GEOLOGICAL SURVEY CIRCULAR 307

STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING

1949–50

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UNITED STATES DEPARTMENT OF THE INTERIOR
Douglas McKay, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

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By R. P. Sheldon, R. G. Waring, M. A. Warner, and R. A. Smart

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Washington, D. C., 1953

Free on application to the Geological Survey, Washington 25, D. C.

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INTRODUCTION

As part of a comprehensive investigation of the phosphate deposits of the western field begun in 1947, the U. S. Geological Survey has measured and sampled the Phosphoria formation of Permian age at many localities in Wyoming and adjacent states. These data will not be fully synthesized for many years, but segments of the data, accompanied by little or no interpretation, are published as preliminary reports as they are assembled. This report, which contains abstracts of the sections measured in western Wyoming (fig. 1) in 1949-50, is the second Wyoming report of this series. The field and laboratory procedures adopted in these investigations are described rather fully in a previous report (McKelvey and others, 1953a).

Many people have taken part in this investigation. The program of which this work is a part was organized by V. E. McKelvey and most of the field program was supervised by R. W. Swanson. F. J. Anderson, D. F. Davidson, A. M. Gutstadt, J. W. Hill, H. W. Peirce, W. R. Record, and M. E. Thompson, participated in the description of strata and the collection of samples referred to in this report. T. K. Rigby assisted in the preparation of exposures and the crushing and splitting of samples in the field. The laboratory preparation of samples for chemical analysis was done in Denver, Colo., under the direction of W. P. Huleatt.

The P_2O_5 and acid-insoluble analyses were made for the Survey by the U. S. Bureau of Mines at the Northwest Electrodevelopment Laboratory, Albany, Oreg., under the direction of S. M. Shelton and M. L. Wright. The Al_2O_3, Fe_2O_3, and loss-on-ignition analyses were made in the Trace Elements Section laboratory of the Survey in Washington, D. C., under the direction of J. C. Rabbitt, by chemists A. Caemmerer, G. Dudley, and N. Guttag.

Compilation of the data has been largely by K. S. Bergman under the supervision of R. W. Swanson. Organization of the tabular data has been largely by Anita Wise.

ACKNOWLEDGMENTS

Special thanks are due J. D. Love, W. W. Rubey, and J. Steele Williams, who contributed much in the way of advice and suggestions in planning and organization of the field program. The cost of both the field and laboratory investigations has been borne partly by the Division of Raw Materials of the Atomic Energy Commission.

It is a pleasure to acknowledge the fine cooperation extended to the field parties by the local residents, property owners, and phosphate companies, who furnished information and services and gave access to property.

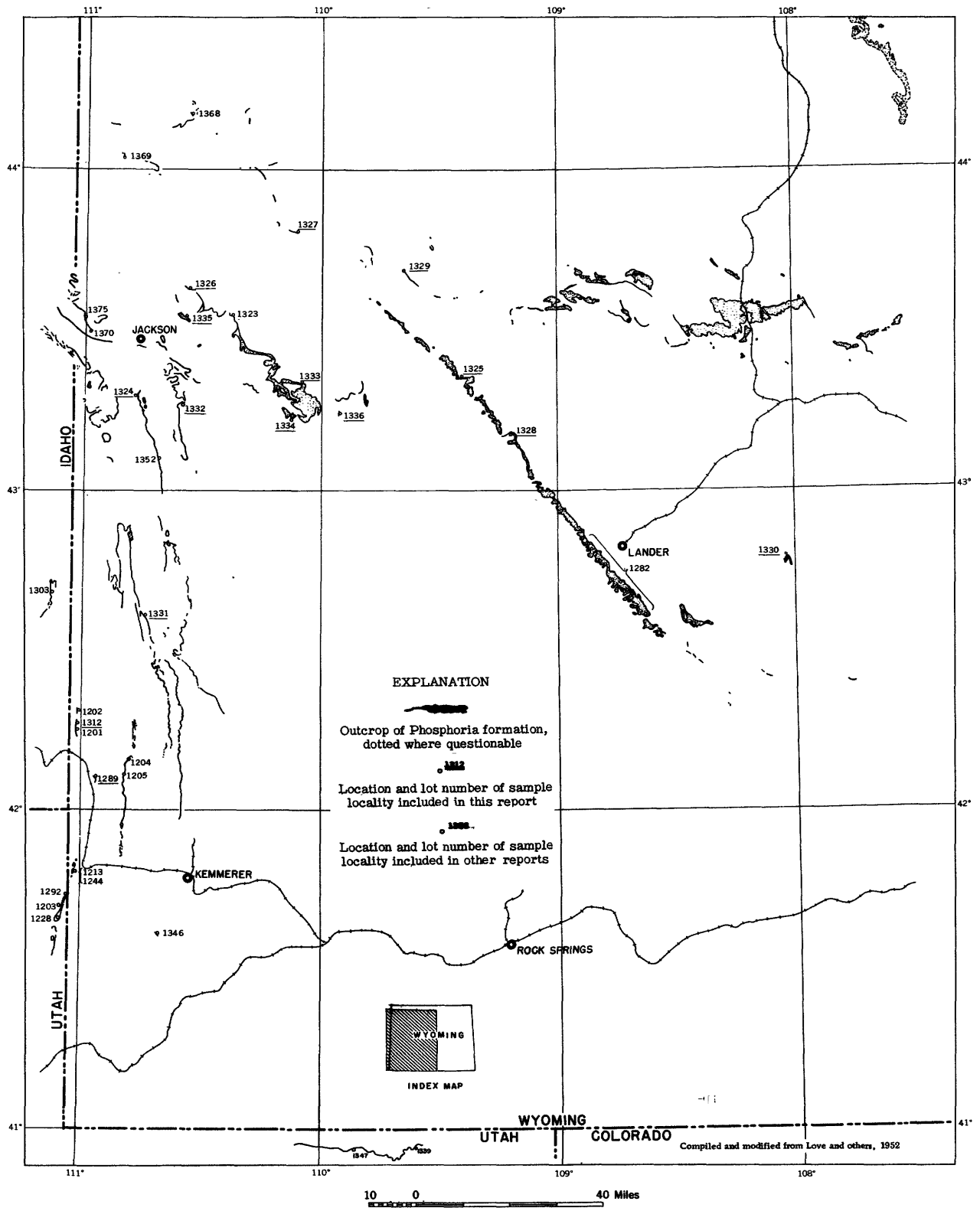

Figure 1.—Outcrops of the Phosphoria formation in Wyoming and localities sampled.

