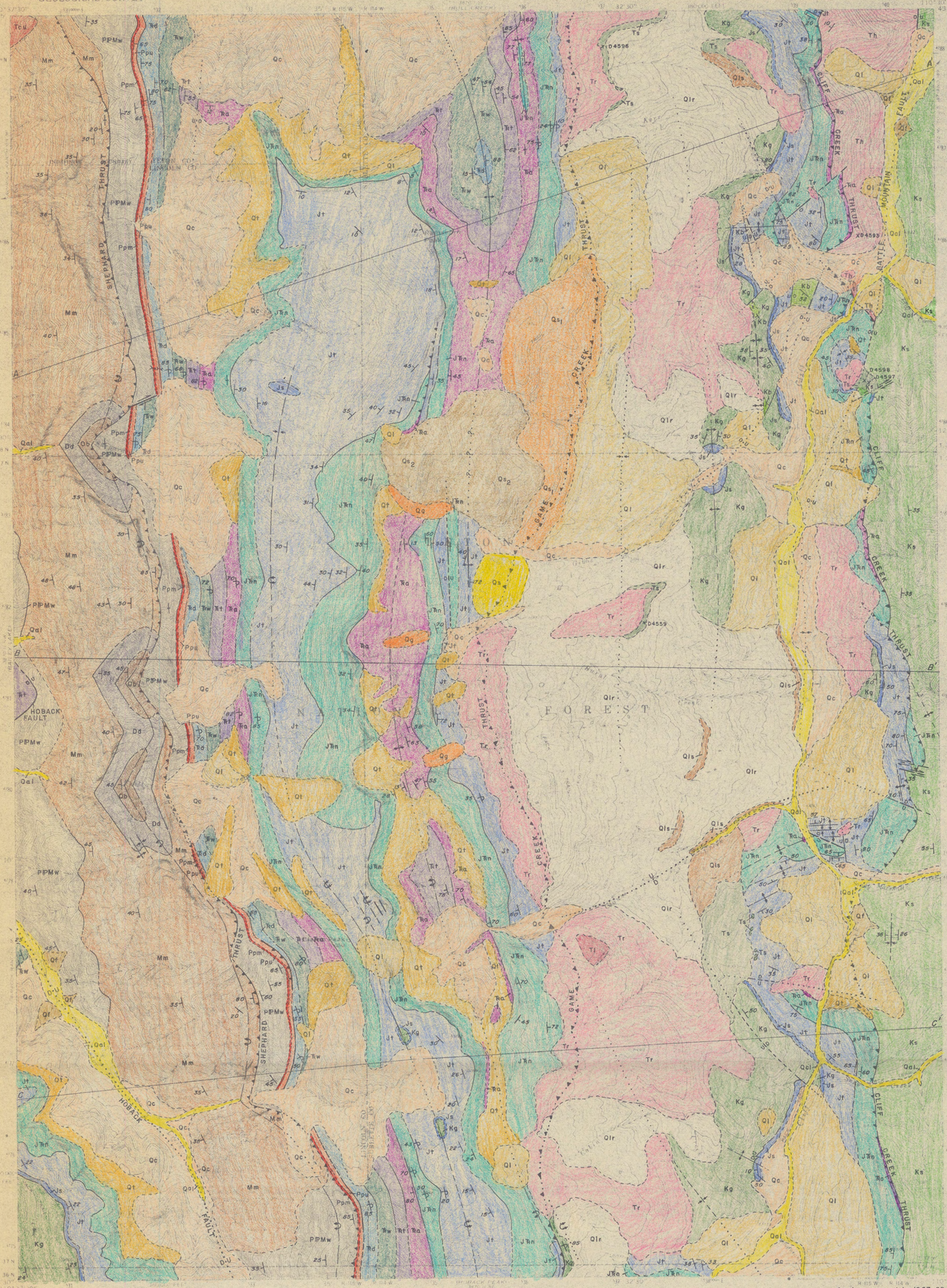
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CLAUSE PEAK QUADRANGLE
WYOMING
7.5 MINUTE SERIES (TOPOGRAPHIC)



