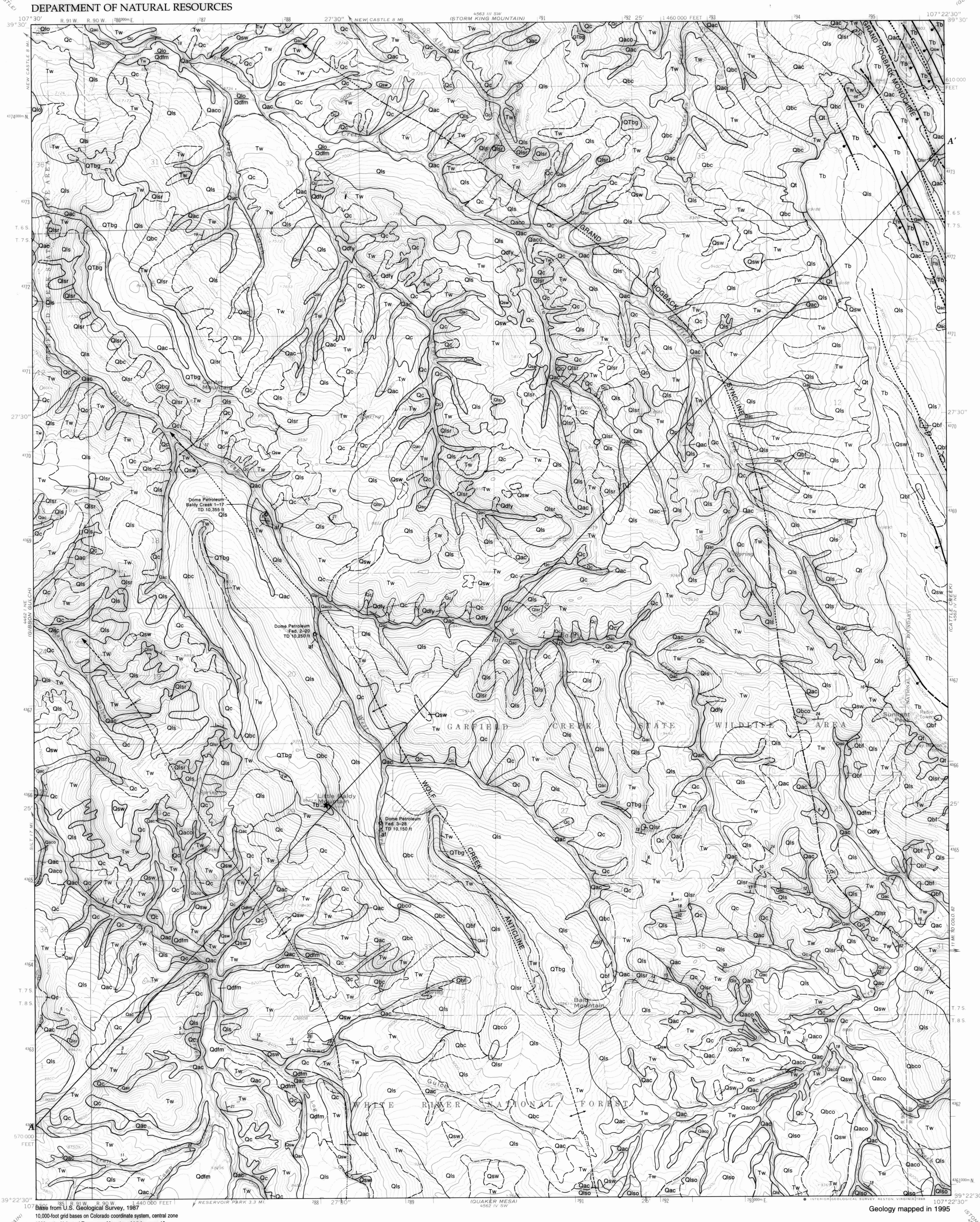
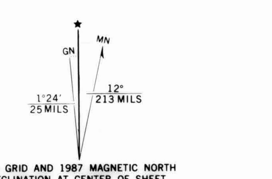
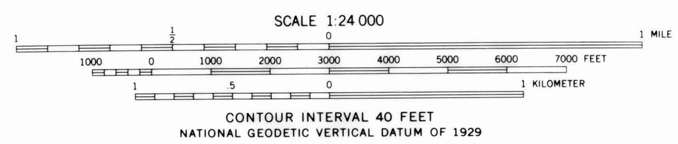
COLORADO GEOLOGICAL SURVEY
DIVISION OF MINERALS AND GEOLOGY
DEPARTMENT OF NATURAL RESOURCES







DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

Surficial deposits shown on the map are generally more than about 5-ft thick, but may be thinner locally. Residuum and some artificial fills were not mapped. Contacts between surficial units maybe gradational Mapped units occasionally include deposits of another type. Divisions of the Pleistocene correspond to those of Richmond and Fullerton (1986). Age assignments for surficial deposits are based primarily upon the degree of erosional modification of original surface morphology, height above modern stream levels, and relative degree of soil development. Many of the surficial deposits are calcareous and contain varying amounts of both primary and secondary calcium carbonate

HUMAN-MADE DEPOSITS—Materials placed by humans

af — **Artificial fill (latest Holocene)**—Fill and waste rock deposited by humans during construction and oil drilling projects along the mainstem and West Fork of Baldy Creek. Composed mostly of unsorted silt, sand, and rock fragments, but may include construction materials. Maximum thickness about 30 ft. May be subject to settlement when loaded if not adequately compacted

ALLUVIAL DEPOSITS—Silt, sand, and gravel deposited in sheet-wash areas along Garfield, Baldy, East Divide, Fourmile, and South Canyon Creeks

Qsw — **Sheet-wash deposits (Holocene and late Pleistocene)**—Includes deposits derived from weathered bedrock and unconsolidated, surficial materials that are transported dominantly by sheet wash and accumulate in ephemeral stream valleys, on gentle hillslopes, or in basinal areas which lack external drainage. Common on gentle to moderate slopes underlain by the Wasatch Formation and in landslides. Typically consists of clayey, pebbly, silty sand and sandy silt. Maximum thickness probably about 25 ft. Area is subject to future sheet-wash activity. Low density deposits may be hydrocompactive and occasionally prone to settlement when loaded

COLLUVIAL DEPOSITS—Silt, sand, gravel, and clay on valley sides, valley floors, and hillslopes that were mobilized, transported, and deposited primarily by gravity, but frequently assisted by sheet wash, freeze-thaw action, and water-saturated conditions that affect pore pressure

Qlsr — **Recent landslide deposits (latest Holocene)**—Include active and recently active landslides with fresh morphological features. Frequently occur at headwalls of large landslides where continued mass wasting advances upon higher ground. Deposits are a heterogeneous unit consisting of unsorted, unstratified rock debris, gravel, sand, silt, clay, and organic debris. Texture and clast lithology dependent upon source area. Includes rotational landslides, translational landslides, and complex slump-earth flows. Thickness probably a maximum of about 100 ft. Deposit on map edge near northeast corner of quadrangle originated during the spring of 1995. Area is prone to renewed or continued landsliding. Distribution of recent landslides (Qlsr) is suggestive of the type of environment which may produce landslides in the current climatic regime. May be susceptible to settlement when loaded. Commonly includes shallow groundwater areas

Qc — **Colluvium (Holocene and late Pleistocene)**—Ranges from clast-supported, pebble to boulder gravel in a sandy silt matrix to matrix-supported, slightly gravelly, sandy, clayey silt that was derived from weathered bedrock and transported down gradient primarily by gravity, but aided by sheet wash. Deposits usually coarser grained in upper reaches and finer grained in distal areas. Deposits derived from Wasatch Formation tend to be finer grained and matrix supported. Clasts typically are angular to subangular. Commonly unsorted or poorly sorted with weak or no stratification. Clast lithology variable and dependent upon types of rocks occurring within the provenance area. Locally includes talus, landslide deposits, sheet-wash deposits, and debris-flow deposits whichare too small or too indistinct on aerial photographs to be mapped separately. Thickly vegetated basins and slopes mantled with surficial deposits were also mapped as colluvium, unless evidence of landsliding was observed. Maximum thickness probably about 100 ft. Area is subject to future colluvial processes and locally to sheet wash, rockfall, small debris flows, and landsliding

Qbc — **Basaltic colluvium (Holocene and late Pleistocene)**—Mostly matrix-supported, basalt-rich, pebbly to bouldery, clayey, sandy silt and silty, clayey gravel. Derived in part from basaltic gravel (QTbg) or basalt flows and transported primarily by gravity. Deposits usually coarser grained in upper reaches (large boulders common) and finer grained in the distal areas. Boulder clasts are angular to subrounded. Unit is poorly sorted and lacks distinct stratification. Similar to colluvium (Qc) in lithology, except for the abundance of basaltic boulders, and in texture and sorting. Maximum thickness probably 120 ft. Mapped in Sections 18 and 19, T. 7 S., R. 90 W. below the ridge leading northwest from Little Baldy Mountain that is capped by basaltic gravel (QTbg) and only on the east side of the creek. Deposits west of the creek lack basaltic boulders and are mapped as colluvium (Qc). Area is susceptible to future colluvial activity and locally to sheet wash, small debris flows, and minor landsliding