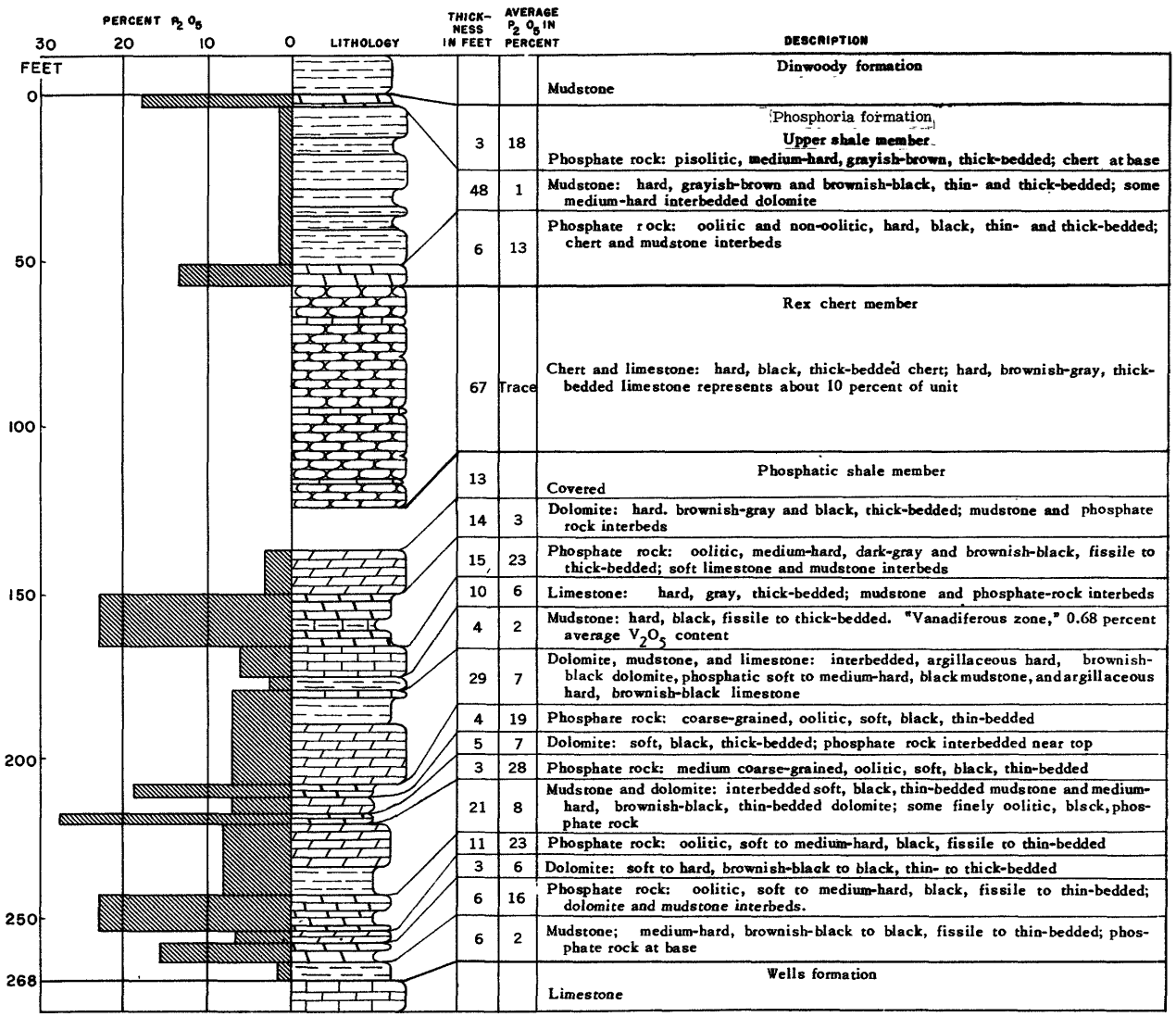

Figure 2.—Generalized section of the Phosphoria formation at Coal Canyon, Wyoming, lot no. 1201.

STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN WESTERN WYOMING

The Phosphoria formation is about 200 feet thick in northwestern Wyoming and has been divided into five members. They have been tentatively correlated with the five members in Montana that have been provisionally designated A, B, C, D, and E from oldest to youngest (Klepper and others in McKelvey, 1949). Member A, overlying the Tensleep sandstone of Pennsylvanian age, consists of cherty carbonate and detrital rocks; it may be equivalent to the upper part of the Wells formation in Idaho. Members B, C, and D, composed respectively of phosphatic-cherty and phosphatic rocks, are equivalent to the phosphatic shale, Rex chert, and upper shale members of the Phosphoria in Idaho (Sheldon in Swanson and others, 1953). Member E, not yet recognized in southeastern Idaho, consists of chert, sandstone, and carbonate rock and is overlain by the Dinwoody formation of Triassic age.

The Phosphoria formation in southwestern Wyoming (fig. 2) consists of a lower phosphatic shale member, 95-145 feet in thickness; overlain by the Rex chert member, cherty limestone 65-145 feet in thickness; and capped by an upper shale member, 15 to 60 feet in thickness. It overlies the Wells formation of Pennsylvanian age and underlies the Dinwoody formation of Triassic age. Although the Wells formation consists largely of quartzose sandstone, calcareous in part, the upper 25 feet or more is dark-gray limestone. It is equivalent to the upper member of the Wells formation in Idaho and may be the correlative of the lowermost member (A member) of the Phosphoria formation in northwestern Wyoming and Montana and the lower limestone member of the Park City formation in Utah (McKelvey, 1949). The Dinwoody formation consists of limestone, calcareous siltstone, and sandstone.

The correlation of individual beds of the phosphatic shale members with those in adjacent parts of Idaho, Montana, and Utah will be considered more fully in a later publication. Most of the phosphatic layers are in the phosphatic shale member of the Phosphoria formation in southwestern Wyoming and in the B member in northwestern Wyoming. The upper shale member in southwestern Wyoming and its correlative the D member in northwestern Wyoming contain thin layers of phosphatic chert and locally significant phosphatic layers.

STRATIGRAPHIC SECTIONS

Analytical data and abstracts of stratigraphic sections measured at 15 localities follow. Their locations, as well as the locations of those reported previously (McKelvey and others, 1953b) and of others to be reported later are shown in figure 1.