Base by U.S. Geological Survey, 1965

SCALE 1:24000

Geology mapped in 1967-69

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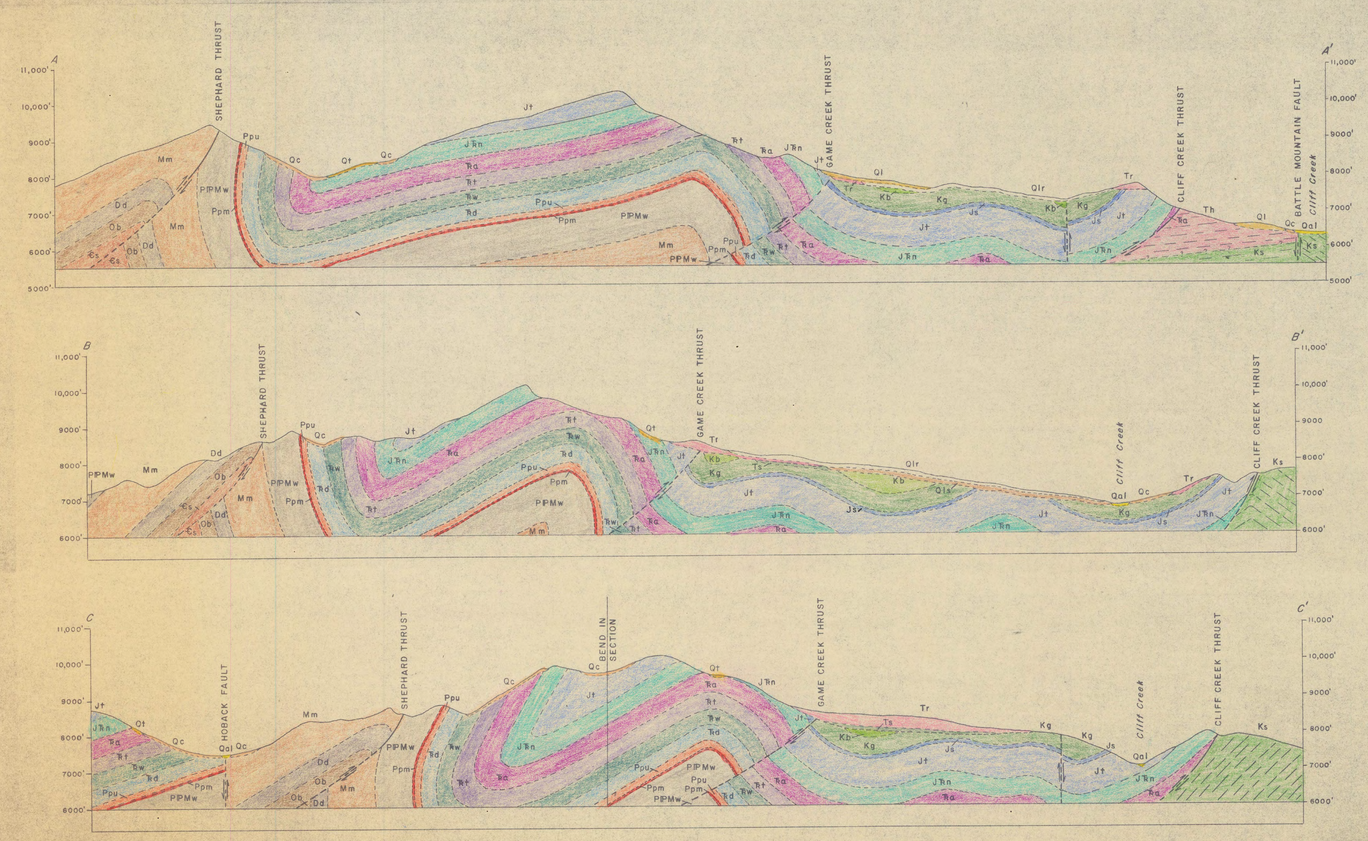
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