Qt — **Talus (Holocene and late Pleistocene)**—Angular, cobbly, and bouldery rubble on steep slopes that is derived from steep basalt cliffs near and north of Sunlight Peak and is transported downslope principally by gravity as rockfalls, rockslides, and rock topples. Locally may be aided by water. Locally lacks matrix material. Contacts with landslides and colluvium frequently gradational. Maximum thickness estimated at about 80 ft. Mapped areas are subject to severe rockfall, rockslide, and rock-topple hazards. May be a source of high quality riprap, decorative rock, and aggregate

Qbf — **Boulder-field deposits (Holocene and late Pleistocene)**—Thin deposits of boulders and cobbles of basalt that essentially lack any matrix material. Occur within landslides and probably move with them. Also occur on the basalt-capped mesa east and north of Sunlight Peak. Probably originally formed as talus and rockfall debris that contained little or no matrix. Fines may also have been removed by winnowing effects of wind, or bouldery debris may have been lifted above matrix material by frost heave. Up to an estimated 25-ft thick. Area may be subject to future landslide activity. Large boulders affect excavatability and frequently are unstable and shift easily, which reduces its suitability for foundations. May be a source of riprap, decorative rock, and aggregate

Qls — **Landslide deposits (Holocene and Pleistocene)**—Highly variable deposits similar in texture and lithology to recent landslide deposits (Qlsr). Includes rotational landslides, translational landslides, complex slump-earthflows, and extensive slope-failure complexes. Maximum thickness about 250 ft. Range from active, slowly creeping landslides to long-inactive, middle or perhaps even early Pleistocene landslides. Landslides are more abundant and larger on the north and northeast sides of ridges. Area may be subject to future landslide activity, however deeply dissected deposits could be stable. May be prone to settlement when loaded. May include areas with shallow groundwater

Qbco — **Older basaltic colluvium (Pleistocene and late Pliocene)**—Occurs mostly on low ridges, drainage divides and hillsides as erosional remnants of formerly more extensive deposits. Transported primarily by gravity and aided by sheet wash. Texturally similar to basaltic colluvium (Qbc), but clasts are more weathered. Thickness ranges up to about 50 ft

Qlso — **Older landslide deposits (Pleistocene and late Pliocene?)**—Erosionally dissected landslide deposits that lack distinctive landslide morphologic features. Similar in texture, bedding, sorting, and clast lithology to recent landslide deposits (Qlsr). May locally include older colluvium. Type of landslide movement not identifiable due to eroded character of deposits. Maximum thickness estimated at 120 ft. Probably not prone to reactivation unless significantly disturbed by construction activities

ALLUVIAL AND COLLUVIAL DEPOSITS—Silt, sand, gravel, and clay in debris fans, stream channels, flood plains, and adjacent hillslopes along tributary valleys. Depositional processes in stream channels and on floodplains primarily alluvial, whereas colluvial and sheet-wash processes are commonly dominant on debris fans, hillslopes, and along the hillslope/valley floor boundary

Qdfy — **Younger debris-flow deposits (Holocene)**—Sediments deposited by debris flows, hyperconcentrated flows, mudflows, and sheet wash on active debris fans and along stream channels, particularly on south-facing slopes. Unit ranges from poorly sorted, clast-supported, pebble and cobble gravel in a clayey, sandy silt or silty sand matrix to matrix-supported gravelly, clayey silt. Frequently bouldery, particularly near the head of fans whose provenance contains coarse basaltic material. Distal parts of many fans are characterized by mudflow and sheet-wash and tend to be finer grained. May interfinger with or be interbedded with alluvium where deposited in stream channels. Grades to colluvium in the upper reaches of some basins. Clasts are mostly angular to subrounded sedimentary rock and basalt fragments, with the latter up to about 6 ft in diameter. Original depositional character of the surface of the unit is preserved, except where disturbed by human activities. Maximum thickness about 60 ft. Area is subject to episodic debris-flow activity following intense rainstorms, except on distal parts, where mudflow and sheet wash are dominant. Prone to hydrocompaction, settlement, and piping where fine-grained and low in density

