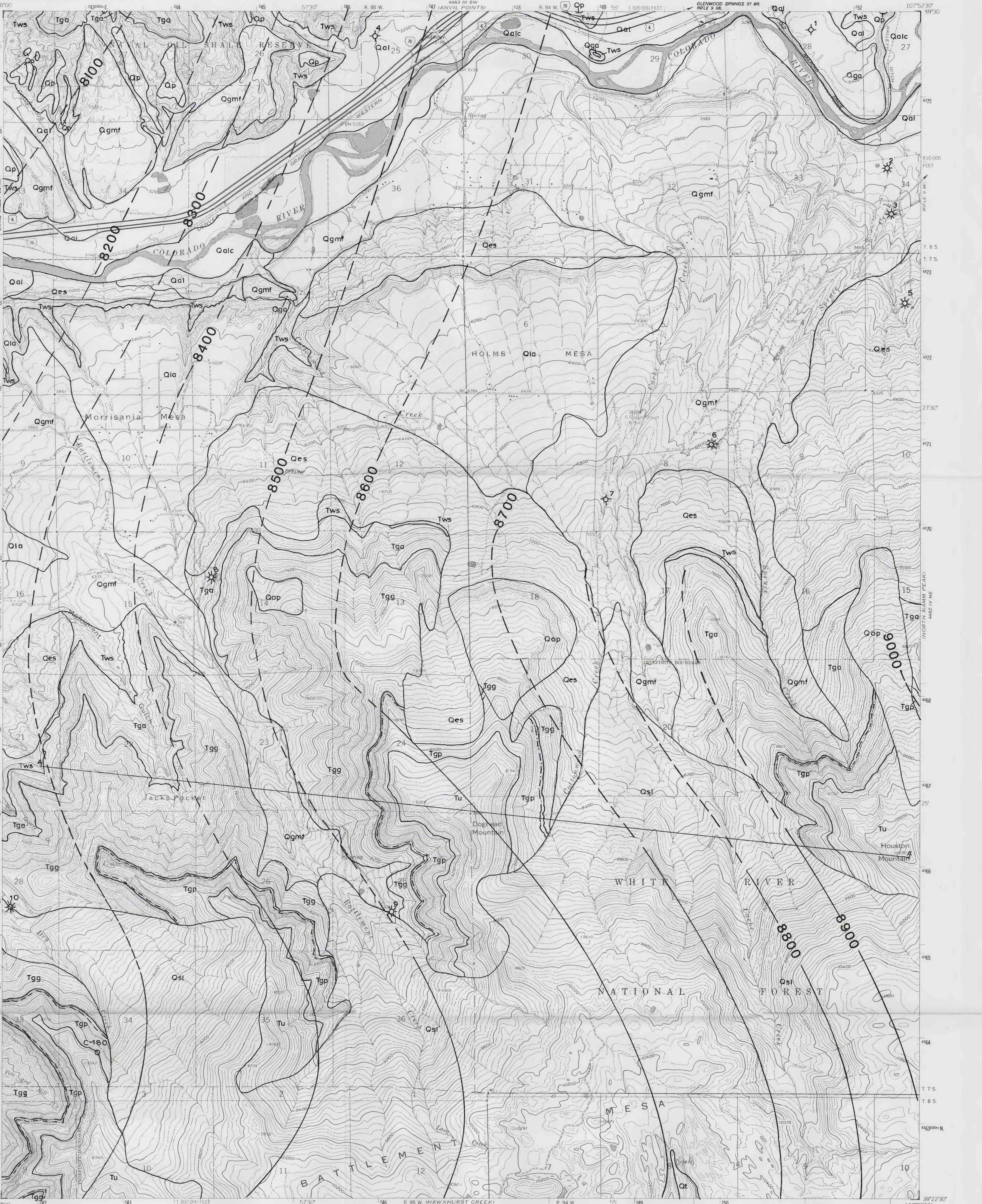


DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-2060



CORRELATION OF MAP UNITS					QUATERNARY	TERTIARY
Qal2	Qal1	Qes	Qc	Qal		
Qga	Qgaf	Qga	Qga	Qga	QUATERNARY	TERTIARY
		Qla				
		Qop				
		UNCONFORMITY				
		Tu			TERTIARY	TERTIARY
		Tgp				
		Tga				
		Tws			TERTIARY	TERTIARY