PRELIMINARY
GEOLOGIC MAP OF THE CLAUSE PEAK QUADRANGLE, LINCOLN, SUBLETTE, AND TETON COUNTIES, WYOMING

By
Marvin L. Schroeder

1971



EXPLANATION

QUATERNARY — Holocene — Order does not reflect relative age

- **Qal** — Alluvium
  Valley and stream deposits of unconsolidated silt, sand, and gravel
- **Qc** — Colluvium
  Mainly slope wash but also includes poorly sorted, unconsolidated weathered material derived from underlying formations
- **Qf** — Alluvial-fan deposits
  Locally derived silt, sand, and gravel deposits at mouths of ravines and canyon areas
- **Qt** — Talus
  Locally derived coarse angular rock fragments deposited on steep slopes or beneath cliffs
- **Qs, Qs1, Qs2** — Slump blocks
  Slump blocks of Nugget Sandstone and Twin Creek Limestone on east side of Hoback Range north of Gibbs Creek; sequence of slump blocks indicated by number
- **Ql, Qlr, Qls** — Landslide deposits
  Ql, mostly composite slumps and earthflows derived from pre-Tertiary rocks
  Qlr, source of landslides recognizable as Tertiary red beds (Tr)
  Qls, source of landslides recognizable as Tertiary shale and sandstone (Ts)

QUATERNARY — Pleistocene

- **Qg** — Glacial deposits
  Several small morainal deposits of Pinedale and younger age

TERTIARY — Lower Pliocene

- **Tcu** — Camp Davis Formation
  Calcareous red conglomerate (upper part of unit) exposed in northwest corner of quadrangle; entire formation 3,200+ feet thick where exposed 6 miles north in the Horse Creek area
- **Tl, Tr** — Red beds
  Red conglomeratic shaly mudstone that contains thick conglomeratic lenses and stream-channel conglomerates; westernmost peripheral facies between Clause and Gibbs Creeks contains mainly angular Nugget fragments in a red silty matrix; unconformably overlies the shale and sandstone (Ts); 400+ feet thick
  Tl, prominent lens of thick-bedded well-cemented pisolitic limestone in the Clause Creek area
- **Ts** — Shale and sandstone
  Poorly exposed olive-green to gray shale and fine-grained angular calcareous buff-weathering quartz sandstone that contains a few lenses of fine-grained brown gastropod-bearing limestone and coaly shale; vegetative matter common; pollen grains identified by R. H. Tschudy (written commun., 1971) indicate a late Paleocene or early Eocene age; 100+ feet thick

TERTIARY — Paleocene and Eocene

- **Th** — Hoback Formation
  Interbedded hard fine-grained well-sorted calcareous cross-bedded buff-weathering sandstone and greenish-gray to gray siltstone and shale; pollen grains identified by R. H. Tschudy (written commun., 1971) indicate only middle Paleocene beds present in quadrangle; 1,000+ feet thick

CRETACEOUS — Upper Cretaceous

- **Ks** — Sedimentary rocks, undivided
  Predominantly fine-grained crossbedded "salt and pepper" friable sandstone and greenish-gray siltstone and shale that contains a few carbonaceous and coaly shale beds; pollen grains identified by R. H. Tschudy (written commun., 1969, 1970) indicate a Late Cretaceous age; 3,000+ feet thick, total thickness not present in quadrangle

CRETACEOUS — Lower Cretaceous

- **Kb** — Bear River Formation
  Dark-gray to olive-green shale interbedded with carbonaceous shale and greenish-gray fine-grained calcareous sandstone; upper part not exposed; 100+ feet thick
- **Kg** — Gannett Group
  Predominantly hematitic- to purplish-red shale and siltstone; contains a few brownish-gray sandstone and quartzite beds; light-gray fine-grained white-weathering limestone in upper part, possibly correlative with Draney Limestone, Bechler Formation, and Peterson Limestone; base is a massive coarse-grained sandstone; about 500 feet thick

JURASSIC — Upper Jurassic

- **Js** — Stump and Preuss Sandstones
  Stump Sandstone, at top, glauconitic greenish- to brownish-gray fine- to medium-grained calcareous sandstone; upper 10 feet, massive oolitic medium-brown very fine grained limestone that is slightly arenaceous and glauconitic; about 100 feet thick. Preuss Sandstone, at base, nonresistant hematitic-red shaly sandstone and siltstone; 20-70 feet thick

JURASSIC — Middle and Upper Jurassic

- **Jt** — Twin Creek Limestone
  Mainly light-gray shaly limestone that contains oyster beds in upper part; shaly limestone beds characteristically fracture into pencil-shaped fragments on long exposed slopes; basal red unit possibly correlative with Gypsum Spring Member of central Wyoming; 700-800 feet thick, but may be tectonically thinned in eastern part of quadrangle

TRIASSIC(?) AND JURASSIC(?)