Qac — **Alluvium and colluvium, undivided (Holocene and late Pleistocene)**—Chiefly stream-channel, low terrace, and flood-plain deposits along valley floors, with colluvium and sheet wash common on valley sides. Deposits of alluvium and colluvium probably interfinger. Locally includes younger debris-flow deposits. Alluvium typically composed of poorly to well sorted, stratified, interbedded sand, pebbly sand, and sandy gravel, but colluvium may range to poorly sorted, unstratified or poorly stratified clayey, silty sand, bouldery sand, and sandy silt. Varied clast lithologies dependant upon type of rock within source area. Thickness commonly 5 to 20 ft, with maximum thickness estimated at about 40 ft. Low-lying areas are subject to flooding. Valley sides are prone to sheet wash, rockfall, and small debris flows. May be hydrocompactive where fine-grained and low in density. Potential source of sand and gravel

Qdfm — **Intermediate debris-flow deposits (Holocene and late Pleistocene)**—Similar in texture and depositional environment to younger debris-flow deposits (Qdfy). Geomorphic character of original depositional surface commonly recognizable, but the surface is topographically about 8 to 30 ft above active debris-flow channels. Area is generally not susceptible to future debris-flow activity unless the channel is blocked or an unusually large debris flow occurs. Hydrocompaction, piping, and settlement may occur where the deposits are fine-grained and low in density

Qaco — **Older alluvium and colluvium, undivided (Pleistocene)**—Deposits of undifferentiated alluvium and colluvium that underlie terraces and hill slopes 10 to 40 ft above small perennial and intermittent streams. Texture, bedding, clast lithology, and sorting similar to alluvium and colluvium (Qac), but clasts are more rounded and weathered. Thickness up to about 30 ft. Area may be prone to sheet wash and rockfall. May be a source of sand and gravel

QTbg — **High-level basaltic gravel (early Pleistocene and late Tertiary)**—Occurs as long, linear deposits on prominent topographic ridges associated with Bald Mountain, Little Baldy Mountain, Center Mountain, and also as isolated remnants on hills and ridges. Unit is very poorly exposed. Based on outcrops in nearby areas and on float that mantles surfaces underlain by the unit, it ranges from clast-supported, silty, cobbly to bouldery gravel to matrix-supported, gravelly, clayey, and sandy silt. Clasts are dominantly locally derived basalt with minor amounts of sandstone. Basalt clasts are often 3 to 6 ft in diameter and occasionally are in excess of 10 ft in diameter. Clasts are moderately to very weathered. Unit ranges from about 20 to 120-ft thick. Probably originally deposited in fluvial and debris-flow environments in paleovalleys or on pediments. Areas armored by high-level basaltic gravel have been protected from erosion as streams downcut into adjoining areas underlain by the more easily eroded Wasatch Formation, creating "inverted topography". Deposits now occur 700 to 1,000 ft above surrounding valleys. An anomalous S-shaped alluvium- and colluvium-filled swale in basaltic gravel on Center Mountain may be a sackungen-like feature related to lateral spreading caused by rapid erosional removal of lateral confining rock masses, similar to the one reported by Kirkham and others (1996) at the top of Sunlight Ski Area. Large boulders in unit affect excavatability. May be a source of riprap or crushed stone

EOLIAN DEPOSITS—Silt, sand, and clay deposited by wind on level to gently sloping surfaces

Qlo — **Loess (late Pleistocene)**—Slightly clayey, sandy silt and silty, fine to very fine sand deposited by wind and preserved on level to gently sloping surfaces underlain by intermediate debris-flow deposits (Qdfm) in lower Garfield Creek. Typically unstratified, friable, and plastic or slightly plastic. Sand grains are sometimes frosted. Fairer and others (1993) suggest most loess was derived from flood-plain sediments of the Colorado River and its tributaries, but recognize that outcrops of Tertiary sedimentary rocks in the Piceance Basin and Utah may have served as source areas for loess deposited in this part of Colorado. Thickness up to 15 ft. Low density loess may be prone to settlement when loaded and to hydrocompaction and piping when wetted. Highly erodible

BEDROCK

Tb — **Basalt (Miocene)**—Multiple flows of basalt and olivine basalt with interflow sediments. Flow rocks range from massive to highly vesicular and occasionally contain calcite amygdules. Based on a whole rock analysis, the upper flow on Little Baldy Mountain is a tholeiitic, subalkaline basalt. Phenocrysts consist of euhedral to anhedral olivine ranging in size from 0.5 to 2.5 mm. The phenocrysts are fractured, with mild iddingsite alteration present along many of the fractures. Groundmass is dominantly plagioclase and pyroxene with lesser amounts of olivine, augite, and hematite. Plagioclase laths are the most common groundmass mineral and average 0.2 mm in length, often forming a trachytic texture.

