GEOLOGIC MAP AND MEASURED COAL SECTIONS OF THE BITTER CREEK NW QUADRANGLE, SWEETWATER COUNTY, WYOMING

By
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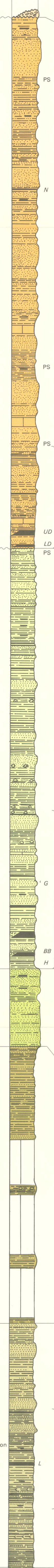
1989

GENERALIZED COLUMNAR SECTION OF EXPOSED ROCKS



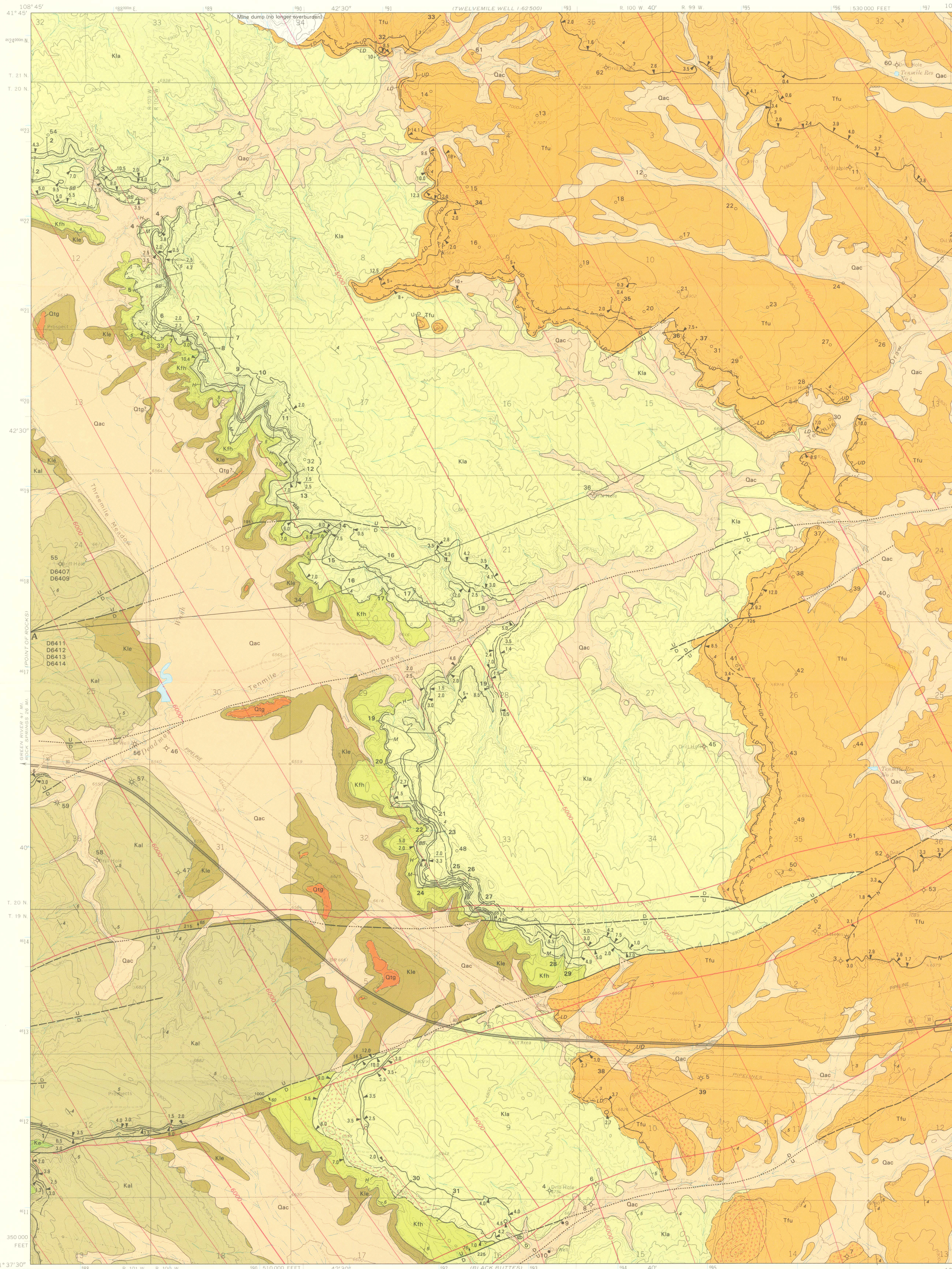
System	Series	Group and formation	Description of map units
QUATERNARY	Holocene and Pleistocene	Surficial deposits	ALLUVIUM AND COLLUVIUM (Qac)—Unconsolidated gravel, sand, silt, and clay TERRACE GRAVEL (Qtg)—Poorly sorted, angular to subangular clasts ranging from granuel to boulder size, calcareous sandstone matrix, well-consolidated. Caps benches of Lewis Shale. 0–15 ft thick
TERTIARY	Paleocene	Fort Union Formation (part)	FORT UNION FORMATION (Tfu)—Sandstone and poorly consolidated sandstone, shale, carbonaceous shale, mudstone, siltstone, and coal, interbedded. Sandstone, generally gray to very light brownish gray, weathers brown or reddish brown, very fine to medium grained; contains sparse conglomerate beds, thin to thick bedded and crossbedded; locally massive and resistant; locally contains carbonaceous material; upper 115 ft micaceous. Poorly consolidated sandstone and sand, most abundant in upper 650 ft, generally light-gray, pale-brown, or reddish-brown, very fine to medium-grained, locally carbonaceous, and nonresistant. Shale, gray to dark-gray, becoming greenish-gray in upper 650 ft. Carbonaceous shale, gray to dark-gray. Mudstone, pale-brown to olive and greenish-gray, silty. Siltstone, gray, weathers brown to reddish brown, and locally contains carbonaceous material; three distinctive, laterally widespread siltstone beds called paleosois (PS) at 910, 360, and 200 ft above the base of the formation, gray to pinkish white, weathers pale gray; calcareous, resistant, resembles calcareous siltstone below base of formation. Two lenticular subbituminous coal beds (upper and lower Deadman, UD and LD,) in lower 200 ft are locally as much as 18 ft and 20 ft thick, respectively, and locally split into thinner beds. The Nuttal coal bed (N), 1.7–4.0 ft thick, occurs about 720 ft above the base of the formation and contains a kaolinite tonstein parting. Beds of impure coal, less than 1 ft thick, are scattered throughout the formation and are interbedded with shale, siltstone, and sandstone. Clinker (baked and fused rock), and red soil locally replace the thickest coal bed in the lower 200 ft where the coal has burned at the outcrop. Alluvial plain, fluvial, and swamp deposits. Only 1,059 ft present in quadrangle
CRETACEOUS	Upper Cretaceous	Lance Formation	LANCE FORMATION (Kla)—Shale, carbonaceous shale, siltstone, sandstone, and coal, interbedded. Shale, gray to dark-gray. Carbonaceous shale, dark-gray. Siltstone, gray weathers reddish-brown, and occurs as concretions in shale. A widespread layer of white calcareous siltstone called a paleosol (PS), 5–10 ft thick, is at top of formation. Sandstone, gray, weathers tan, locally white, fine-to medium-grained, thin-to thick-bedded and crossbedded, locally channeled, and locally calcareous, carbonaceous, or vertically burrowed; lower 200–300 ft forms cliffs and steep slopes where rocks are well exposed. Coal, lenticular beds of subbituminous coal, 15–16.5 ft thick, most numerous in lower 250 ft; coal beds in upper 640 ft are less than 2 ft thick. Clinker (Baked and fused rock) locally replaces burned coal beds in lower 100 ft. Abundant oyster-shell fragments occur in shale and sandstone in lower 200 ft. Lagoonal and coastal swamp deposits in lower 200 ft grade upward to fluvial, alluvial-plain, and swamp deposits in upper 600–700 ft. 830–950 ft thick