- **JTrn** — Nugget Sandstone
  Light-tan to reddish-orange very fine grained ridge-forming quartz sandstone; 500-600 feet thick

TRIASSIC — Lower and Upper Triassic

- **Ra** — Ankareh Shale
  Hematitic-red to reddish-purple calcareous siltstone and shale and scattered interbeds of gray and pinkish-gray aphanitic limestone; about 500 feet thick
- **Rt** — Thaynes Formation
  In western part of quadrangle, mainly light-brownish-gray siltstone that contains 148 feet of hematitic-red siltstone in lower part; top and basal units are fine-grained limestone that contains interbeds of siltstone and pods, laminae, and stringers of gypsum. In eastern part of quadrangle, mainly a red siltstone that contains interbeds of greenish-gray siltstone and gypsiferous limestone at top and base; 400-450 feet thick
- **Rw** — Woodside Formation
  Reddish-brown shale, siltstone, and fine-grained sandstone; commonly poorly exposed; about 400 feet thick
- **Rd** — Dinwoody Formation
  Mainly brownish-gray to light-brown shale and siltstone with interbeds of bluish-gray silty limestone; 400-500 feet thick

TRIASSIC — Lower Triassic

PERMIAN — Phosphoria Formation and equivalent units

- **Ppu, Ppm** — Phosphoria Formation and equivalent units
  Ppu, upper part, includes: Retort Phosphatic Shale Member of the Phosphoria Formation, mainly dark-brownish-gray mudstone, shale, and siltstone and minor beds of phosphorite; Franson Member of the Park City Formation, light-gray aphanitic dolomite; Shedhorn Sandstone, brownish-gray fine-grained quartz sandstone. About 122 feet thick
  Ppm, Meade Peak Phosphatic Shale Member of Phosphoria Formation; nonresistant thin-bedded dark unit of phosphorite, mudstone, and carbonate rock; about 54 feet thick

PENNSYLVANIAN — Wells Formation and associated rocks

- **PPMw** — Wells Formation and associated rocks
  Upper part, light-gray to buff well-sorted quartzitic sandstone and minor interbeds of limestone and dolomite; forms conspicuous cliffs and coarse talus; uppermost 10-20 feet is white aphanitic dolomite, in part correlative with Lower Permian Grandeur Member of Park City Formation. Lower part, thin-bedded gray limestone and cherty dolomite underlain by red shale, siltstone, and pink quartzitic sandstone, in part correlative to the Amsden Formation. Total thickness 800-1,000 feet

MISSISSIPPIAN — Lower and Upper Mississippian — Madison Group

- **Mm** — Mission Canyon and Lodgepole Limestones
  Mission Canyon Limestone, at top, massive light- to dark-gray cherty bioclastic partly dolomitic limestone. Lodgepole Limestone, at base, thin-bedded dark-gray fine-grained fossiliferous limestone. Total thickness 1,300+ feet

DEVONIAN — Middle and Upper Devonian

- **Dd** — Darby Formation
  Upper part, nonresistant yellowish-brown thin-bedded dolomitic siltstone; lower part, interbedded dark-gray limestone and brownish-gray to dark-brown fine- to medium-grained dolomite; 400-500 feet thick

ORDOVICIAN — Upper Ordovician

- **Ob** — Bighorn Dolomite
  White to light-gray fine- to medium-grained massive slightly calcareous cliff-forming dolomite; light-gray mottling common; 400+ feet thick

CAMBRIAN

- **Cs** — Sedimentary rocks, undifferentiated
  Shown in cross section only

Contact
Dashed where approximately located; short dashed where inferred

Fault
Dashed where approximately located; short dashed where inferred; dotted where concealed. U, upthrown side; D, downthrown side. Arrows show relative horizontal displacement

Thrust fault
Dashed where approximately located; short dashed where inferred; dotted where concealed; queried where doubtful. Sawteeth on upper plate

Anticline
Showing trace of axial plane. Dashed where approximately located; short dashed where inferred; dotted where concealed; queried where doubtful