DESCRIPTION OF MAP UNITS

[Descriptions of the surficial deposits of the Rulison quadrangle are included in a detailed report on the Quaternary geology of Grand and Battlement Mesas, Colorado, by Yeend, 1969]

- Qal2 Alluvium of the Colorado River (Holocene)--Mud, silt, sand, and gravel along present lowermost flood plain of Colorado River. Gravel consists of more than 50 percent crystalline rocks derived from a distant easterly source
- Qal1 Alluvial and flood-plain deposits (Holocene)--Mud, silt, sand, and gravel. Locally derived coalescing fan deposits and sheetwash deposits along Colorado River; also contains well-sorted, well-sorted, crystalline rocks that are not locally derived. May contain some reworked alluvium of Pleistocene age
- Qes Earthflow and soil creep deposits (Holocene)--Poorly sorted boulder, cobble, and pebble gravel in a matrix of greenish-gray sandy silt. Contains some basalt boulders derived from older till, landslide and colluvial deposits, and angular fragments of sandstone, siltstone, and claystone derived from Wasatch and Green River Formations. Almost exclusively restricted to areas underlain by claystone-rich Wasatch Formation
- Qc Talus deposits (Holocene)--Boulders and cobbles of basalt, commonly 1-4 ft (0.3-1.2 m) in diameter, some as much as 20 ft (6 m) across, angular, lichen covered; boulders have accumulated at base of basalt cliff just south of quadrangle boundary
- Qal1 Slump blocks and solifluction deposits (Holocene and Pleistocene)--Basalt blocks and boulders, and unconsolidated material moved down slope by gravity. Slump blocks form ridges of basalt, pebble mantling much of Battlement Mesa. Unbroken blocks are as much as 1 m (1.6 km) long. Most deposits are of Pleistocene age but some movement continues to present time
- Qga Grand Mesa Formation (Pleistocene--Probably of Hinderer(?) glaciation)
- Qga Alluvial-terrace deposits--Silt, sand, and gravel. Pebble, cobble and boulder gravel includes both locally derived sedimentary rocks and basalt, and crystalline rocks of distant easterly source. Reddish-brown windblown sand and silt locally mantles terrace surfaces which lie 80-200 ft (25-60 m) above Colorado River. Maximum thickness about 80 ft (24 m)
- Qgmf Mudflow and fan-gravel deposits--Pebble, cobble, and boulder gravel in a gray matrix of coarse sand; poorly sorted, clasts primarily unweathered basalt, but contains some sandstone, marlstone, siltstone, and claystone. Sedimentary rocks predominate in deposits north of Colorado River. Derived largely from solifluction deposits (Qal) south of Colorado River. Forms both smooth and irregular slopes, some natural levees
- Qp Pediment-gravel deposits (Pleistocene)--Angular to subrounded pebble and cobble gravel of sandstone, siltstone, and marlstone derived from the Wasatch and Green River Formations. Pediment is commonly mantled by a thin veneer of reddish-brown windblown sand and silt. Occurs in small patches north of the Colorado River. Thickness 5-40 ft (1.5-12 m)
- Qla Lands End Formation (Pleistocene--Probably of Bull Lake(?) glaciation)
- Qla Alluvial-terrace and fan-gravel deposits--Grayish-brown sandy gravel of basalt and locally derived silty siltstone, marlstone, and sandstone; moderately to poorly sorted; poorly stratified, rock fragments angular to well rounded. Includes some probable mudflow debris. Present on Holmes and Morrisania Mesas. Thickness 20-200 ft (6-60 m)
- Qop Older deposits (Pleistocene--Pre-Bull Lake(?) age)
- Qop Pediment-gravel deposits--Subangular to subrounded pebble, cobble, and boulder gravel; coarse, poorly sorted. Locally derived basalt boulders as much as 8 ft (2.5 m) in diameter are common near the slopes of Battlement Mesa. Siltstone, claystone, and marlstone derived from the Wasatch, Green River, and Uinta Formations make up most of the gravel. Surface is generally covered with a thin patchy layer of reddish-brown windblown sand and silt. Thickness generally less than 50 ft (15 m)
- Tu Uinta Formation (Eocene)--Light-brown and gray very fine to medium-grained sandstone and medium-grained light-gray marlstone and siltstone; contains pelecypods, gastropods, ostracodes, and fragments of fossil vertebrates. Mostly covered by solifluction deposits (Qal). Upper part eroded. Maximum thickness of exposed rocks about 850 ft (259 m)
- Tgp Green River Formation (Eocene)
- Tgp Parachute Creek Member--Gray-weathering black, brown, and gray marlstone including oil shale, that locally forms cliffs; contains minor amounts of light-gray siltstone, light-gray and brown fine- to medium-grained sandstone, and numerous very thin persistent amnietite and tuff beds. Thickness about 600 ft (183 m)
- Tga Mahogany oil-shale bed--Outcrop of richest oil-shale bed 40-50 ft (12-24 m) above base of Parachute Creek Member. In drill hole C-180, the Mahogany bed yields as much as 62 gallons of oil per ton (259 l/metric ton). Thickness 2-4 ft (0.6-1.2 m). The entire Mahogany zone in this hole is 74 ft (23 m) thick and averages 20.82 gallons of oil per ton (87 l/metric ton)
- Tga Garden Gulch Member--Light-gray marlstone, dark-brown to black locally fissile shale some of which is oil shale; light-gray oolitic limestone and sandstone, light-gray algal limestone, and some massive brown fine- to medium-grained sandstone. Maximum thickness 1,500 ft (457 m)