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Togwotee, Wyo., lot 1327

Phosphoria formation measured and sampled at natural exposure by a tributary to Black Rock Creek 2 miles west of Togwotee Lodge on U. S. Highway No. 189, sec. 2, T. 44 N., R. 111 W., Teton County, Wyo., on the south limb of an anticline overturned to the south. Beds strike N. 80° W. and dip 75° N. Section measured and sampled by H. W. Peirce, R. G. Waring, and M. A. Warner in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
	Phosphoria formation—top not exposed					
P-32	Sandstone, carbonatic	--	43.8	--	--	43.8
P-31	Chert, argillaceous, sandy	--	11.5	--	--	55.3
P-30	Sandstone, carbonatic, cherty	--	5.0	--	--	60.3
P-29	Chert	--	24.0	--	--	84.3
P-28	Chert	--	9.0	--	--	93.3
P-27	Sandstone, phosphatic	5148-RGW	1.4	12.5	62.1	94.7
P-26	Sandstone, phosphatic	5147-RGW	.9	12.2	61.6	95.6
P-25	Sandstone, carbonatic	--	6.0	--	--	101.6
P-24	Sandstone	--	1.1	--	--	102.7
P-23	Sandstone, carbonatic	--	4.0	--	--	106.7
P-22	Sandstone	--	1.6	--	--	108.3
P-21	Sandstone, carbonatic	--	.8	--	--	109.1
P-20	Sandstone	--	1.9	--	--	111.0
P-19	Chert	--	4.0	--	--	115.0
P-18	Sandstone, carbonatic	--	1.0	--	--	116.0
P-17	Carbonate rock, cherty	--	2.4	--	--	118.4
P-16	Chert	--	4.5	--	--	122.9
P-15	Mudstone, phosphatic	5146-MAW	.8	16.4	43.7	123.7
P-14	Carbonate rock	--	.7	--	--	124.4
P-13	Chert	--	7.1	--	--	131.5
P-12	Phosphate rock, sandy	5145-HWP	1.3	20.1	38.5	132.8
P-11	Phosphate rock, cherty	5144-HWP	1.2	15.5	28.9	134.0
P-10	Chert	--	2.4	--	--	136.4
P- 9	Carbonate rock	--	2.2	--	--	138.6
P- 8	Carbonate rock	--	3.4	--	--	142.0
P- 7	Mudstone, carbonatic	--	4.3	--	--	146.3
P- 6	Sandstone, carbonatic	--	.5	--	--	146.8
P- 5	Carbonate rock	--	.9	--	--	147.7
P- 4	Chert	--	6.2	--	--	153.9
P- 3	Chert	--	1.0	--	--	154.9

Togwotee—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
P- 2	Sandstone----------	--	1.0	--	--	155.9
P- 1	Sandstone----------	--	3.1	--	--	159.0
	Tensleep formation—top bed only					
T- 1	Sandstone----------	--	--	--	--	--

Burroughs Creek, Wyo., lot 1329

Phosphoria formation measured and sampled at a natural exposure near Burroughs Creek, NE¼ sec. 14, T. 43 N., R. 107 W., Fremont County, Wyo., on the north flank of an overturned anticline. Section measured and sampled by H. W. Peirce and J. W. Hill in July 1950, and R. A. Smart and T. M. Cheney in August 1951. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
	Phosphoria formation					
P-61	Carbonate rock, sandy	--	2.6	--	--	2.6
P-60	Carbonate rock, sandy; fos. col. no. 12200[1]	--	13.0	--	--	15.6
P-59	Sandstone, carbonatic	--	3.2	--	--	18.8
P-58	Carbonate rock	--	2.0	--	--	20.8
P-57	Carbonate rock, cherty; fos. col. no. 12199	--	8.0	--	--	28.8
P-56	Carbonate rock, cherty; fos. col. no. 12198	--	5.8	--	--	34.6
P-55	Carbonate rock, cherty; fos. col. no. 12197	--	10.0	--	--	44.6
P-54	Carbonate rock, phosphatic; fos. col. no. 12196	--	1.3	--	--	45.9
P-53	Carbonate rock; fos. col. no. 12196	--	.8	--	--	46.7
P-52	Chert, carbonatic; fos. col. no. 12196	--	.5	--	--	47.2
P-51	Carbonate rock	--	.7	--	--	47.9
P-50	Chert	--	.7	--	--	48.6
P-49	Carbonate rock	--	.6	--	--	49.2
P-48	Chert; fos. col. no. 12195	--	2.2	--	--	51.4
P-47	Chert, carbonatic; fos. col. no. 12195	--	2.0	--	--	53.4
P-46	Chert	--	.8	--	--	54.2
P-45	Sandstone, carbonatic, cherty	--	2.0	--	--	56.2
P-44	Phosphate rock, carbonatic, sandy	--	.4	--	--	56.6
P-43	Chert; fos. col. no. 12194	--	3.3	--	--	59.9
P-42	Carbonate rock, argillaceous; fos. col. no. 12194	--	1.0	--	--	60.9
P-41	Chert; fos. col. no. 12194	--	.7	--	--	61.6
P-40	Sandstone, phosphatic; fos. col. no. 12194	--	.4	--	--	62.0
P-39	Chert; fos. col. no. 12194	--	1.6	--	--	63.6
P-38	Chert, argillaceous, carbonatic; fos. col. no. 12193	--	4.4	--	--	68.0

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Burroughs Creek—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
P-37	Chert, argillaceous, carbonatic	--	4.0	--	--	72.0
P-36	Sandstone, carbonatic	--	4.0	--	--	76.0
P-35	Sandstone, cherty, carbonatic	--	6.0	--	--	82.0
P-34	Chert	--	5.2	--	--	87.2
P-33	Chert	--	5.6	--	--	92.8
P-32	Chert	--	4.7	--	--	97.5
P-31	Chert	--	4.8	--	--	102.3
P-30	Sandstone, phosphatic; fos. col. no. 12192	4970-JWH	1.1	9.0	67.6	103.4
P-29	Sandstone, carbonatic; fos. col. no. 12191	4969-JWH	5.5	3.5	65.0	108.9
P-28	Mudstone, sandy; fos. col. no. 12190	4868-JWH	1.1	3.1	66.0	110.0
P-27	Carbonate rock; fos. col. no. 12189	--	15.2	--	--	125.2
P-26	Carbonate rock, argillaceous; fos. col. no. 12188	--	4.9	--	--	130.1
P-25	Mudstone, carbonatic; fos. col. no. 12187	--	.2	--	--	130.3
P-24	Carbonate rock; fos. col. no. 12187	--	1.3	--	--	131.6
P-23	Mudstone, carbonatic; fos. col. no. 12187	--	.5	--	--	132.1
P-22	Carbonate rock; fos. col. no. 12186	--	2.5	--	--	134.6
P-21	Carbonate rock; fos. col. no. 12185	--	2.1	--	--	136.7
P-20	Mudstone, phosphatic	4967-JWH	1.1	13.5	37.4	137.8
P-19	Carbonate rock, cherty	--	3.2	--	--	141.0
P-18	Carbonate rock, cherty; fos. col. no. 12184	4966-JWH	1.7	6.1	33.7	142.7
P-17	Carbonate rock, cherty; fos. col. no. 12183	--	2.6	--	--	145.3
P-16	Carbonate rock; fos. col. no. 12182	--	4.9	--	--	150.2
P-15	Mudstone	--	1.1	--	--	151.3
P-14	Mudstone, cherty	--	6.7	--	--	158.0
P-13	Mudstone	--	1.2	--	--	159.2
P-12	Mudstone, cherty	--	2.5	--	--	161.7
P-11	Mudstone	--	2.2	--	--	163.9
P-10	Mudstone	--	3.3	--	--	167.2
P- 9	Carbonate rock	--	1.7	--	--	168.9
P- 8	Mudstone	--	7.9	--	--	176.8
P- 7	Mudstone, carbonatic	--	1.5	--	--	178.3
P- 6	Mudstone	--	3.8	--	--	182.1
P- 5	Sandstone, carbonatic	--	6.2	--	--	188.3
P- 4	Carbonate rock, sandy	--	2.4	--	--	190.7