		Fox Hills Sandstone	FOX HILLS SANDSTONE (Kfh)—Upper 35–45 ft: sandstone, gray, weathers tan, fine-grained, massive to horizontally bedded, locally crossbedded, locally carbonaceous; contains several carbonaceous shale beds and oyster shell fragments. Upper contact locally gradational and interfingering. Middle 20 ft: shale, dark-brown Lower 95–120 ft: Sandstone and shale. Sandstone, silty sandstone and minor shale, interbedded. Sandstone and silty sandstone, gray to white, weathers pale-brown to white, fine-grained, massive to horizontally bedded and crossbedded, locally calcareous; contains *Ophiomorpha* sp. and oyster shell fragments. Shale, dark-brown, occurs in sparse thin beds. Lower contact is gradational and consists of thin, interfingering beds of sandstone, siltstone, and shale. Marginal marine barrier-bar and bench deposits. 150–360 ft thick
		Lewis Shale	LEWIS SHALE (Kle)—Shale, siltstone, and sandstone. Shale, gray to dark-gray or grayish-brown, silty. Siltstone, gray to dark-gray, calcareous, sparse thin beds. Siltstone concretions, reddish-brown, sparse, interbedded with shale. Sandstone, brown to white, fine-grained, sparse thin beds interbedded with shale. Middle part mostly covered by alluvium; lower contact is gradational and interfingering. Marine deposits. 540–675 ft thick
		Mesaverde Group (part): Almond Formation	ALMOND FORMATION (Kal)—Upper 150–200 ft: shale, silty shale, sandstone, and siltstone, interbedded; contains shallow-marine fossil bivalves and brackish-water bivalves and gastropods, possibly transported. Shale, gray to dark-gray and brown to dark-brown. Silty shale, brown. Sandstone, brown to pale-brown, gray to white, fine-grained, well-bedded and locally crossbedded or massive and cliff-forming; locally burrowed, contains *Ophiomorpha* sp. and oyster shell fragments in upper 125–300 ft. Siltstone, brown, weathers white; sparse thin beds interbedded with shale. Lower 300–350 ft: shale, carbonaceous shale, carbonaceous siltstone, silty shale, sandstone, coal, and bentonite interbedded; fossils include brackish-water bivalves and gastropods, and shallow-water marine bivalves and gastropods. Shale, gray to black or brown to very dark brown. Carbonaceous shale, dark-gray, dark-brown or black; contains thin coal lenses. Carbonaceous siltstone, fissile. Silty shale, brown, interbedded with gray to dark-brown shale. Sandstone, dark-brown to white, fine-grained, locally crossbedded, in thin beds less than 5 ft thick. Siltstone, reddish-brown, in thin beds less than 1 ft thick, or in concretions. Lenticular beds of subbituminous coal, 1.5–8.0 ft thick. Two bentonite beds, 0.1–0.5 ft thick, occur at about 60 and 160 ft. Coastal swamp and estuarine deposits in lower 250 ft grade upward to marine deposits in upper part. 450–550 ft thick
		Ericson Sandstone (part)	ERICSON SANDSTONE (Ke)—Sandstone, gray to white, coarse-to fine-grained; forms cliffs. Only upper 100 ft exposed in quadrangle