- Tga Anvil Points Member--Brown and buff massive fine- to coarse-grained sandstone that forms conspicuous ledges, minor amounts of light-gray siltstone, marlstone, and a few thin tan low-grade oil-shale beds. Upper part of Anvil Points Member grades westward into the Garden Gulch Member with a decrease in number and thickness of sandstone beds. Thickness about 400 ft (122 m) where both Garden Gulch and Anvil Points are present. Ranges from 1,100-1,700 ft (335-518 m) thick in eastern part of quadrangle where Garden Gulch Member is not present
- Tws Shire Member of Wasatch Formation (Eocene)--Variegated purple, lavender, red, gray, and brown claystone; some locally lenticular fine- to coarse-grained sandstone. Mostly covered by Quaternary units south of the Colorado River

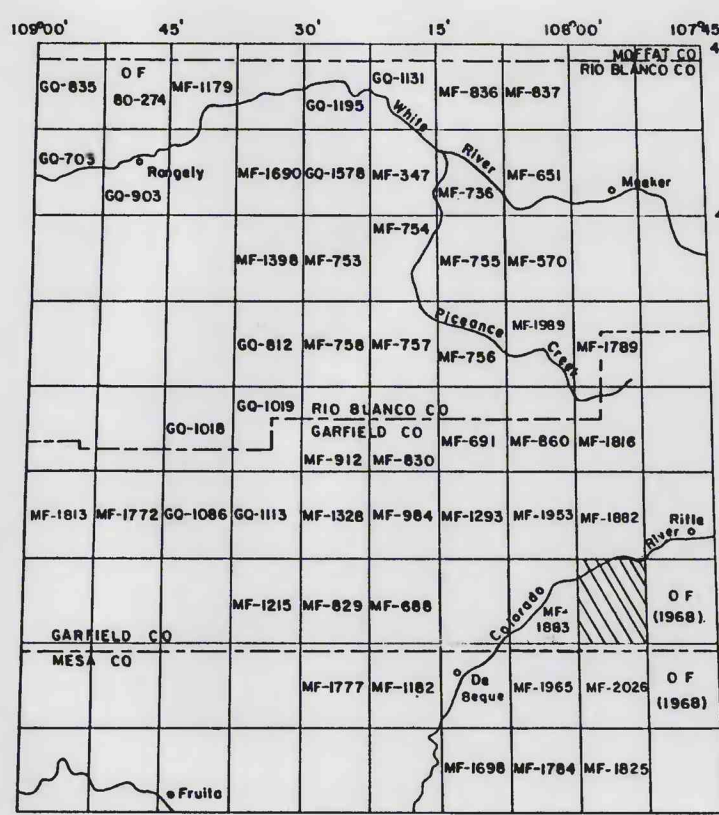
REFERENCE

Yeend, W.E., 1969, Quaternary geology of the Grand and Battlement Mesas area, Colorado: U.S. Geological Survey Professional Paper 617, 50 p.