P- 3	Sandstone, carbonatic ----------	--	3.3	--	--	194.0
P- 2	Chert ----------	--	.8	--	--	194.8
P- 1	Sandstone, carbonatic ----------	--	..4	--	--	195.2
	Tensleep formation—upper part only					
T- 1	Sandstone, carbonatic ----------	--	6.5	--	--	6.5
T- 2	Sandstone ----------	--	3.8	--	--	10.3
T- 3	Chert and sandstone ----------	--	1.4	--	--	11.7
T- 4	Sandstone ----------	--	4.4	--	--	16.1
T- 5	Chert and sandstone ----------	--	2.8	--	--	18.9
T- 6	Sandstone and chert ----------	--	6.0	--	--	24.9
T- 7	Sandstone and chert ----------	--	13.0	--	--	37.9
T- 8	Mudstone, carbonatic ----------	--	8.0	--	--	45.9
T- 9	Carbonate rock, sandy----------	--	7.0	--	--	52.9

Gros Ventre Slide, Wyo., lot 1326

Phosphoria formation measured and sampled at Gros Ventre Slide near Gros Ventre River, SW¼ sec. 5, T. 42 N., R. 114 W., Teton County, Wyo., on the west limb of an anticline. Beds strike N. 65° W. and dip 22° N. Section measured and sampled by M. A. Warner, R. A. Smart, H. W. Peirce, R. G. Waring and J. W. Hill in July 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—basal bed only						
Trd-1	Sandstone, calcareous	--	0.5	--	--	0.5	--
	E member of Phosphoria formation						
E- 7	Chert	--	2.4	--	--	2.4	--
E- 6	Mudstone, cherty	--	.5	--	--	2.9	--
E- 5	Mudstone	--	1.0	--	--	3.9	--
E- 4	Sandstone, carbonatic	--	17.0	--	--	20.9	--
E- 3	Sandstone, carbonatic	--	5.4	--	--	26.3	--
E- 2	Sandstone, carbonatic; fos. col. no. 12135[1]	--	1.4	--	--	27.7	--
E- 1	Chert; fos. col. no. 12134	--	30.0	--	--	57.7	--
	D member of Phosphoria formation—lower part only						
	A covered interval of not less than 20 feet occurs between D-3 and E-1. Hence, most of D member and the lower part of E member are not described.						
D- 3	Phosphate rock, argillaceous, and phosphatic mudstone	4913-MAW	1.1	12.1	48.5	1.1	13.31
D- 2	Sandstone, phosphatic	4912-MAW	1.2	9.2	62.9	2.3	24.35
D- 1	Mudstone	4911-MAW	1.9	2.8	76.3	4.2	29.67
	C member of Phosphoria formation						
C-25	Mudstone	4910-MAW	1.8	1.1	79.2	1.8	--
C-24	Sandstone, carbonatic	--	4.2	--	--	6.0	--
C-23	Mudstone, cherty	--	6.6	--	--	12.6	--
C-22	Mudstone, carbonatic; fos. col. no. 12132	--	2.0	--	--	14.6	--
C-21	Carbonate rock; fos. col. no. 12131	--	1.4	--	--	16.0	--
C-20	Carbonate rock	--	9.1	--	--	25.1	--
C-19	Sandstone, carbonatic	--	.5	--	--	25.6	--
C-18	Mudstone and cherty mudstone	--	2.8	--	--	28.4	--
C-17	Mudstone, cherty; fos. col. no. 12130	--	1.2	--	--	29.6	--

C-16	Mudstone, carbonatic	--	3.4	--	--	33.0	--
C-15	Mudstone	--	2.9	--	--	35.9	--
C-14	Mudstone	--	2.0	--	--	37.9	--
C-13	Mudstone; fos. col. no. 12129	--	1.2	--	--	39.1	--
C-12	Mudstone	--	1.9	--	--	41.0	--
C-11	Sandstone	--	1.0	--	--	42.0	--
C-10	Chert	--	.7	--	--	42.7	--
C- 9	Sandstone	--	1.2	--	--	43.9	--
C- 8	Carbonate rock, argillaceous	--	.7	--	--	44.6	--
C- 7	Mudstone, carbonatic	--	.6	--	--	45.2	--
C- 6	Chert	--	1.3	--	--	46.5	--
C- 5	Chert	--	1.3	--	--	47.8	--
C- 4	Carbonate rock, cherty	--	.6	--	--	48.4	--
C- 3	Chert	--	1.7	--	--	50.1	--
C- 2	Chert and mudstone	--	4.2	--	--	54.3	--
C- 1	Chert, calcareous and mudstone	--	3.6	--	--	57.9	--
	B member of Phosphoria formation						
B-17	Phosphate rock, argillaceous; fos. col. no. 12128	4909-MAW	0.3	23.8	27.7	0.3	--
B-16	Mudstone, cherty	--	1.0	--	--	1.3	--
B-15	Carbonate rock, argillaceous	--	1.0	--	--	2.3	--
B-14	Mudstone, cherty	--	5.0	--	--	7.3	--
B-13	Mudstone, cherty	--	3.0	--	--	10.3	--
B-12	Mudstone, cherty	--	1.0	--	--	11.3	--
B-11	Mudstone, cherty	--	3.0	--	--	14.3	--
B-10	Carbonate rock, cherty	--	2.3	--	--	16.6	--
B- 9	Mudstone, carbonatic	4908-HWP	3.7	.8	52.8	20.3	2.96
B- 8	Mudstone	4907-HWP	1.0	.4	74.4	21.3	3.36
B- 7	Carbonate rock, argillaceous	4906-HWP	1.8	.3	31.3	23.1	3.90
B- 6	Mudstone	4905-HWP	.6	5.5	71.0	23.7	7.20
B- 5	Mudstone, phosphatic	4904-HWP	.9	11.7	47.6	24.6	17.73
B- 4	Phosphate rock	4903-HWP	2.0	30.9	6.8	26.6	79.53
B- 3	Phosphate rock	4902-HWP	.5	24.9	2.1	27.1	91.98
B- 2	Sandstone and chert; fos. col. no. 12127	4901-HWP	2.7	2.2	88.7	29.8	97.92
B- 1	Phosphate rock and chert	4900-HWP	1.1	18.4	44.4	30.9	**118.16
	A member of Phosphoria formation						
A- 2	Carbonate rock	--	5.0	--	--	5.0	--
A- 1	Mudstone	--	1.1	--	--	6.1	--