EXPLANATION

Crossbedded sandstone
Sandstone
Siltstone
Siltstone with carbonaceous material
Mudstone
Shale
Bentonite
Clinker
Siltstone concretions
Shale and thin interbedded sandstone beds
Coal
Unconformity
Covered
PS Paleosol

UD, upper Deadman coal bed
LD, lower Deadman coal bed
G, Gilbralter coal bed
H, Hall coal bed
L, Lebar coal bed

FEET 0, 50, 100 — METERS 0, 15, 30



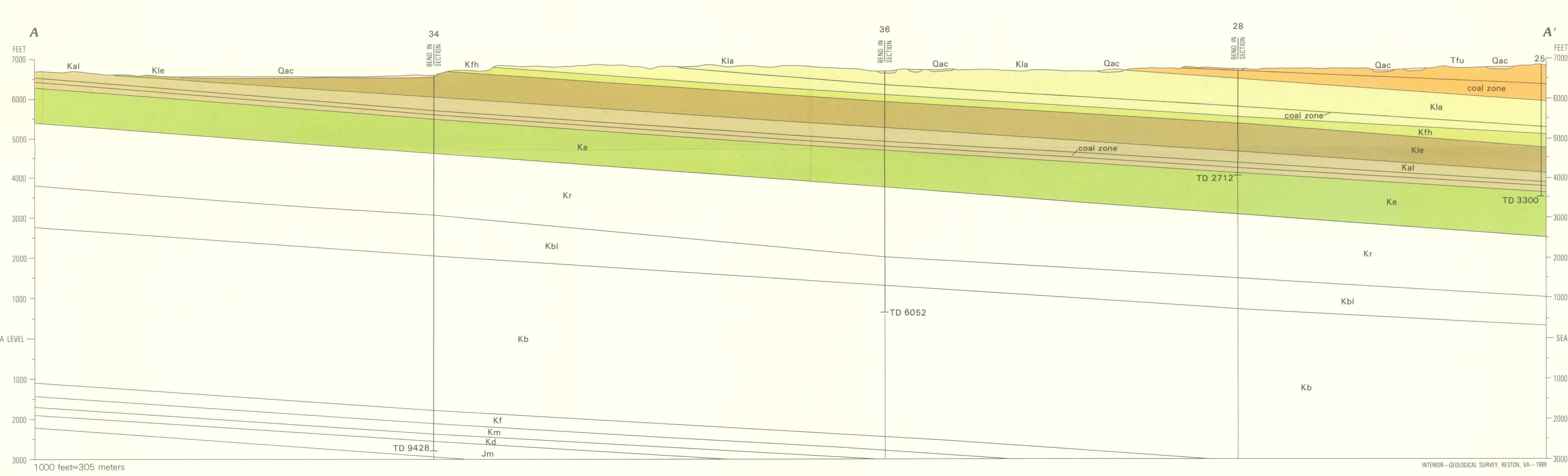
Base from U.S. Geological Survey, 1968
Photorevised 1978
10,000-foot grid based on Wyoming coordinate system, west central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

TRUE NORTH — MAGNETIC NORTH — 13°
APPROXIMATE MEAN DECLINATION, 1989

SCALE 1:24 000
1 ½ 0 1 MILE
1 .5 0 1 KILOMETER
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

WYOMING
QUADRANGLE LOCATION

Geology mapped by D. Hill Madden, 1976, 1978, assisted by S. J. Barkeley, L. L. Basile, and S. M. Molz



INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1989

CORRELATION OF MAP UNITS

Unit	Age	
Qac	Holocene and (or) Pleistocene	QUATERNARY
UNCONFORMITY		
Qtg	Holocene and (or) Pleistocene	QUATERNARY
UNCONFORMITY		
Tfu	Paleocene	TERTIARY
UNCONFORMITY		
Kla, Kfh, Kle, Kal, Ke (Mesaverde Group: Kal, Ke, Kr, Kbl), Kr, Kbl, Kb, Kf	Upper Cretaceous	CRETACEOUS
UNCONFORMITY		
Km, Kd	Lower Cretaceous	CRETACEOUS
UNCONFORMITY		
Jm	Upper Jurassic	JURASSIC

LIST OF MAP UNITS

Qac	Alluvium and colluvium
Qtg	Terrace gravel
Tfu	Fort Union Formation
Kla	Lance Formation
Kfh	Fox Hills Sandstone
Kle	Lewis Shale
Kal	Almond Formation
Ke	Ericson Sandstone
Kr	Rock Springs Formation
Kbl	Blair Formation
Kb	Baxter Shale
Kf	Frontier Sandstone
Km	Mowry Shale
Kd	Dakota Sandstone
Jm	Morrison Formation

Coal bed—Dashed where approximately located. Letter denotes coal bed name: *N*, Nuttal; *UD*, upper Deadman; *LD*, lower Deadman; *G*, Gibralter; *BB*, Black Butte; *M*, Maxwell; *H*, Hall; *L*, Lebar. Thickness of coal, in feet, measured at triangle, calculated by method of Bass, Smith, and Horn (1970, fig. 2). + indicates minimum thickness; two coal beds mapped as one indicated by $\frac{5.0}{7.0}$

Burned coal bed—Approximately located

Clinker—Baked and fused rock from burning of coal beds

Contact—Dashed where approximately located

Fault—Showing dip of fault plane and stratigraphic offset, in feet. Dashed where approximately located; dotted where covered by surficial deposits. U, upthrown side: D, downthrown side. Faults are vertical where dip not shown