Overturned anticline
Showing trace of axial plane. Dashed where approximately located; short dashed where inferred; dotted where concealed

Syncline
Showing trace of axial plane. Dashed where approximately located; short dashed where inferred; dotted where concealed

Overturned syncline
Showing trace of axial plane. Dashed where approximately located; short dashed where inferred; dotted where concealed

60
Strike and dip of beds

70
Strike and dip of overturned beds

Strike of vertical beds

Phosphate trench

x D4559
Fossil locality, pollen and spores
U.S. Geological Survey locality number (Denver catalogue)

ECONOMIC GEOLOGY

The Clause Peak quadrangle was mapped as part of the U.S. Geological Survey program of classifying and evaluating mineral lands in the public domain. Previous mapping by Ross and St. John (1960) and Froidevaux (1968) covers the western and the southern parts of the map area, respectively. Resources of economic interest in the quadrangle are phosphate, sand and gravel, limestone, riprap, and water.

Phosphate rock is the major mineral resource in the quadrangle. An estimated 60 million tons of phosphate rock that exceeds 18 percent P_2O_5 is present above entry level. Most of the phosphate-bearing rocks are in the Meade Peak Phosphatic Shale Member of the Phosphoria Formation. Phosphate rock also occurs in the Retort Phosphatic Shale Member of the Phosphoria, but it is generally much lower in average P_2O_5 content than the Meade Peak. The Meade Peak was described and sampled on a ridge 2 miles southwest of Ramshorn Peak (CP-58); the analyses are given in table 1. The Meade Peak in trench CP-58 contains an upper unit 5.3 feet thick that averages 26.6 percent P_2O_5 and a lower unit 9.7 feet thick that averages 23.5 percent P_2O_5. Phosphate rock has not been mined in the Clause Peak quadrangle because of higher grade deposits in other areas.

Sand and gravel in the alluvium in the eastern part of the quadrangle are easily accessible from a blacktopped road along Cliff Creek. Small amounts obtained about half a mile north of the junction of Cliff and Clause Creeks have been used locally as road metal. Relatively pure limestone is in the Mission Canyon Limestone in the western part of the quadrangle, but this area is generally inaccessible. Limestone is available from the Twin Creek Limestone in several places along the Cliff Creek road, but it is generally considered impure because it is very shaly. Rock suitable for riprap is present in resistant parts of the Bighorn Dolomite, Mission and Lodgepole Limestones, Wells Formation and associated rocks, and Nugget Sandstone, but only rock from the Nugget along the Cliff Creek road is accessible. Water for local use is available from Cliff Creek in the eastern part of the quadrangle; some water is available from Hunter Creek in the southwestern part and from streams in the mountainous areas in the central part.

Although no oil and gas have been discovered in or adjacent to this quadrangle, the area should be considered for future exploration because of the favorable structural conditions and the thick sedimentary sequence.

REFERENCES CITED

Froidevaux, C. M., 1968, Geology of the Hoback Peak area in the overthrust belt, Lincoln and Sublette Counties, Wyoming: Wyoming Univ. master's thesis, 126 p., and appendix, 26 p.

Ross, A. R., and St. John, J. W., 1960, Geology of the Northern Wyoming Range, Wyoming, in Wyoming Geol. Assoc. Guidebook 15th Ann. Field Conf., Overthrust belt of southwestern Wyoming and adjacent areas, 1960: p. 44-56.

TABLE 1.--CHEMICAL ANALYSES OF THE RETORT AND MEADE PEAK PHOSPHATIC SHALE MEMBERS OF THE PHOSPHORIA FORMATION IN THE CLAUSE PEAK QUADRANGLE

[Ramshorn Peak trench (USGS Lot No. CP-58), center sec. 35, unsurveyed, T. 38 N., R. 115 W., on ridge west of Ramshorn Peak. Measured and sampled in 1968 by D. A. Jobin and M. L. Schroeder; analyses by K. P. Moore.]