** Note incompleteness of cumulative data.

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Gros Ventre Slide—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Tensleep formation—upper part only						
T- 1	Sandstone	--	3.9	--	--	3.9	--
T- 2	Carbonate rock	--	5.2	--	--	9.1	--
T- 3	Sandstone, carbonatic and chert	--	9.7	--	--	18.8	--
T- 4	Sandstone, carbonatic	--	3.5	--	--	22.3	--
T- 5	Sandstone, carbonatic	--	3.6	--	--	25.9	--
T- 6	Sandstone	--	3.3	--	--	29.2	--
T- 7	Sandstone	--	8.4	--	--	37.6	--

Flat Creek, Wyo., lot 1335

Phosphoria formation measured and sampled at natural exposure near Flat Creek, 2.9 miles east of Teton National Forest boundary, sec. 6, T. 41 N., R. 114 W., Teton County, Wyo. Beds dip gently north. Section measured and sampled by H. W. Peirce, R. G. Waring, R. A. Smart, and M. A. Warner in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—not measured						
Trd-1	Mudstone, carbonatic	--	--	--	--	--	--
	E member of Phosphoria formation						
E- 8	Sandstone, carbonatic; fos. col. no. 12628	--	10.2	--	--	10.2	--
E- 7	Sandstone; fos. col. no. 12226	--	.3	--	--	10.5	--
E- 6	Sandstone	--	.7	--	--	11.2	--
E- 5	Chert; fos. col. no. 12629	--	1.2	--	--	12.4	--
E- 4	Chert	--	26.3	--	--	38.7	--
E- 3	Chert; fos. col. no. 12225	--	7.3	--	--	46.0	--
E- 2	Carbonate rock (lens?)	--	.7	--	--	46.7	--
E- 1	Chert	--	.5	--	--	47.2	--
	D member of Phosphoria formation						
D-16	Mudstone, cherty	5254-HWP	1.6	2.3	78.3	1.6	3.68
D-15	Mudstone	5253-HWP	2.3	1.1	74.5	3.9	6.21
D-14	Mudstone	5252-HWP	3.8	2.1	70.1	7.7	14.19
D-13	Mudstone	5251-HWP	2.4	3.9	63.9	10.1	23.55
D-12	Carbonate rock, argillaceous	5250-HWP	.7	.9	31.9	10.8	24.18
D-11	Mudstone, carbonatic	5249-HWP	3.1	2.7	61.7	13.9	32.55
D-10	Carbonate rock, argillaceous	5248-HWP	2.3	1.1	42.6	16.2	35.08
D- 9	Mudstone, carbonatic	5247-RGW	2.8	2.5	59.4	19.0	42.08
D- 8	Mudstone, carbonatic	5246-RGW	3.5	1.7	62.2	22.5	48.03
D- 7	Mudstone, carbonatic	5245-RGW	4.2	.8	66.8	26.7	51.39
D- 6	Mudstone	5244-RGW	2.0	.9	93.3	28.7	53.19
D- 5	Phosphate rock	5243-RGW	.5	29.8	9.7	29.2	68.09
D- 4	Mudstone	5242-RGW	2.2	2.3	66.4	31.4	73.15
D- 3	Phosphate rock, argillaceous	5241-RGW	.5	18.1	32.6	31.9	82.20
D- 2	Mudstone, carbonatic	5240-RGW	1.1	3.6	56.7	33.0	86.16
D- 1	Phosphate rock, argillaceous	5238-RGW	.5	26.5	17.3	33.5	99.41

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	C member of Phosphoria formation						
C-22	Sandstone, carbonatic	--	11.5	--	--	11.5	--
C-21	Carbonate rock	--	12.4	--	--	23.9	--
C-20	Phosphate rock, carbonatic, and carbonatic sandstone	5237-RGW	1.5	--	--	25.4	--
C-19	Carbonate rock; fos. col. no. 12223	--	13.3	--	--	38.7	--
C-18	Carbonate rock	--	4.8	--	--	43.5	--
C-17	Mudstone, carbonatic	--	2.0	--	--	45.5	--
C-16	Mudstone, carbonatic	--	1.6	--	--	47.1	--
C-15	Mudstone	--	2.9	--	--	50.0	--
C-14	Mudstone, carbonatic	--	1.2	--	--	51.2	--
C-13	Mudstone, carbonatic	--	3.8	--	--	55.0	--
C-12	Mudstone, carbonatic	--	2.9	--	--	57.9	--
C-11	Mudstone, carbonatic	--	1.9	--	--	59.8	--
C-10	Carbonate rock	--	3.3	--	--	63.1	--
C- 9	Sandstone, carbonatic	--	1.1	--	--	64.2	--
C- 8	Mudstone, cherty	--	2.2	--	--	66.4	--
C- 7	Chert	--	10.8	--	--	77.2	--
C- 6	Chert	--	1.2	--	--	78.4	--
C- 5	Sandstone	--	.4	--	--	78.8	--
C- 4	Mudstone, cherty, and chert	--	.6	--	--	79.4	--
C- 3	Carbonate rock	--	.7	--	--	80.1	--
C- 2	Chert	--	.8	--	--	80.9	--
C- 1	Chert, argillaceous	--	1.3	--	--	82.2	--
	B member of Phosphoria formation						
B-17	Mudstone	--	1.7	--	--	1.7	--
B-16	Chert	--	.7	--	--	2.4	--
B-15	Mudstone	--	.5	--	--	2.9	--
B-14	Sandstone	--	1.3	--	--	4.2	--
B-13	Mudstone, cherty	--	1.7	--	--	5.9	--
B-12	Sandstone	--	1.0	--	--	6.9	--
B-11	Mudstone, cherty	--	1.0	--	--	7.9	--
B-10	Mudstone	--	.9	--	--	8.8	--
B- 9	Mudstone	5236-MAW	1.7	3.3	60.8	10.5	--
B- 8	Mudstone	--	1.0	--	--	11.5	--
B- 7	Mudstone	--	1.5	--	--	13.0	--
B- 6	Mudstone, cherty	--	.9	--	--	13.9	--
B- 5	Mudstone	--	.6	--	--	14.5	--