Structure contour—Drawn on top of Ericson Sandstone. Contour interval 200 feet. Fault traces at intersections of fault planes and top of Ericson Sandstone in footwall shown by heavy red lines

Strike and dip of beds

Coal drill hole—Number refers to coal section (sheet 2)

Gas well—Number is keyed to table 3 and coal section (sheet 2)
Producing gas
Show of gas

Producing oil well—Number refers to table 3 and coal section (sheet 2)

Dry hole—Number refers to table 3 and coal section (sheet 2)

Line of measured coal section—Number refers to coal section (sheet 2)

D6407 **USGS Mesozoic fossil locality**—Showing Denver catalog number. Approximately located. List of samples is in Table 4

INTRODUCTION

The Bitter Creek NW quadrangle is located in Sweetwater County, southwestern Wyoming, about 26 mi (42 km) east of the town of Rock Springs. Three coal-bearing formations are exposed in the quadrangle and these range in age from Late Cretaceous through Paleocene. These formations contain beds of coal having economic importance and for this reason the quadrangle was mapped as part of the U.S. Geological Survey's program to evaluate public mineral lands. The mapping was done on aerial photographs at a scale of 1:33,000 and topographic maps at a scale of 1:24,000.

The area of the quadrangle is easily accessible by highway and railroad. Interstate Highway 80 crosses the southern half of the quadrangle, and gravel roads and dirt tracks provide access elsewhere in the quadrangle. Railroad access is provided by the Union Pacific, which passes through the town of Point of Rocks 2 mi (3.2 km) east of the quadrangle. The railroad and the U.S. Government own the surface and mineral rights in alternate sections within the quadrangle: the State of Wyoming owns the mineral rights in sections 16 and 36 of each township.

Schultz (1909, 1910) mapped the geology of this and adjacent quadrangles while mapping the larger area of the Rock Springs uplift.

STRATIGRAPHY

Exposed sedimentary rocks in the Bitter Creek NW quadrangle range in age from Late Cretaceous through Quaternary. These rocks constitute about 3,200 ft (975 m) of strata, and they overlie additional strata that occur only in the subsurface. The subsurface strata range in age from Cambrian to Late Cretaceous. The total section, including subsurface strata, is about 17,000 ft (5182 m) thick. Many oil and gas wells have been drilled in this quadrangle; some have penetrated as deep as the Upper Jurassic Morrison Formation. The Morrison lies at depths of 8590–9542 ft (2618.2–2908.4 m). The whole stratigraphic section consists of interlayered marine and nonmarine rocks.

The oldest exposed sedimentary rocks in the quadrangle comprise two formations of the Upper Cretaceous Mesaverde Group: the fluvial deposits of the upper part of the Ericson Sandstone and the overlying lagoonal and nearshore-marine deposits of the Almond Formation. The Mesaverde Group is overlain by three Late Cretaceous formations: marine deposits of the Lewis Shale, nearshore-marine deposits of the Fox Hills Sandstone (Land, 1972), and lagoonal and nonmarine deposits of the Lance Formation. Above the Lance Formation lie the nonmarine, coal-bearing, basin-fill deposits of the Paleocene Fort Union Formation. The contact between the Lance and Fort Union is mapped as an unconformity. In this area, the unconformity is located above a bed of calcareous siltstone that ranges from gray to white. This bed is 5 ft (1.5 m) or less in thickness. Similar beds of siltstone have been interpreted as paleosols (Ritzma, 1965; Roehler, 1977 a, b). The calcareous siltstone bed at the top of the Lance Formation is the lowest of four such beds in the Bitter Creek NW quadrangle.

Sedimentary rocks of the Upper Cretaceous Mesaverde Group compose the upper part of the subsurface section and consist of the Blair and Rock Springs Formations, and lower part of the Ericson Sandstone. These formations are composed of members and tongues, which are shown on the composite geophysical log (sheet 4). The marine Blair Formation consists of a lower sandy member and an upper shaly member, both of which lack coal. The coal-bearing Rock Springs Formation consists of marine and nonmarine tongues of sandstone and shale, in ascending order as follows: Chimney Rock and Black Butte Tongues of Hale (1950); Brooks Sandstone, Coulson Tongue, and McCourt Sandstone of Smith (1961); and Gottsche Tongue of Smith (1965). The Ericson Sandstone consists of the sand-rich Trail zone of Roehler (1965), the shale-rich Rusty zone of Hale (1950), and the sand-rich Canyon Creek zone of Roehler (1965).

STRUCTURE

The Bitter Creek NW quadrangle is located on the faulted northeastern flank of the Rock Springs uplift, which is a large dome exposing Upper Cretaceous through Miocene strata. As a result of this location on the flank of the uplift, strata in this quadrangle dip 3°–6° to the north-east. These strata are cut by east-northeast-trending normal faults that have stratigraphic displacement of as much as 1000 ft (305 m). Schultz (1920) mapped several of these faults and showed that they are major features extending 15–20 mi (24–32 km) across the eastern flack of the uplift.

ECONOMIC GEOLOGY

COAL

Coal-bearing formations in the Bitter Creek NW quadrangle consist of the Rock Springs Formation in the subsurface and the overlying Almond, Lance, and Fort Union Formations at the surface. The discussions of coal deposits which follow are organized by formation from the oldest to the youngest. The names of the coal beds follow Roehler (1977b, 1978) and local industry usage. Where these coal beds contain partings, their net thicknesses were calculated by the method of Bass and others (1970).

Rock Springs Formation

In the subsurface, the Rock Springs Formation contains thin beds of coal near the top of the Brooks Sandstone (well 47 on sheet 3) and in the Gottsche Tongue (wells 9 and 47). These thin beds are 3 ft (0.9 m) or less in thickness.