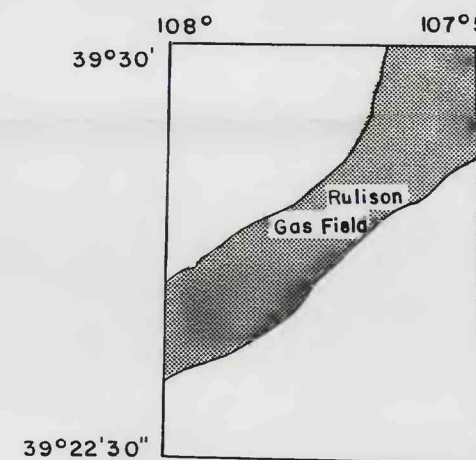
Table 1.--Drill-hole data, Rulison quadrangle, Colorado

[All drill holes are gas exploration wells except for C-180, which is an oil-shale corehole]

Drill-hole No. (on map)	Section	Company and Name	Feet	Total Depth	Meters
		T. 6 S., R. 94 W.			
1	28	Petroleum Equipment Leasing, Lake #2	1,856	566	
2	34	CER Corp., MWX-1	4,098	1,249	
3	34	Carter & Carter, Bernklau #1	4,590	1,399	
		T. 6 S., R. 95 W.			
4	25	Equity Oil Co., Mahafey #1X	2,500	762	
		T. 7 S., R. 94 W.			
5	3	Austral Oil Co., Govt 3-94	6,515	1,986	
6	8	Southern Union Prod.,	7,560	2,304	
7	8	Austral Oil Co., Dean #1	3,158	963	
		T. 7 S., R. 95 W.			
8	14	Southern Union Prod., Fed 14-95	9,037	2,754	
9	25	Austral Oil Co., Hayward 25-95	8,516	2,596	
10	28	Southern Union Prod., Fed. 28-95	7,593	2,314	
C-180	34	Gulf Oil Corp., #2	617	188	



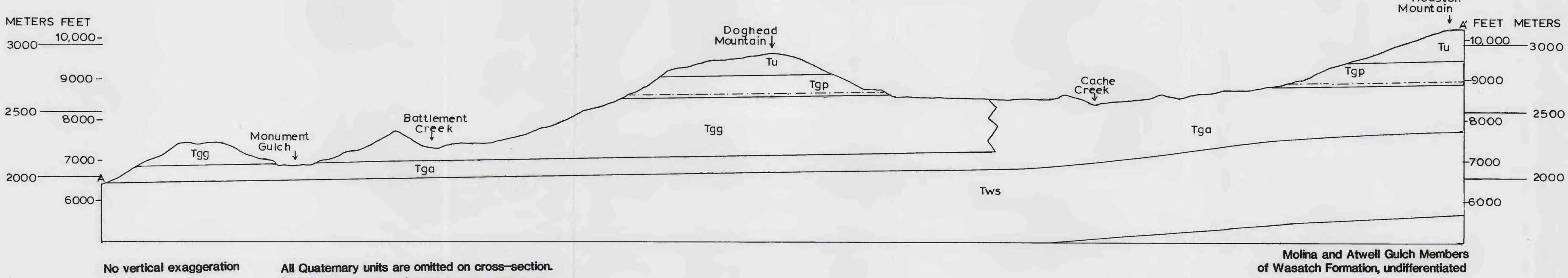
INDEX MAP SHOWING LOCATION OF THIS QUADRANGLE (PATTERNED) AND OTHER PUBLISHED U.S. GEOLOGICAL SURVEY 7 1/2-MINUTE GEOLOGIC MAPS IN THE PICEANCE CREEK BASIN AREA, NORTHWESTERN COLORADO. PUBLISHED INDEX MAPS INCLUDE GEOLOGIC QUADRANGLE MAPS (Q), MISCELLANEOUS FIELD STUDIES MAPS (MF), AND OPEN-FILE REPORTS (OF).



Index map showing location of gas field in the Rulison quadrangle, Colorado

GEOLOGIC MAP OF THE RULISON QUADRANGLE,
GARFIELD COUNTY, COLORADO

By
Warren E. Yeend, John R. Donnell, and Marjorie C. Smith
1988



No vertical exaggeration

All Quaternary units are omitted on cross-section. Some contacts are projected to surface through the overlying Quaternary unit.

Molina and Atwell Gulch Members of Wasatch Formation, undifferentiated

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INTERIOR--GEOLOGICAL SURVEY, RESTON, VIRGINIA--1988

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