B- 4	Mudstone, carbonatic	--	2.2	--	--	16.7	--
B- 3	Phosphate rock	5235-MAW	.9	26.2	7.0	17.6	--
B- 2	Carbonate rock	--	.5	--	--	18.1	--
B- 1	Phosphate rock; fos. col. no. 12222	5234-MAW	2.7	32.4	1.7	20.8	--
	A member of Phosphoria formation						
A- 4	Chert	--	1.3	--	--	1.3	--
A- 3	Carbonate rock, cherty	--	1.0	--	--	2.3	--
A- 2	Chert	--	1.0	--	--	3.3	--
A- 1	Carbonate rock; fos. col. no. 12221	--	1.5	--	--	4.8	--
	Tensleep formation—upper part only						
T- 1	Sandstone, carbonatic	--	25.8	--	--	25.8	--
T- 2	Carbonate rock, sandy	--	6.5	--	--	32.3	--
T- 3	Sandstone	--	33.0	--	--	65.3	--
T- 4	Carbonate rock	--	14.0	--	--	79.3	--
T- 5	Carbonate rock, cherty	--	5.0	--	--	84.3	--
T- 6	Sandstone, carbonatic	--	80.4	--	--	164.7	--
T- 7	Carbonate rock, sandy	--	6.8	--	--	171.5	--
T- 8	Sandstone, carbonatic	--	10.8	--	--	182.3	--
T- 9	Carbonate rock, sandy	--	13.7	--	--	196.0	--

Dinwoody Lakes, Wyo., lot 1325

Phosphoria formation measured and sampled at a natural exposure in Dinwoody Canyon, SW¼SW¼ sec. 6, T. 4 N., R. 5 W., Fremont County, Wyo., on the northwest flank of the Wind River anticline. The beds dip gently to the northeast and strike northwest. Section measured and sampled by J. W. Hill, M. A. Warner, H. W. Peirce and R. A. Smart in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—not measured						
	E member of Phosphoria formation—top not exposed						
	Dinwoody-Phosphoria contact concealed by 20-foot covered interval but probably at or near top of bed E-13.						
E-13	Carbonate rock; fos. col. no. 12178	--	4.8	--	--	4.8	--
E-12	Carbonate rock; fos. col. no. 12177	--	6.8	--	--	11.6	--
E-11	Carbonate rock; fos. col. no. 12176	--	3.3	--	--	14.9	--
E-10	Carbonate rock; fos. col. no. 12175	--	5.9	--	--	20.8	--
E- 9	Chert, carbonatic; fos. col. no. 12174	--	1.6	--	--	22.4	--
E- 8	Carbonate rock, argillaceous; fos. col. no. 12174	--	.6	--	--	23.0	--
E- 7	Carbonate rock, cherty; fos. col. no. 12174	--	.9	--	--	23.9	--
E- 6	Mudstone, carbonatic; fos. col. no. 12173	--	.5	--	--	24.4	--
E- 5	Chert, carbonatic; fos. col. no. 12173	--	.5	--	--	24.9	--
E- 4	Mudstone, carbonatic; fos. col. no. 12173	--	.4	--	--	25.3	--
E- 3	Carbonate rock, argillaceous; fos. col. no. 12172	--	1.5	--	--	26.8	--
E- 2	Mudstone, carbonatic; fos. col. no. 12171	--	2.2	--	--	29.0	--
E- 1	Chert	--	31.2	--	--	60.2	--
	D member of Phosphoria formation						
D-12	Mudstone	--	7.1	--	--	7.1	--
D-11	Phosphate rock	--	.4	--	--	7.5	--
D-10	Mudstone, carbonatic	--	4.9	--	--	12.4	--
D- 9	Mudstone fos. col. no. 12170	--	11.9	--	--	24.3	---
D- 8	Mudstone, carbonatic	4964- RAS	2.5	2.3	54.8	26.8	5.75
D- 7	Mudstone, phosphatic, carbonatic; fos. col. no. 12169	4963- RAS	1.8	9.7	41.8	28.6	23.21
D- 6	Phosphate rock, argillaceous; fos. col. no. 12168	4962- RAS	.9	17.7	27.8	29.5	39.14
D- 5	Mudstone, phosphatic, carbonatic; fos. col. no. 12167	4961- RAS	.5	9.4	37.8	30.0	43.84

D- 4	Phosphate rock, argillaceous; fos. col. no. 12166	4960- RAS	1.0	17.5	34.0	31.0	61.34
D- 3	Carbonate rock, argillaceous; fos. col. no. 12165	4959- RAS	4.9	2.1	29.4	35.9	71.63
D- 2	Carbonate rock, cherty; fos. col. no. 12164	4958- RAS	5.7	.6	41.9	41.6	75.05
D- 1	Mudstone, phosphatic; fos. col. no. 12163	4957- RAS	1.2	10.0	48.8	42.8	**87.05
	C member of Phosphoria formation						
C-26	Chert, argillaceous	--	3.6	--	--	3.6	--
C-25	Mudstone; fos. col. no. 12162	--	.5	--	--	4.1	--
C-24	Mudstone, carbonatic; fos. col. no. 12162	--	.9	--	--	5.0	--
C-23	Chert; fos. col. no. 12162	--	.3	--	--	5.3	--
C-22	Mudstone, cherty, and carbonate rock	--	2.2	--	--	7.5	--
C-21	Carbonate rock, argillaceous; fos. col. no. 12161	--	24.0	--	--	31.5	--
C-20	Carbonate rock, argillaceous	--	3.0	--	--	34.5	--
C-19	Sandstone, carbonatic	--	3.0	--	--	37.5	--
C-18	Carbonate rock, argillaceous	--	1.4	--	--	38.9	--
C-17	Carbonate rock; fos. col. no. 12160	--	1.0	--	--	39.9	--
C-16	Mudstone	--	1.6	--	--	41.5	--
C-15	Mudstone, carbonatic	--	.5	--	--	42.0	--
C-14	Mudstone, carbonatic, cherty	--	1.7	--	--	43.7	--
C-13	Mudstone, carbonatic, cherty	--	1.7	--	--	45.4	--
C-12	Carbonate rock	--	2.5	--	--	47.9	--
C-11	Carbonate rock	--	1.1	--	--	49.0	--
C-10	Mudstone, cherty	--	1.5	--	--	50.5	--
C- 9	Carbonate rock, cherty	--	3.0	--	--	53.5	--
C- 8	Chert	--	.4	--	--	53.9	--
C- 7	Carbonate rock	--	.5	--	--	54.4	--
C- 6	Carbonate rock, cherty; fos. col. no. 12159	--	4.2	--	--	58.6	--
C- 5	Carbonate rock and chert; fos. col. no. 12158	--	1.1	--	--	59.7	--
C- 4	Carbonate rock and chert; fos. col. no. 12158	--	1.4	--	--	61.1	--
C- 3	Carbonate rock and chert	--	1.8	--	--	62.9	--
C- 2	Carbonate rock	--	.6	--	--	63.5	--
C- 1	Chert	--	.7	--	--	64.2	--
	B member of Phosphoria formation						
B- 5	Mudstone	--	1.0	--	--	1.0	--
B- 4	Sandstone, carbonatic; fos. col. no. 12157	--	.8	--	--	1.8	--
B- 3	Chert	--	.5	--	--	2.3	--
B- 2	Phosphate rock, carbonatic, sandy; fos. col. no. 12156	4965-HWP	1.1	14.7	30.0	3.4	--
B- 1	Carbonate rock, sandy; fos. col. no. 12155	--	1.1	--	--	4.5	--
	Lower beds of B member not measured.						