Coal in the Rock Springs Formation is bituminous and of higher quality than coal in the overlying formations, which is subbituminous. For example, 10–12 mi (16.1–19.3 km) to the northwest, in the abandoned Superior mining district, the coal is high-volatile C bituminous; 26 mi (41.8 km) to the west, in the Rock Springs area, the coal is high-volatile A-C bituminous (table 2).

Almond Formation

Coal beds in the Almond Formation crop out only in the southwestern part of the quadrangle. In this area a sequence of six beds lies between 80 ft (24.4 m) and 320 ft (97.5 m) above the base of the formation. Two of the beds are named. Individual coal beds occur within the following intervals above the base of the formation: unnamed, 80–90 ft (24.4–27.4 m); Wyoming, 120–150 ft (36.6–45.7 m); Lebar, 160–215 ft (48.8–65.5 m(; unnamed, 205–310 ft (62.5–94.5 m); unnamed, 220–330 ft (67–106 m); and unnamed, 260–280 ft (79.3–85.3 m). The Lebar coal bed of Roehler (1978) once was mined near the town of Point of Rocks. The abandoned mine shafts are on the hillside north of Interstate 80, about 1 mi (1.6 km) west of the quadrangle.

Coal in the Almond Formation is subbituminous A and B were it was sampled in the coal mines near Point of Rocks (table 2). Farther south, in the area of Black Butte, the coal is subbituminous A (table 2).

Lance Formation

At least ten coal beds occur within the lower 300 ft (91.4 m) of the Lance, and most of these beds are locally more than 5 ft (1.5 m) thick. Only four of the beds have been named. The beds are shown on the geologic map and coal sections. Individual beds of coal occur within the following stratigraphic intervals above the base of the Lance Formation: Hall, 0–20 ft (0–6.1 m); Maxwell, 15–40 ft (4.6–12.2 m); unnamed, 50–70 ft (15–21 m); unnamed, 70–100 ft (21–30.5 m); Black Butte, 80–115 ft (24.4–35 m); unnamed, 110–130 ft (33.5–40 m); unnamed, 125–155 ft (38–47 m); unnamed, 170–200 ft (52–61 m); unnamed, 210–220 ft (64–67 m); and Gibralter, 230–280 ft (70–85 m).

Coal from the Lance Formation is subbituminous A and B. This is based on analyses of samples from this quadrangle and the area of Black Butte, which is about 5 mi (8 km) to the south (table 2).

Fort Union Formation

The thickest and most extensive coal beds in the quadrangle are the lower and upper Deadman coal beds, which lie near the base of the Fort Union Formation. These beds thicken to 20 ft (6.1 m) and 18 ft (5.5 m), respectively. In the northern part of the quadrangle, these coal beds are separated by about 20 ft (6.1 m) of strata; to the south, they are separated by 20–80 ft (6.1–24.4 m) of strata (sheet 2). The near-surface thicknesses of these beds are poorly known because the beds are extensively burned and are represented by clinker along their outcrops. Stripping methods were used to mine the beds to the north of the quadrangle. Piles of the overburden that was removed during mining extend southward into the quadrangle and locally cover outcrops of the coal beds.

Coal from the Deadman coal beds is subbituminous A-C, based on heating values calculated on a mineral-matter-free basis. Table 1 shows coal-quality data from six core holes drilled in the quadrangle.

Stratigraphically higher in the Fort Union Formation, the thin Nuttal coal bed occurs a little over 700 ft (213 m) above the base of the formation. The Nuttal is a continuous coal bed, but it thickens to a maximum of only 4 ft (1.2 m) and therefore it has less economic value than the Deadman coal beds. The Nuttal coal bed lies in the same stratigraphic position as the Big burn coal bed, 7–8 mi (11–13 km) to the south (Roehler, 1977b, 1978).

OIL AND GAS

Exploration for oil and gas in the Mesaverde Group in this part of the Rock Springs uplift has been carried out since late in the 1950's. This was when gas was discovered in sandstone within the Lewis Shale, and both oil and gas were discovered in sandstone within the upper part of the Almond Formation. Wells producing gas and oil (wells 9, 25, 56, and 59 in table 3) occur near faults within the quadrangle. The producing zones occur in the Blair and Almond Formations.

GROUND WATER

Ground water occurs in many of the formations exposed in the Rock Springs uplift; however, the best aquifers are in near-surface sandstone beds of the Ericson Sandstone. To the west, at Point of Rocks, water wells reach depths of 170–1000 ft (51.8–304.8 m), reaching aquifers primarily in the Ericson Sandstone, but also in the underlying Rock Springs Formation. Sandstones in the Blair and Almond Formations contain ground water, and sandstones in the Lance and Fort Union Formations also are capable of yielding water (Welder and McGreevy, 1966). A single deep well on a flank of the uplift can tap water from several of these formations.