Includes a sequence of multiple flows along the eastern margin of the quadrangle that cap the prominent northeast sloping mesa, on which Sunlight Peak is the highest point (herein called Sunlight Mesa), and also a two-flow sequence exposed on Little Baldy Mountain. Larson and others (1975) include the basalt on Sunlight Mesa with their Group 2 rocks, which they indicate are 9 to 14 Ma.

An exposure on Little Baldy Mountain includes two flows with pahoehoe flow structure. Rounded pebbles consisting of various types of igneous, sedimentary, and metamorphic rocks except for basalt occur in float below the basalt flow. The basalt flows on Little Baldy Mountain are overlain by early Quaternary/late Tertiary high-level, basaltic gravel (QTbg). A whole rock sample from the upper basalt flow on Little Baldy Mountain was dated using $^{40}Ar/^{39}Ar$ (L. Snee, 1996, written commun.). The age spectra analysis for this sample is disturbed and indicates significant ^{40}Ar loss. An isochron analysis yields an age of 9.7 ± 0.2 Ma and should be viewed as a minimum age.

Unit is well exposed in cliffs along the west ridge of Sunlight Mesa, and near Sunlight Peak just east of the quadrangle boundary, where a succession of as many as seven or eight stacked flows (K. Hon, 1995, oral commun.) with no interbedded sediments crops out. A sample from the lowermost exposed flow east of Sunlight Peak yielded a minimum age of 10.4 ± 0.1 Ma (Kirkham and others, 1996).

At the northeast corner of the quadrangle the bench mapped as basalt (Tb) in the SE 1/4 of Section 25 consists of matrix-supported gravelly, clayey silt that is overlain by basalt flows to the east. Clasts within this deposit include subangular to rounded pebbles, cobbles, and boulders of basalt and well rounded pebbles of quartz, quartzite, plutonic and hypabyssal rock, and chert. Clast lithology suggests a provenance area that includes the Elk Mountains.

Maximum exposed thickness is 209 ft, based on an outcrop east of Sunlight Peak, just beyond the quadrangle boundary, but typically it is much thinner. Outcrop on Little Baldy Mountain is about 25-ft thick. Unit is a source of rockfall debris and talus in steep cliffs along Sunlight Mesa. Potential source of high quality riprap and aggregate.

Tw — **Wasatch Formation (Eocene and Paleocene)**—Interbedded and lenticular, tan, yellowish to reddish brown, and reddish purple claystone, siltstone, sandstone and conglomerate which unconformably overlie the Upper Cretaceous Mesaverde Group. Johnson and May (1980) suggest the time gap represented by the unconformity extends from late Campanian or early Maestrichtian to late Paleocene. They conclude that the kaolinitic, white, frequently conglomeratic section with clasts of chert, which previously was called the Ohio Creek Conglomerate, is actually a paleoweathering profile and should be reduced from formational status to a member of the Mesaverde Group.

Exposures are very poor and are limited to small outcrops of sandstone and freshly exposed rock in headscarps of recent landslides, and excavated cuts. Although previous workers have divided the Wasatch into the Shire, Molina, and Atwell Gulch Members (Donnell, 1969), these members were not recognized in this quadrangle, perhaps because of the very limited exposures. Conglomeratic beds at the base of the Wasatch Formation east of the quadrangle in Fourmile Creek contain pebbles and occasional cobbles of hypabyssal rocks and chert. Most sandstone beds are fine grained. Fine-grained beds of sandstone are well sorted and thinly laminated or platy. Coarse-grained sandstone beds are poorly to well sorted and commonly trough cross-bedded. Cross-beds dip between 10 to 25 degrees. Shaley partings are common.

In measured sections from around the margins of the Piceance Basin, the Wasatch Formation ranges from 3,400 to 5,200-ft thick(Hemborg, 1993). Maximum subsurface thickness as drilled in the basin is more than 6,000 ft (Snow, 1970). Maximum thickness in the quadrangle is probably around 6,000 ft. along the Grand Hogback Syncline. Deposited as non-marine sediments in lacustrine, flood-plain and high-energy fluvial environments. Highly susceptible to landsliding and frequently is veneered by landslide deposits which are too thin to be shown

Kmv — **Mesaverde Group (Upper Cretaceous)**—Shown only on cross section

Kmt — **Tongue of Mancos Shale within the Mesaverde Group (Upper Cretaceous)**—Shown only on cross section