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch.
**Note incompleteness of cumulative data.

Tosi Creek, Wyo., lot 1333

Phosphoria formation measured and sampled at natural exposure near Tosi Creek, SE¼, sec. 17, T. 39 N., R. 110 W., Sublette County, Wyo., on the west nose of the Tosi Creek anticline. Beds strike N. 22° W. and dip 15° E. Section measured and sampled by M. A. Warner, H. W. Peirce, and R. P. Sheldon in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—not measured						
	E member of Phosphoria formation						
	Dinwoody-Phosphoria contact concealed by covered interval but probably at or near top of bed E-14.						
E-14	Sandstone, cherty	--	4.5	--	--	4.5	--
E-13	Sandstone, carbonatic	--	6.1	--	--	10.6	--
E-12	Carbonate rock; fos. col. no. 12212[1]	--	2.1	--	--	12.7	--
E-11	Carbonate rock	--	1.4	--	--	14.1	--
E-10	Carbonate rock	--	2.1	--	--	16.2	--
E- 9	Carbonate rock	--	1.2	--	--	17.4	--
E- 8	Sandstone; fos. col. no. 12211	--	6.2	--	--	23.6	--
E- 7	Sandstone	--	2.5	--	--	26.1	--
E- 6	Sandstone	--	2.1	--	--	28.2	--
E- 5	Chert	--	2.8	--	--	31.0	--
E- 4	Chert	--	3.1	--	--	34.1	--
E- 3	Chert	--	4.2	--	--	38.3	--
E- 2	Chert	--	14.0	--	--	52.3	--
E- 1	Chert	--	4.1	--	--	56.4	--
	D member of Phosphoria formation						
D-19	Chert	--	2.4	--	--	2.4	--
D-18	Mudstone	--	2.0	--	--	4.4	--
D-17	Mudstone, phosphatic	--	.2	--	--	4.6	--
D-16	Carbonate rock, cherty	--	1.0	--	--	5.6	--
D-15	Chert	--	1.6	--	--	7.2	--
D-14	Mudstone, cherty	--	.6	--	--	7.8	--
D-13	Mudstone; fos. col. no. 12210	--	2.2	--	--	10.0	--
D-12	Chert	--	.8	--	--	10.8	--
D-11	Mudstone, cherty	--	1.6	--	--	12.4	--
D-10	Mudstone, cherty	--	2.1	--	--	14.5	--

D- 9	Mudstone	--	.7	--	--	15.2	--
D- 8	Mudstone, cherty	--	2.1	--	--	17.3	--
D- 7	Mudstone	--	1.5	--	--	18.8	--
D- 6	Mudstone	--	1.8	--	--	20.6	--
D- 5	Covered interval	--	38.0	--	--	58.6	--
D- 4	Phosphate rock, sandy; fos. col. no. 12209	5228-HWP	1.1	15.8	36.5	59.7	17.38
D- 3	Chert, phosphatic	5227-HWP	.6	8.3	56.2	60.3	22.36
D- 2	Phosphate rock, sandy	5226-HWP	1.1	16.3	37.5	61.4	40.29
D- 1	Mudstone, phosphatic, cherty	5225-HWP	.6	9.4	63.9	62.0	**45.93
	C member of Phosphoria formation						
C-31	Chert, carbonatic	5224-HWP	1.5	1.3	61.7	1.5	1.95
C-30	Chert, carbonatic	5223-HWP	1.7	1.6	61.8	3.2	4.67
C-29	Phosphate rock, argillaceous; fos. col. no. 12208	5222-HWP	1.8	17.3	27.4	5.0	35.81
C-28	Carbonate rock, phosphatic	5221-MAW	1.9	11.4	14.2	6.9	57.47
C-27	Carbonate rock, sandy	--	2.0	--	--	8.9	--
C-26	Carbonate rock; fos. col. no. 12207	--	2.5	--	--	11.4	--
C-25	Carbonate rock and phosphatic carbonate rock; fos. col. no. 12206	5220-MAW	4.1	6.6	6.7	15.5	--
C-24	Carbonate rock, argillaceous; fos. col. no. 12205	--	2.2	--	--	17.7	--
C-23	Carbonate rock, argillaceous	--	2.7	--	--	20.4	--
C-22	Carbonate rock	--	4.9	--	--	25.3	--
C-21	Carbonate rock	--	2.9	--	--	28.2	--
C-20	Carbonate rock	--	2.1	--	--	30.3	--
C-19	Carbonate rock, sandy	--	.5	--	--	30.8	--
C-18	Covered interval	--	3.5	--	--	34.3	--
C-17	Carbonate rock	--	1.9	--	--	36.2	--
C-16	Sandstone, carbonatic	--	3.3	--	--	39.5	--
C-15	Sandstone, carbonatic	--	1.5	--	--	41.0	--
C-14	Sandstone, cherty	--	.7	--	--	41.7	--
C-13	Sandstone	--	2.2	--	--	43.9	--
C-12	Sandstone, carbonatic	--	3.8	--	--	47.7	--
C-11	Chert	--	5.0	--	--	52.7	--
C-10	Sandstone, cherty, and carbonatic chert	--	1.6	--	--	54.3	--
C- 9	Sandstone, cherty and chert	--	2.4	--	--	56.7	--
C- 8	Sandstone, carbonatic and chert	--	1.8	--	--	58.5	--
C- 7	Sandstone, cherty, carbonatic	--	2.0	--	--	60.5	--
C- 6	Sandstone	5219-HWP	.5	2.2	70.4	61.0	--

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.
** Note incompleteness of cumulative data.