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Table 1.—*Coal analyses of drill-core samples from coal beds in the Lance and Fort Union Formations, Bitter Creek NW quadrangle, Sweetwater County, Wyo.*

[Data from Northern Energy Resources Co. and Rocky Mountain Energy Co. A, as received; B, moisture-free; ---, no data]

Name of coal bed	Depth of cored interval (ft)	Type of analysis	Proximate analysis (percent): Moisture	Volatile matter	Fixed carbon	Ash	Ultimate analysis (percent): Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heating value (Btu/lb)
Drill-hole 13, sec. 4, T. 20 N., R. 100 W. - Fort Union Formation												
Upper Deadman	318–325	A	17.54	31.94	43.54	6.98	---	---	---	---	0.66	10,086
		B	---	38.73	52.81	8.46	---	---	---	---	.80	12,231
Upper Deadman	325–332.5	A	17.69	32.50	44.87	4.94	---	---	---	---	.68	10,299
		B	---	39.48	54.52	6.00	---	---	---	---	.83	12,512
Lower Deadman	368.3–377.8	A	15.90	31.60	42.42	10.00	---	---	---	---	.64	9,886
		B	---	37.58	50.43	11.99	---	---	---	---	.76	11,755
Drill-hole 14, sec. 5, T. 20 N., R. 100 W. - Fort Union Formation												
Lower Deadman	146.8–151	A	16.37	33.64	39.17	10.82	4.00	56.07	0.79	11.10	0.85	9,683
		B	---	40.23	46.83	12.94	4.78	67.05	.94	13.27	1.02	11,578
Lower Deadman	151–155	A	15.37	33.46	42.31	8.86	3.97	57.73	.91	12.46	.69	10,026
		B	---	39.54	49.99	10.47	4.69	68.22	1.08	14.72	.81	11,847
Drill-hole 19, sec. 10, T. 20 N., R. 100 W. - Fort Union Formation												
Upper Deadman	158–165	A	26.54	29.48	33.97	10.01	3.07	48.58	0.65	10.74	0.40	8,179
		B	---	40.13	46.24	13.63	4.17	66.13	.89	14.62	.55	11,131
Upper Deadman	165–173	A	19.78	32.95	41.53	5.74	3.88	57.20	.71	12.25	.43	9,864
		B	---	41.07	51.77	7.16	4.84	71.31	.89	15.26	.53	12,296
Lower Deadman	197–209	A	17.08	29.05	31.54	22.33	3.08	46.10	.78	10.08	.54	7,871
		B	---	35.03	38.04	26.93	3.71	55.59	.94	12.17	.65	9,492
Drill-hole 22, sec. 11, T. 20 N., R. 100 W. - Fort Union Formation												
Upper Deadman (upper split)	186–192	A	19.04	33.34	39.26	8.63	3.65	55.85	0.86	11.83	0.40	9,493
		B	---	41.18	48.49	10.33	4.51	68.98	1.06	14.62	.49	11,725
Lower Deadman	300–306	A	12.87	34.56	42.83	9.74	3.93	59.60	.84	12.42	.60	10,236
		B	---	39.67	49.15	11.18	4.51	68.40	.96	14.26	.69	11,748
Drill-hole 29, sec. 14, T. 20 N., R. 100 W. - Fort Union Formation												
Upper Deadman	56.5–63.3	A	18.57	31.51	35.06	14.86	---	---	---	---	0.48	8,689
		B	---	38.70	43.05	18.25	---	---	---	---	.59	10,671
Upper Deadman	63.3–70	A	20.76	33.74	39.01	6.49	---	---	---	---	.53	9,347
		B	---	42.58	49.23	8.19	---	---	---	---	.67	11,796
Lower Deadman (lower split)	150–156	A	19.10	31.92	40.34	8.64	---	---	---	---	.61	9,439
		B	---	39.45	49.87	10.68	---	---	---	---	.75	11,666
Drill-hole 39, sec. 23, T. 20 N., R. 100 W. - Fort Union Formation												
Upper Deadman (upper split)	111–117	A	21.62	31.24	37.08	10.06	3.39	52.54	0.67	11.08	0.63	8,965
		B	---	39.86	47.30	12.84	4.33	67.03	.86	14.13	.80	11,438
Upper Deadman	136–144	A	20.46	33.95	39.81	5.78	3.75	56.78	.84	11.96	.43	9,631
		B	---	42.68	50.05	7.27	4.72	71.38	1.05	15.04	.54	12,109
Drill-hole 32, sec. 17, T. 20 N., R. 100 W. - Lance Formation												
Hall	235–240.5	A	21.41	---	44.95	4.50	---	---	---	---	0.50	9,665
Drill-hole 48, sec. 33, T. 20 N., R. 100 W. - Lance Formation												
Unnamed	93–99.5	A	21.42	---	42.08	5.74	---	---	---	---	0.56	9,412
Unnamed	158–163	A	21.09	---	43.90	4.49	---	---	---	---	.73	9,663
Maxwell	208–216	A	21.61	---	43.12	5.87	---	---	---	---	.67	9,471
Hall	237–245	A	21.84	---	42.43	5.54	---	---	---	---	.84	9,484
Drill-hole 54, sec. 1, T. 20 N., R. 101 W. - Lance Formation												
Unnamed	130–134.5	A	21.69	---	44.21	4.18	---	---	---	---	0.47	9,758
Unnamed	186–196	A	20.81	---	44.07	5.72	---	---	---	---	.48	9,732
Black Butte	220–225.5	A	21.04	---	44.73	4.69	---	---	---	---	.44	9,798
Maxwell	285–288.5	A	19.14	---	45.82	3.88	---	---	---	---	.43	10,273

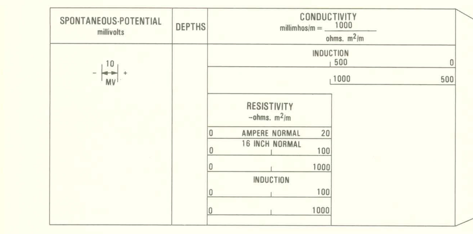


Table 2.—*Coal analyses of samples from the Lance, Almond, and Rock Springs Formations, Rock Springs uplift, Sweetwater County, Wyo.*

