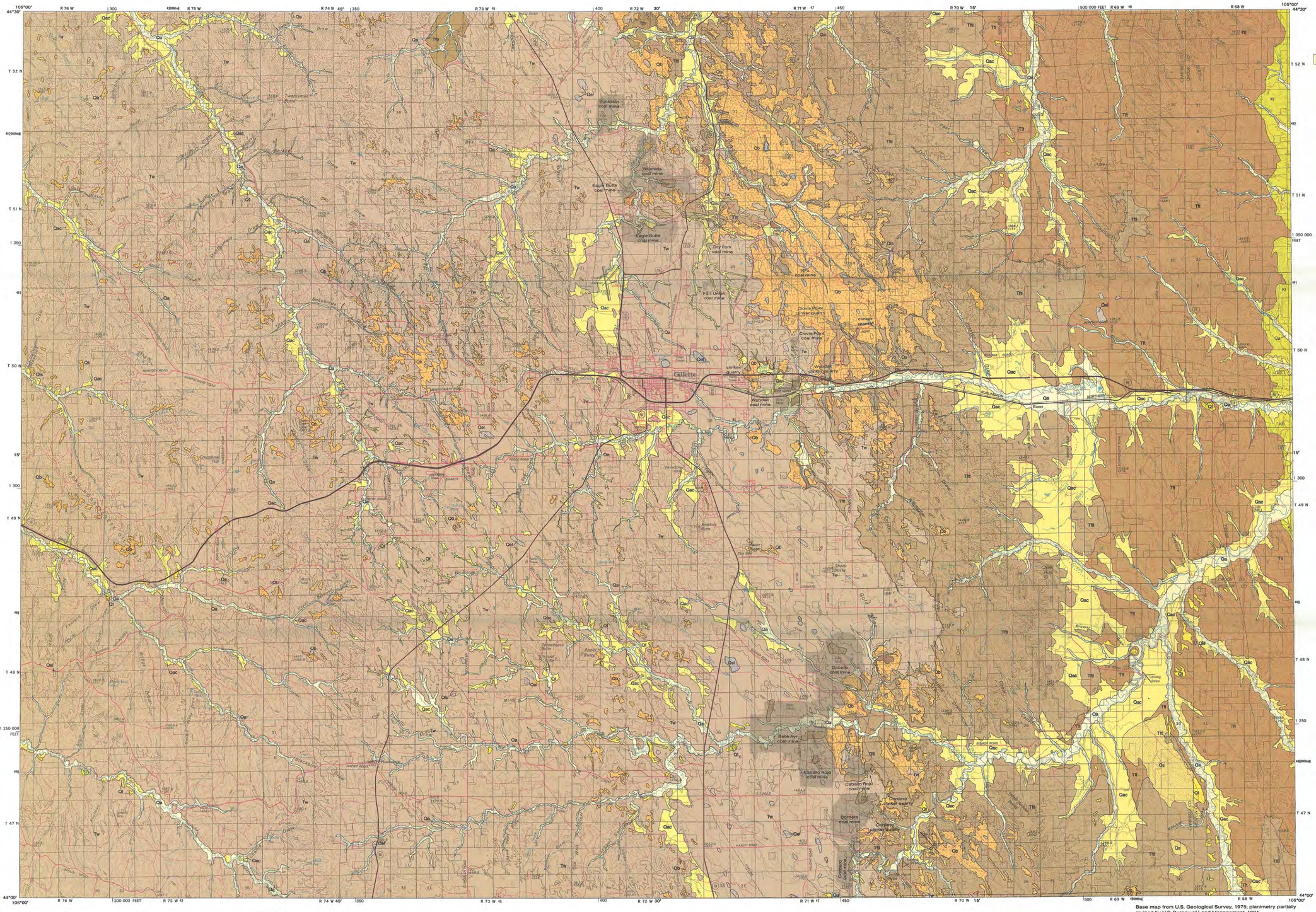
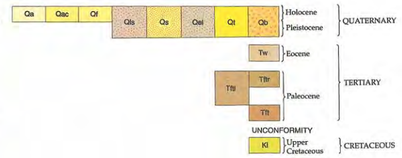
WYOMING STATE GEOLOGICAL SURVEY
Gary B. Glass, State Geologist
Laramie, Wyoming