Km — **Mancos Shale (Upper Cretaceous)**—Shown only on cross section

MAP SYMBOLS

- **Contact**—Dashed where approximately located
- **Fault**—Dashed where approximately located; dotted where concealed; bar and ball on downthrown side
- **Anticline**—Showing trace of axial surface and direction of plunge; long dashes where approximately located; short dashes where inferred; dotted where concealed. Position of Wolf Creek Anticline from Grout and others (1991)
- **Syncline**—Showing trace of axial surface and direction of plunge; long dashes where approximately located; short dashes where inferred; dotted where concealed
- 26 — **Strike and dip of bed**—Angle of dip shown in degrees; most attitudes in basalt were measured on top of flow surfaces
- ★ — **Locality of rock sample**—Radiometrically dated using the $^{40}Ar/^{39}Ar$ method
- A——A′ — **Alignment of cross section**
- **Gas well**—Operator, well name, and total depth shown
- Qlo/Qdfm — **Fractional symbol**—Indicates a thin veneer of the deposit shown in the numerator overlies the deposit in the denominator

ECONOMIC GEOLOGY

Mineral fuel resources in the Center Mountain quadrangle include three natural gas wells drilled in the 1980s. Dome Petroleum drilled these wells in Sections 17, 20 and 28 of T .7 S., R. 90 W. as development wells for Baldy Creek Field. The wells lie near the axis of the Wolf Creek Anticline (Grout and others, 1991; Gunneson and others, 1995). According to Colorado Oil and Gas Conservation Commission (1993) American Matrix Reserves is the owner of these wells, which presently are shut-in. A pipeline was constructed to service the Divide Creek Field. Total cumulative production for the field as of 1993 was 444,664 million cubic feet of gas.

ACKNOWLEDGEMENTS

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SELECTED REFERENCES

Bass, N.W., and Northrop, S.A., 1963, Geology of Glenwood Springs quadrangle and vicinity, northwestern Colorado: U.S. Geological Survey Bulletin 1142-J, 74 p.

Colorado Oil and Gas Conservation Commission, 1996, 1993 oil and gas statistics: Colorado Department of Natural Resources, Denver, Colorado.

Donnell, J.R., 1969, Paleocene and lower Eocene units in the southern part of the Piceance Creek Basin, Colorado: U.S. Geological Survey Bulletin 1274-M, p. M1–M18.

Ellis, M.S., and Freeman, V.L., 1984, Geologic map and cross sections of the Carbondale 30' by 60' quadrangle, west-central Colorado: U.S. Geological Survey Coal Investigations map C-97A.

Fairer, G.M., Green, M.W., and Shroba, R.R., 1993, Preliminary geologic map of the Storm King Mountain quadrangle, Garfield, County, Colorado: U.S. Geological Survey Open-File Report 93-320.

Franczyk, K.J., Fouch, T.D., Johnson, R.C., Molenaar, C.M., and Cobban, W.A., 1992, Cretaceous and Tertiary paleogeographic reconstructions for the Uinta-Piceance Basin study area, Colorado and Utah: U.S. Geological Survey Bulletin 1787-Q, p. Q1–Q37.

Grout, M.A., and Verbeek, E.R., 1992, Fracture history of the Divide Creek and Wolf Creek Anticlines and its relation to Laramide basin-margin tectonism, southern Piceance Basin, northwestern Colorado: U.S. Geological Survey Bulletin 1787-Z, p.Z1–Z32.

Grout, M.A., Abrams, G.A., Tang, R.L., Hainsworth, T.J., Verbeek, E.R., 1991, Late Laramide thrust-related and evaporite-domed anticlines in the southern Piceance Basin, northeastern Colorado Plateau: American Association of Petroleum Geologists Bulletin v. 75, no. 2, p. 205–218.

Gunneson, B.G., Wilson, M.S., and Labo, J.A., 1995, Divide Creek Anticline: A decapitated pop-up structure with two detachment zones, *in* Ray, R.R., ed., High-Definition Seismic 2-D, 2-D Swath, and 3-D Case Histories: Rocky Mountain Association of Geologists, 1995 Guidebook, p. 31–45.

Hemborg, H.T., 1993, Wasatch Formation and Douglas Creek Member of Green River Formation, *in* Robertson, J.M. and Broadhead, R.F., ed., Atlas of Major Rocky Mountain Gas Reservoirs: New Mexico Bureau of Mines and Mineral Resources and others, p. 96.

Johnson, J.G., 1971, Timing and coordination of orogenic, epeirogenic, and eustatic events: Geological Society of America Bulletin, v. 82, no. 12, p. 3263–3298.