[---, no data]

(These samples are from localities outside the Bitter Creek NW quadrangle)

Coal bed or mine	Proximate analyses (in percent), as received: Moisture	Volatile matter	Fixed carbon	Ash	Sulfur	Heating value (Btu/lb)
Lance Formation						
Hall bed[1]	20.8	---	---	4.6	1.08	9,900
Maxwell bed[1]	21.0	---	---	6.0	.84	9,670
Black Butte bed[1]	20.7	---	---	5.0	.61	9,650
Gibralter bed[1]	20.6	---	---	4.7	.53	9,900
Collective average[2]	20.8	---	---	5.5	0.77	9,780
Collective average[2]	17.5	29.8	48.6	4.1	.4	10,110
Almond Formation						
Point of Rocks mine[3]	17.9	29.5	49.3	3.3	0.5	10,220
Point of Rocks mine[3]	16.6	30.2	44.0	9.2	.7	9,410
Average analyses[4]	16.4	31.0	47.7	5.0	.6	9,727
Lebar[1]	17.5	---	---	7.6	.57	10,000
Rock Springs Formation						
B mine, Superior[3]	11.8	37.0	47.8	3.4	1.0	12,000
C mine, Superior[3]	13.1	35.8	47.7	3.4	1.0	11,620
Range of analyses[5]	5.0–17.0	33.8–40.3	43.9–52.6	2.2–6.69	0.6–1.1	10,480–13,110

[1]Black Buttes area, east of Rock Springs (Glass, 1976).
[2]Collective average of analyses of coal samples from the Hall, Maxwell, Black Butte, Gibralter, and Overland coal beds, east flank of the Rock Springs uplift (Glass, 1976).
[3]C. E. Dobbin (unpublished data, 1944).
[4]Average of analyses of undifferentiated coal beds in the Almond Formation, Black Buttes area (Glass, 1976).
[5]Range of analyses of samples collected from beds 1, 3, 7, and 11 near Rock Springs (Nielsen, 1976, p. 455–457).

Table 3.—*Wells drilled for oil and gas, Bitter Creek NW quadrangle, Sweetwater County, Wyo.*

Number on geologic map	Company and well name	Location	Drilling completed	Surface elevation (ft)	Total depth (ft)	Lowest formation reached	Well status and remarks
T. 19 N., R. 100 W.							
1	Chandler and Simpson Govt-Rowland 1	NE1/4NE1/4 sec. 2	Jan. 1962	7,023	3,061	Ericson Sandstone	Abandoned (May 1976) gas well. Gas from Almond Formation.
2	Chandler and Simpson Govt-Rowland 2	Center of NW1/4NE1/4 sec.2	Aug. 1962	6,980	2,675	------do------	Dry and abandoned.
3	Chandler and Associates, Inc. Rowland-Federal 8-2	SE1/4NE1/4 sec. 2	May 1976	7,018	2,923	------do------	Do.
4	Union Pacific Railroad 44-9-DUPRR	SE1/4SE1/4 sec. 9	Dec. 1962	6,753	1,884	------do------	Do.
5	Candler and Associates, Inc. Rowland-Federal 1-10	NE1/4NE1/4 sec. 10	March 1975	6,848	2,352	------do------	Abandoned (Oct. 1976) gas well. Gas from Almond Formation.
6	Texaco, Inc. Govt-Mesaverde NCT-1 Well #1	Center of SW1/4SW1/4 sec. 10	Feb. 1963	6,713	1,837	------do------	Dry and abandoned.
7	Exploration Drilling Govt-Gilbert 1	SE1/4NE1/4 sec. 14	March 1960	6,834	2,566	------do------	Do.
8	Union Pacific Railroad 11-15-A UPRR	NW1/4NW1/4 sec. 15	Sept. 1963	6,680	1,633	------do------	Do.
9	Chandler and Simpson Husky-State 1	NE1/4NE1/4 sec. 16	Sept. 1962	6,671	5,135	Blair Formation	Producing oil from the Almond Formation.
10	Chandler and Simpson Husky-State 2	SE1/4NE1/4 sec. 16	Feb. 1963	6,663	1,551	Ericson Sandstone	Do.
T. 20 N., R. 100 W.							
11	Chandler and Associates, Inc. Monsanto-Govt 1	SE1/4SE1/4 sec. 2	May 1966	6,899	3,256	Ericson Sandstone	Dry and abandoned.
25	Chandler and Simpson Winegardner-Govt 1	SW1/4NE1/4 sec. 12	April 1961	6,811	3,300	------do------	Producing gas from the Almond Formation.
28	Chandler and Simpson and Monsanto Burg-Govt-A-1	SW1/4NE1/4 sec. 14	March 1963	6,740	2,712	------do------	Dry and abandoned.
33	True Oil Co. True-Bluewater-Husky Federal 11-18	NW1/4NW1/4 sec. 18	Dec. 1973	6,691	9,542	Morrison Formation	Do.
34	True Oil Co. Shanahan-Federal 14-20	SW1/4SW1/4 sec. 20	Dec. 1972	6,620	9,428	------do------	Do.
35	El Paso Natural Gas Co. WDH-1-1	SW1/4SW1/4 sec. 21	July 1959	6,605	1,520	Ericson Sandstone	Abandoned. No additional information.
36	Lion Oil Co. and Monsanto Towne 1	NW1/4NW1/4 sec. 22	July 1960	6,703	6,052	Baxter Shale	Dry and abandoned.
45	Union Pacific Railroad 47-27-UPRR	SE1/4SE1/4 sec. 27	Sept. 1963	6,802	2,250	Ericson Sandstone	Do.
46	Chandler and Simpson Burg-Govt 1	SW1/4SW1/4 sec. 30	Dec. 1962	6,540	4,550	Baxter Shale	Do.
47	Forest Oil Co. FOC Shiprock #31-1	Center of SW1/4 sec. 31	July 1977	6,620	8,324	Mowry Shale	Do.
52	Chandler and Simpson State-C-1	NW1/4SW1/4 sec. 36	Sept. 1961	6,973	2,700	Ericson Sandstone	Dry and abandoned.
53	Chandler and Simpson State-C-2	SE1/4SW1/4 sec. 36	July 1962	7,068	3,077	------do------	Do.
T. 20 N., R. 101 W.							
55	Chandler and Simpson Govt-Stroock 1	NE1/4SW1/4 sec. 24	Jan. 1962	6,704	4,011	Blair Formation	Dry and abandoned.
56	Union Pacific Railroad 44-25 UPRR	SE1/4SE1/4 sec. 25	Sept. 1963	6,539	3,466	------do------	Producing gas from the Blair Formation.
57	Prenalta Corp. State 41-36-20 101	NE1/4NE1/4 sec. 36	Sept. 1970	6,593	3,462	------do------	Do.
58	Chandler and Simpson Harris-State 1	NW1/4SE1/4 sec. 36	March 1963	6,618	4,070	Baxter Shale	Dry and abandoned.
59	Prenalta Corp. State 11-36-20101	Center of NW1/4 sec. 36	Dec. 1977	6,567	8,590	Morrison Formation	Producing gas from the Blair Formation.
T. 21 N., R. 99 W.							
60	Chapman and Poland Govt 1	SW1/4SE1/4 sec. 32	Oct. 1966	6,980	3,223	Almond Formation	Dry and abandoned.
T. 21 N., R. 100 W.							
62	Chandler and Simpson State-A-1	SW1/4SE1/4 sec. 36	Aug. 1961	7,059	3,142	Ericson Sandstone	Dry and abandoned.