MAP SERIES 49
Gillette 1:100,000-Scale Geologic Map



EXPLANATION

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

HOLOCENE SURFICIAL DEPOSITS

Qa **Alluvial deposits** - Unconsolidated, main channel fill, floodplain, and lowest terraces consisting of reworked, locally derived sediments; primarily clay, silt, sand, and gravel, and baked and fused rock. Thickness is generally less than 20 feet.

Qac **Mixed alluvium and colluvium** - Unconsolidated clay, silt, sand, gravel, and baked and fused rock found above the level of present day flooding, deposited prior to the recent incision of streams. Includes slope wash and smaller alluvial fans that coalesce with alluvium. Thickness ranges from less than 3 feet to about 60 feet (Law, 1975).

Qaf **Alluvial fan deposits** - Poorly sorted clay, silt, sand, and angular to subangular gravel torrentially deposited at the outlet of steeper valleys and spread out laterally into a fan shaped surface. Thickness ranges from a thin veneer to about 52 feet (Reheis, 1987).

HOLOCENE AND PLEISTOCENE SURFICIAL DEPOSITS

Qls **Landslide deposits, talus deposits** - Unsorted angular bedrock fragments of baked and fused rock, sandstone, and siltstone mixed with sediments, ranging in size from clay particles to boulders that have undergone mass movement. Thickness ranges from 16 feet to 97 feet (Reheis, 1987).

Qs **Windblown sand** - Loose particles of quartz sand and silt deposited in dunes and sheets downwind from areas of loosely consolidated bedrock. Thickness ranges from 0 to 22 feet (Reheis, 1987).

Qal **Lake sediments; ephemeral lake deposits** - Clay, silt, and sand interbedded in closed drainage basins. Stringers and surface encrustations of evaporate minerals may also be present. Thickness ranges from 0 to about 22 feet (Reheis, 1987).

Qt **Terrace deposits** - Sand, silt, and gravel capping higher terraces along major drainages. Gravels consist of locally derived and transported sandstone, chert, silicified wood, chalcedony, and baked and fused rock. Thickness ranges from a thin veneer to about 20 feet (Reheis, 1987 and Grazis, 1977).

Qb **Baked and fused rock (clinker)** - Hard, dense red to orange baked shale and siltstone, and black bubbly sometimes glassy rock formed as overlying strata was altered by burning coal beds in the Wasatch and Fort Union Formations[1]. Talus forms locally where blocks have detached from scarps of baked and fused rock and moved downslope (Reheis, 1987).

Tw **WASATCH FORMATION (EOCENE)** - Non-marine buff to gray interbedded arkosic sandstone, siltstone, carbonaceous shale, and lenticular conglomerate; with numerous coal beds near the base. Rock types poorly indurated except for a few well cemented sandstone beds. Thickness ranges from 0 to 2000 feet (Love, Christiansen, McGrew, and King, 1990).

FORT UNION FORMATION (PALEOCENE) - The Wasatch-Fort Union contact on the map is the top of the uppermost Wyodak coal bed in the Fort Union Formation (Love, Christiansen, McGrew, and King, 1990).

Ttlr **Tongue River Member** - Light gray to yellowish brown felspathic sandstone, gray siltstone and sandy shale, and carbonaceous shale; numerous coal beds. Is only mapped separately in northwestern portion of the map near the north boundary on the Jamison Prong of Wildcat Creek and north of Hay Creek. Thickness ranges from 800 to 1200 feet (Love, Christiansen, McGrew and King, 1990)

Ttl **Tongue River and Lebo Members undivided** - These members are mapped together on the majority of the map.

Lebo Member - Light to dark gray shale and claystone with some interbedded light gray sandstone, minor carbonaceous shale, and coal beds. Thickness ranging from 200 to 250 feet (Love, Christiansen, McGrew, and King, 1990).