Rock description	Thickness (ft)	Analyses P_2O_5	Analyses V_2O_5	Analyses Cr_2O_3	Acid insoluble (percent)
Retort Member (top).					
Mudstone, silty, phosphatic	8.0	9.24			67.11
Mudstone, silty, siliceous, phosphatic	2.0	8.60			68.72
Mudstone, shaly, phosphatic	1.0	7.78			36.95
Limestone, silty, phosphatic	1.5	7.71			43.54
Mudstone, shaly, phosphatic	20.0	4.14	0.04	0.01	57.83
Mudstone, silty, phosphatic	3.0	4.69	0.04	0.10	62.49
Mudstone, shaly, phosphatic	3.0	5.33	0.07	0.18	64.53
Phosphorite, siliceous	0.2	20.78			29.75
Siltstone, shaly, phosphatic	2.2	4.20			65.00
Siltstone, dolomitic, phosphatic	3.0	10.11			65.35
Total	43.9				
Meade Peak Member (top).					
Phosphorite, siliceous	2.3	30.63			10.33
Dolomite	0.5	2.00			30.19
Phosphorite	0.5	31.30			6.97
Dolomite, phosphatic	0.5	3.57			38.38
Phosphorite, shaly	1.2	34.96			2.53
Phosphorite	0.3	34.88			3.55
Dolomite	0.3	1.08			10.15
Phosphorite, shaly	0.6	16.49			13.63
Limestone	0.4	0.02			51.86
Mudstone, silty	1.0	2.04	0.50	0.14	65.69
Limestone	1.8	0.01			64.51
Phosphorite	0.4	27.26			14.36
Limestone	0.6	1.51			84.03
Phosphorite	0.3	26.57			13.63
Limestone, silty	7.0	0.14			75.82
Phosphorite	1.5	28.32			9.32
Carbonate rock	1.4	0.14			25.83
Phosphorite, shaly	0.3	20.15			28.54
Mudstone	1.0	0.59			81.17
Phosphorite, shaly	1.0	18.88	0.11	0.37	28.50
Carbonate rock	1.1	1.13			19.78
Phosphorite, shaly	0.8	12.90	0.17	0.21	45.34
Mudstone, phosphatic	0.4	6.56	0.04	0.03	16.57
Phosphorite	0.3	31.00			2.94
Shale, phosphatic	1.0	11.64	0.11	0.30	39.34
Phosphorite, shaly	1.8	18.51	0.17	0.34	21.99
Mudstone, shaly, phosphatic	1.8	4.34	0.03	0.03	3.54
Shale, phosphatic	4.5	11.23	0.34	0.33	37.60
Mudstone, phosphatic	1.0	8.32	0.38	0.22	54.10
Phosphorite	0.2	25.43	0.30	0.16	16.18
Carbonate rock	0.8	0.74			23.34
Shale, phosphatic	1.0	9.52			51.51
Carbonate rock	1.6	0.43			20.71
Mudstone	1.4	0.66			41.97
Shale, phosphatic	4.0	6.46			45.05
Phosphorite, argillaceous	5.5	28.28			4.39
Phosphorite	0.9	17.31			8.99
Mudstone, siliceous	1.8	1.81			20.71
Phosphorite, cherty	1.5	35.61			1.27
Total	54.0				

TABLE 2.--POLLEN AND SPORES FROM THE TERTIARY SHALE AND SANDSTONE

[Identified by R. H. Tschudy, U.S. Geological Survey]

	Late Paleocene or early Eocene	Late Paleocene		
	D4559	D4596	D4597	D4598
Maceopolipollenites	X	X	X	
Inaperturopollenites	X	X		
Pa_3-rug2 (Ulmipollenites)	X	X	X	
Pa_4-rug (Ulmipollenites)	X		X	X
Abietineaepollenites	X	X	X	X
Carya, large	X	X	X	X
BCP_3-r11B	X	X	X	X
Pa_5-sm 1 (Alnus)	X		X	
Pistillipollenites			X	X
P_3-sm1C	X			
C_3-r10	X			
Poo-sm (Juglanspollenites)	X			X
BCP_3-rt (Tilia)	X			
Ephedra (modern type)				X
Pa_3-sm11		X	X	
Pa_4-sm1 Alnus			X	X
Carya, small		X	X	
C_3-rt18		X		
Classopollis		X		
Pperi-sm			X	
Pandaniidites			X	

This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards or nomenclature.

Wyoming (Clause Peak quad.). geol. 1:24,000. 1971.
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