Table 4.—*Fossils collected from the Almond Formation in the Bitter Creek NW quadrangle*

[Collected by J. R. Gill, 1967]

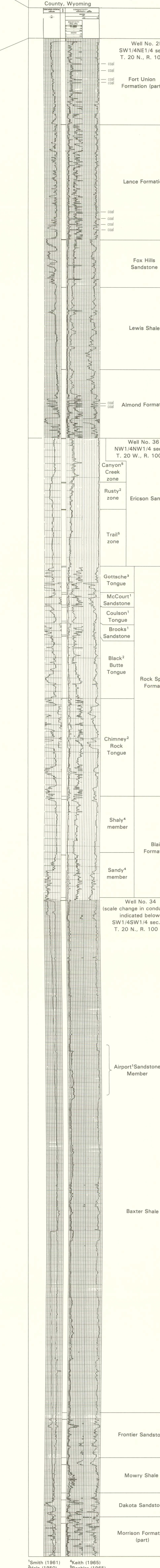
USGS Mesozoic locality	Field No.	Geographic locaion and stratigraphic position	Fossils	Identification credits
D6409	G67-201	NE1/4SW1/4 sec. 24, T. 20 N., R. 101 W. Top of highest sandstone	*Crassostrea glabra* (Meek and Hayden)	W. A. Cobban
D6407	G67-200	Same locality as D6409; from three levels in the highest sandstone.	*Inoceramus* cf. *I. typicus* Whitfield *Crassostrea glabra* (Meek and Hayden) *Anomia* sp. *Crenella* sp. *Cymbophora* cf. *C. alta* (Meek and Hayden)	W. A. Cobban
D6414	G67-206	NW1/4 sec. 25, T. 20 N. R. 101 W. More than 400 ft above base, near top.	*Inoceramus* sp. *Cymbophora* aff. *C. formosa* (Meek and Hayden)	W. A. Cobban
D6413	G67-205	Same locality as D6414. About 400 ft above base.	*Glycymeris* sp. *Inoceramus* cf. *I. typicus* Whitfield *Cymbophora* aff. *C. formosa* (Meek and Hayden) *Pachymelania wyomingensis* (Meek) Indeterminate snails	W. A. Cobban and N. Sohl
D6412	G67-204	Same locality as D6414. About 273 ft above base.	*Glycymeris* sp. *Cymbophora* aff. *C. formosa* (Meek and Hayden)	W. A. Cobban
D6411	C67-203	Same locality as D6414. About 200 ft above base.	*Nuculana* sp. *Crassostrea* sp. *Ethmocardium* sp. *Tellina* sp. *Senis*? sp. *Cymbophora* sp. *Pachymelania wyomingensis* (Meek) *Banis* cf. *B. siniformis* Stephenson *Buccinidae*, new genus and species *Cryptorphytis* n. sp. *Eoacteon*? sp. *Dimorphotychia* n. sp. *Holospira* cf. *H. dyeri* Tozer	W. A. Cobban and N. Sohl

CONVERSION FACTORS FOR METRIC EQUIVALENTS

To convert ENGLISH UNIT	Multiply by	To obtain METRIC UNIT
Mile	1.609	Kilometer
Foot	.3048	Meter
inch	2.54	Centimeter

COMPOSITE GEOPHYSICAL LOG

Composite geophysical log of three wells showing spontaneous-potential, resisivity, and conductivity curves, Bitter Creek NW quadrangle, Sweetwater County, Wyoming



[1]Smith (1961)
[2]Hale (1950)
[3]Smith (1965)
[4]Keith (1965)
[5]Roehler (1965)

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