Tfl **Tullock Member** - Non-marine light gray to yellowish sandstone, gray sandy or silty shale, and dominant carbonaceous shale and thin beds of coal. Thickness 1000 to 1100 feet (Love, Christiansen, McGrew, and King, 1990).

Kl **LANCE FORMATION (UPPER CRETACEOUS)** - Non-marine dark brown shales; drab massive, lenticular and concretionary sandstones; with lower part of section dominantly sandstone. Occurs in outcrop only on the eastern boundary of the map. Thickness ranges from 700 to 1600 feet (Love, Christiansen, McGrew, and King, 1990).

[1] Although the oldest dated clinker in this area is about 600,000 years old, some clinker may be older than the Quaternary (Heffern and Coates, 1997).

SYMBOLS

CONTACT - Dashed where approximately located, dotted where concealed.

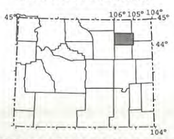
FAULT - Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side.

ANTICLINE - Trace of axis and direction of plunge. Shorter arrow indicates limb of fold with steeper dip. Dashed where approximately located.

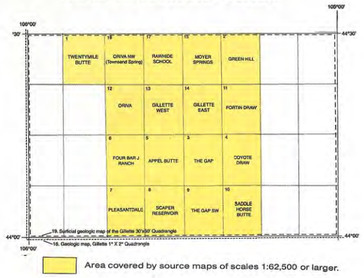
SYNCLINE - Trace of synclinal axis.

SURFACE MINES AND QUARRIES - Bedrock areas disturbed, removed, or reclaimed, as of the 1997 (or most recent) mining plan/permit. Includes mine name and/or commodity removed.

LOCATION DIAGRAM



INDEX TO GEOLOGIC SOURCES

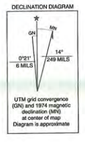


Area covered by source maps of scales 1:62,500 or larger.

Area covered by source maps of scales smaller than 1:62,500

750 copies printed by Pikes Peak Lithographing Co., Colorado Springs, Colorado.

DECLINATION DIAGRAM



UTM grid convergence (GN) and 1974 magnetic declination (MN) at center of map
Diagram is approximate

KILOMETERS 0 1 2 3 4 5 6 7 8 9 10
MILES 0 1 2 3 4 5 6

SCALE 1:100,000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 20 METERS

0 1000 5000 10,000 METERS
0 5000 10,000 15,000 20,000 25,000 30,000 FEET

GEOLOGIC MAP OF THE GILLETTE 30' x 60' QUADRANGLE, CAMPBELL, CROOK, AND WESTON COUNTIES, NORTHEASTERN WYOMING

compiled by
Cynthia S. Boyd and Alan J. Ver Ploeg

1998

Base map from U.S. Geological Survey, 1975; planimetry partially revised by U.S. Bureau of Land Management, 1991.

Cartography by Fred H. Porter.

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.

GEOLOGIC SOURCES

Number corresponds to mapped area; unnumbered items are general references.

1. Boher, B.F., Kent, B.H., and Haddock, D.R., 1979, Geologic map and coal sections of the Twentymile Butte Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-1073; scale 1:24,000.

2. Buck, S.P., 1975, Geologic map of the Green Hill Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Map (unpublished), Wyoming State Geological Survey files; scale 1:24,000.

Denson, N.M., Macke, D.L., and Schumann, R.R., 1989, Geologic map and distribution of heavy minerals in Tertiary rocks of the Gillette 30' x 60' Quadrangle, Campbell, Crook, and Weston Counties, Wyoming: U.S. Geological Survey Miscellaneous Investigations Map I-2023, scale 1:100,000.

Denson, N.M., Pierson, C.T., and Grundy, W.D., 1994, Geologic map showing thickness of sedimentary rocks from ground surface to the top of the Cretaceous Pierre Shale in the north half of the Powder River Basin, southeastern Montana and northeastern Wyoming: U.S. Geological Survey Miscellaneous Investigations Map I-2433-A, scale 1:200,000.

3. Galyardt, G.L., 1974, Preliminary geologic map and coal resources of The Gap Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 74-98, scale 1:24,000.