Johnson, R.C., and May, F., 1980, A study of the Cretaceous-Tertiary unconformity in the Piceance Creek Basin, Colorado: The underlying Ohio Creek Formation (Upper Cretaceous) redefined as a member of the Hunter Canyon or Mesaverde Formation: U.S. Geological Survey Bulletin 1482-B, p. B1–B27.

Kirkham, R.M., Streufert, R.K., Hemborg, H.T., and Stelling, P.L., 1996, Geologic map of the Cattle Creek quadrangle, Garfield County, Colorado: Colorado Geological Survey Open-File Report 96-1.

Kirkham, R.M., Streufert, R.K. and Cappa, J.A., 1995, Geologic map of the Glenwood Springs quadrangle, Garfield County, Colorado: Colorado Geological Survey Open-File Report 95-3.

Larson, E.E., Ozima, M., and Bradley, W.C., 1975, Late Cenozoic basic volcanism in northwest Colorado and its implications concerning tectonism and origin of the Colorado River system, *in* Curtis, Bruce, ed., Cenozoic history of the Southern Rocky Mountains: Geological Society of America Memoir 144, p. 155–178.

Lorenz, J., Nadon, G., and LaFreniere, L., 1995, Geology of the Molina Member of the Wasatch Formation, Piceance Basin, Colorado Preliminary Report: Progress report to DOE on Geologic Studies in Support of the Subsurface Science Project, 33 p.

Murray, F.N., 1966, Stratigraphy and structural geology of the Grand Hogback monocline, Colorado: University of Colorado, Ph.D. dissertation, Boulder, Colorado, 219 p.

_____, 1969, Flexural slip as indicated by faulted lava flows along the Grand Hogback Monocline, Colorado: Journal of Geology, v. 77, p. 333–339.

Richmond, G.M, 1986, Stratigraphy and correlation of glacial deposits of the Rocky Mountains, the Colorado Plateau and the ranges of the Great Basin, *in* Sibrava, V., Bowen, D.Q., and Richmond, G.S., eds., Quaternary glaciations in the northern hemisphere: Quaternary Science Reviews, v. 5, p. 99–127.

Richmond, G.M., and Fullerton, D.S., 1986, Introduction to Quaternary glaciations in the United States of America, *in* Sibrava, V., Bowen, D.Q., and Richmond, G.S., eds., Quaternary glaciations in the northern hemisphere: Quaternary Science Reviews, v. 5, p. 3–10.

Shroba, R.R., Fairer, G.M., and Green, M.W., 1994, Preliminary geologic map of the Silt quadrangle, Garfield County, Colorado: U.S. Geological Survey Open-File Report 94-696.

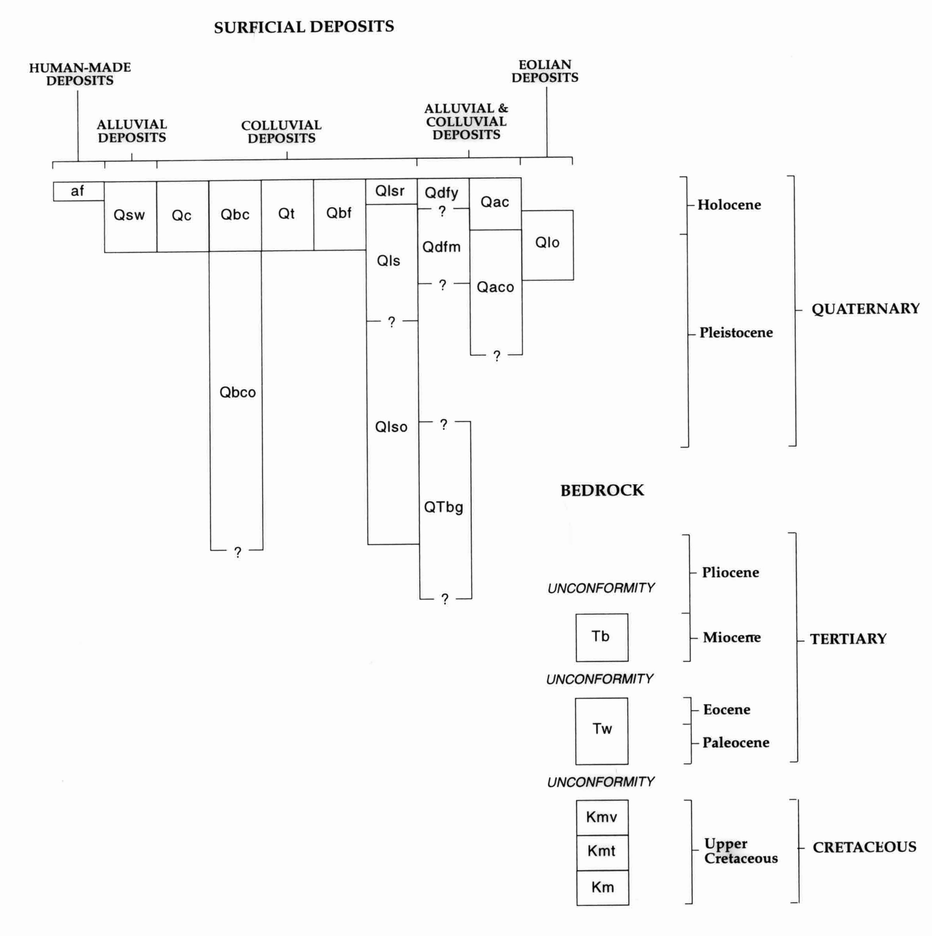
Shroba, R.R., Green, M.W., and Fairer, G.W. 1995, Preliminary geologic map of the Rifle quadrangle, Garfield County, Colorado: U.S. Geological Survey Open-File Report 95-52.

Snow, C.B., 1970, Stratigraphy of basal sandstones in the Green River Formation, northeast Piceance Basin, Rio Blanco County, Colorado: The Mountain Geologist, v. 7, no. 1, p. 3–32.

Soule, J.M., and Stover, B.K., 1984, Surficial geology, geomorphology, and general engineering geology of parts of the Colorado River valley, Roaring Fork River valley, and adjacent areas, Garfield County, Colorado: Colorado Geological Survey Open-File Report 85-1.

Tweto, Ogden, Moench, R.H., and Reed, J.C., 1978, Geologic map of the Leadville 1° x 2° quadrangle, northwest Colorado: U.S. Geological Survey Miscellaneous Investigations Map I-999.

CORRELATION OF MAP UNITS



WHOLE-ROCK ANALYSES OF THE CENTER MOUNTAIN QUADRANGLE

PERCENT

SampleID	SiO_2	Al_2O_3	CaO	MgO	Na_2O	K_2O	Fe_2O_3	MnO	TiO_2	P_2O_5	Cr_2O_3	LOI*
C69B	49.9	14.4	7.90	7.43	2.69	1.50	11.7	0.16	1.38	0.46	0.05	0.40

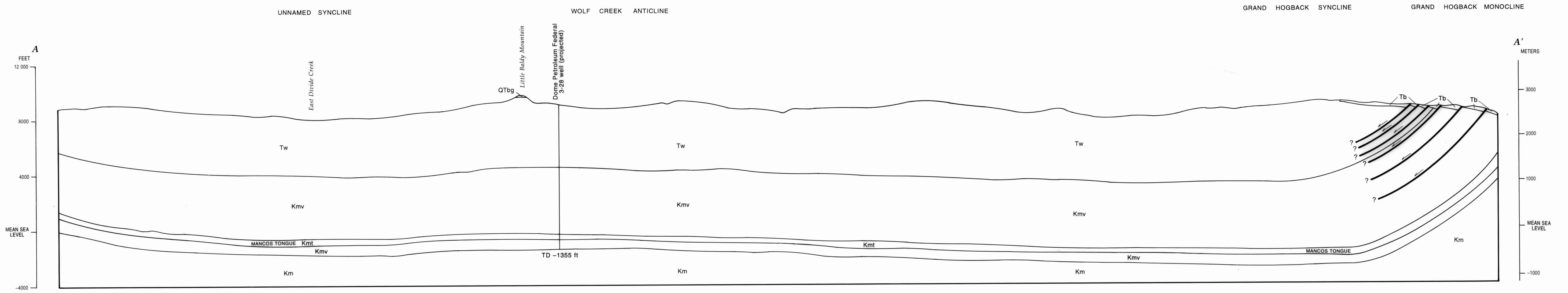
* Loss on ignition

PPM

Sample ID	Rb	Sr	Y	Zr	Nb	Ba
C69B	36	818	34	158	13	853

SAMPLE DESCRIPTIONS

C69B: Basaltic rock from upper flow unit on Little Baldy Mountain; SW 1/4 SE 1/4 NE 1/4 of Section 29, T. 7 S., R. 90 W.



GEOLOGIC MAP OF THE CENTER MOUNTAIN QUADRANGLE, GARFIELD COUNTY, COLORADO

By
Christopher J. Carroll, Robert M. Kirkham, and Peter L. Stelling

1996