4. Galyardt, G.L., 1974, Preliminary geologic map and coal resources of the Coyote Draw Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 74-350, scale 1:24,000

5. Galyardt, G.L., 1980, Preliminary geologic map and coal deposits of the Appel Butte Quadrangle, Campbell County, Wyoming, U.S. Geological Survey Open File Report 80-53, scale 1:24,000.

6. Galyardt, G.L., 1980, Geologic map and coal deposits of the Four Bar J Ranch Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 80-648, scale 1:24,000.

7. Grazis, S.L., 1977, Geologic map and coal resources of the Pleasantdale Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Coal Investigations Map C-76, scale 1:24,000.

8. Grazis, S.L., 1977, Geologic map and coal resources of the Scaper Reservoir Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Coal Investigations Map C-77, scale 1:24,000.

9. Grazis, S.L., 1977, Geologic map and coal resources of The Gap SW Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Coal Investigations Map C-78, scale 1:24,000.

10. Grazis, S.L., 1977, Geologic map and coal resources of the Saddle Horse Butte Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Coal Investigations Map C-79, scale 1:24,000.

Haddock, D.R., Kent, B.H., and Bohor, B.F., 1976, Geologic map and coal sections of the Croton Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-826, scale 1:24,000.

Heffern, E.L., and Coates, D.A., 1997, Clinker–its occurrence, uses, and effects on coal mining in the Powder River Basin, *in* Harris, R.E., and Jones, R.W., **editors, Proceedings of the 32nd annual forum on the geology of industrial minerals: Wyoming State Geological Survey Public Information Circular 38, p. 151-165.**

Kent, B.H., 1976, Geologic map and coal sections of the Wildcat Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-735, scale 1:24,000.

Kent, B.H., and Berlage, L.J., 1980; Geologic map of the Recluse 1° x 1/2° Quadrangle, Campbell and Crook Counties, Wyoming: U.S. Geological Survey Coal Investigations Map C-81 D, scale 1:100,000.

Kent, B.H., Haddock, D.R., and Bohor, B.F., 1978, Geologic map and coal sections of the Truman Draw Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-917, scale 1:24,000.

11. **Law, B.E., 1974, Preliminary geologic map and coal resources of the Fortin Draw Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 74-36, scale 1:24,000.**

12. **Law, B.E., 1975, Preliminary geologic map and coal resources of the Oriva Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 75-195, scale 1:24,000.**

13. **Law, B.E., 1978, Geological map and coal deposits of the Gillette West Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-974, scale 1:24,000.**

14. **Law, B.E., 1978, Geologic map of the Gillette East Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Map (unpublished), Wyoming State Geological Survey files, scale 1:24,000.**

15. **Law, B.E., 1978, Geologic map of the Moyer Springs Qugdrangle, Campbell County, Wyoming: U.S. Geological Survey Map (unpublished), Wyoming State Geological Survey files, scale 1:24,000.**

16. **Love, J.D., Christiansen, A.C., McGrew, L.W., and King, J.K., 1990, Geologic map of the Gillette 1° x 2° Quadrangle, northeastern Wyoming and western South Dakota: Geological Survey of Wyoming Map Series 25-G, scale 1:250,000.**

17. **Mapel, W.J., 1973, Preliminary geologic map of the Rawhide School Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 73-177, map scale 1:24,000 (used here with major modifications).**

McKay, E.J., and Maple, W.J., 1973, Preliminary geologic map of the Calf Creek Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Open File Report 73-170, scale 1:24,000.

18. **McLaughlin, R.L., and Hayes, P.T., 1973 (1974), Preliminary geologic map of the Oriva NW (Townserd Spring) Quadrangle, Campbell County, Wyoming: U.S. Geological Survey Miscellaneous Field Studies Map MF-545, scale 1:24,000.**

19. **Reheis, M.C., 1987, Surficial geologic map of the Gillette 30' x 60' Quadrangle, Campbell and Crook Counties, Wyoming: U.S. Geological Survey Coal Investigations Map C-105, scale 1:100,000.**