Tosi Creek—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
C- 5	Chert, carbonate rock, and sandy chert	5218-HWP	1.4	1.5	61.8	62.4	--
C- 4	Chert; fos. col. no. 12204	--	3.5	--	--	65.9	--
C- 3	Chert	--	3.8	--	--	69.7	--
C- 2	Chert	--	6.0	--	--	75.7	--
C- 1	Chert	--	2.9	--	--	78.6	--
	B member of Phosphoria formation						
B- 4	Chert, phosphatic, and argillaceous phosphate rock	5217-HWP	1.8	14.8	46.7	1.8	26.64
B- 3	Carbonate rock	5216-HWP	.8	4.6	10.5	2.6	28.72
B- 2	Phosphate rock, argillaceous	5215-HWP	.4	18.0	24.0	3.0	35.92
B- 1	Phosphate rock	5214-HWP	2.3	28.6	6.6	5.3	101.70
	A member of Phosphoria formation						
A- 7	Carbonate rock, cherty; fos. col. no. 12203	--	6.0	--	--	6.0	--
A- 6	Chert, sandy; fos. col. nos. 12202 and 12201	--	3.0	--	--	9.0	--
A- 5	Chert	--	3.1	--	--	12.1	--
A- 4	Carbonate rock	--	1.9	--	--	14.0	--
A- 3	Sandstone, carbonatic	--	2.0	--	--	16.0	--
A- 2	Carbonate rock	--	.8	--	--	16.8	--
A- 1	Sandstone	--	.6	--	--	17.4	--
	Tensleep formation—top bed only						
T- 1	Sandstone	--	1.6	--	--	1.6	--

Hoback, Wyo., lot 1324

Phosphoria formation measured and sampled at natural exposure and road cut along U. S. Highway No. 89 in Snake River Canyon, SW¼NE¼, sec. 32, T. 39 N., R. 116 W., Teton County, Wyo. Beds strike N. 65° E. and dip 18° N. Section measured and sampled by R. G. Waring, M. A. Warner, R. A. Smart and H. W. Peirce in June and August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—covered above						
Trd-2	Sandstone, carbonatic	--	7.0	--	--	7.0	--
Trd-1	Sandstone	--	2.0	--	--	9.0	--
	Upper shale member of Phosphoria formation						
U- 6	Mudstone and phosphate rock	5269-RGW	2.1	13.2	45.2	2.1	27.72
U- 5	Mudstone	5268-RGW	.9	6.0	57.0	3.0	33.12
U- 4	Mudstone	5267-RGW	2.1	6.4	59.7	5.1	46.56
U- 3	Phosphate rock, argillaceous and mudstone	5266-RGW	1.0	11.0	47.2	6.1	57.56
U- 2	Mudstone	5265-RGW	2.9	5.1	56.3	9.0	72.35
U- 1	Phosphate rock, sandy	5264-RGW	1.1	21.6	33.0	10.1	96.11
	Rex chert member of Phosphoria formation						
R-26	Sandstone; fos. col. no. 12144[1]	--	10.4	--	--	10.4	--
R-25	Sandstone; fos. col. no. 12143	--	5.0	--	--	15.4	--
R-24	Phosphate rock, argillaceous	5270-RGW	1.5	22.3	26.7	16.9	--
R-23	Mudstone and sandstone	--	1.9	--	--	18.8	--
R-22	Sandstone, argillaceous	--	2.1	--	--	20.9	--
R-21	Mudstone, carbonatic; fos. col. no. 12142	--	3.8	--	--	24.7	--
R-20	Chert, argillaceous	--	11.0	--	--	35.7	--
R-19	Mudstone, carbonatic	--	11.9	--	--	47.6	--
R-18	Mudstone, carbonatic	--	7.4	--	--	55.0	--
R-17	Mudstone	--	1.2	--	--	56.2	--
R-16	Mudstone, carbonatic	--	.9	--	--	57.1	--
R-15	Chert	--	.4	--	--	57.5	--
R-14	Mudstone, carbonatic	--	1.0	--	--	58.5	--
R-13	Chert	--	.6	--	--	59.1	--
R-12	Mudstone, carbonatic	--	2.0	--	--	61.1	--
R-11	Mudstone and chert	--	4.9	--	--	66.0	--

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
R-10	Mudstone and chert	--	2.4	--	--	68.4	--
R- 9	Mudstone, carbonatic	--	2.0	--	--	70.4	--
R- 8	Chert, contains pyrite	--	.6	--	--	71.0	--
R- 7	Mudstone, carbonatic and mudstone	--	2.1	--	--	73.1	--
R- 6	Mudstone, carbonatic and chert	--	3.2	--	--	76.3	--
R- 5	Carbonate rock, argillaceous	--	7.0	--	--	83.3	--
R- 4	Carbonate rock; fos. col. no. 12141	--	3.0	--	--	86.3	--
R- 3	Carbonate rock, argillaceous; fos. col. no. 12140	--	5.8	--	--	92.1	--
R- 2	Carbonate rock, argillaceous; fos. col. no. 12139	--	7.5	--	--	99.6	--
R- 1	Chert	4874-HWP	3.7	2.5	88.2	103.3	--
	Phosphatic shale member of Phosphoria formation						
P-31	Chert, phosphatic	4873-RGW	2.1	13.6	54.1	2.1	28.56
P-30	Phosphate rock and carbonatic mudstone	4872-RGW	1.2	6.3	41.6	3.3	36.12
--	Mudstone, carbonatic, concretion in bed P-29	--	(.6)	--	--	--	--
P-29	Mudstone	4871-RGW	1.9	.7	68.9	5.2	37.45
P-28	Phosphate rock, argillaceous	4870-RGW	.4	16.6	30.6	5.6	44.09
P-27	Mudstone	4869-RGW	1.8	5.7	64.6	7.4	54.35
P-26	Mudstone	4868-RGW	3.5	.5	76.1	10.9	56.10
P-25	Phosphate rock and mudstone	4867-RGW	2.3	.2	81.3	13.2	56.56
P-24	Phosphate rock and argillaceous carbonate rock	4866-RGW	1.0	17.4	20.9	14.2	73.96
P-23	Carbonate rock, argillaceous	4865-RGW	2.2	.5	29.2	16.4	75.06
P-22	Phosphate rock and mudstone	4864-RGW	1.1	3.6	63.4	17.5	79.02
P-21	Phosphate rock, argillaceous and mudstone	4863-RGW	1.3	15.3	24.4	18.8	98.91
P-20	Carbonate rock	4862-RGW	1.8	.6	17.1	20.6	99.99
P-19	Phosphate rock, argillaceous, and carbonatic mudstone	4861-HWP	1.4	11.2	37.9	22.0	115.67
P-18	Carbonate rock, phosphatic, argillaceous	4860-HWP	1.1	8.7	20.3	23.1	125.24
P-17	Carbonate rock, phosphatic	4859-HWP	2.7	10.6	12.5	25.8	153.86
P-16	Carbonate rock	4858-HWP	1.0	6.1	11.7	26.8	159.96
P-15	Carbonate rock, phosphatic, argillaceous	4857-HWP	2.5	10.4	18.7	29.3	185.96
P-14	Mudstone, phosphatic, carbonatic	4856-HWP	3.8	10.4	30.8	33.1	225.48
P-13	Carbonate rock, argillaceous	4855- RAS	2.3	.4	27.2	35.4	226.40
P-12	Mudstone, carbonatic	4854- RAS	1.7	4.7	46.5	37.1	234.39
P-11	Mudstone, phosphatic, carbonatic	4853- RAS	1.4	9.4	32.4	38.5	247.55
--	Carbonate rock, argillaceous, concretion	4852- RAS	(1.0)	.5	21.3	--	--

P-10	Phosphate rock and carbonatic mudstone ----	4851- RAS	1.3	10.1	34.5	39.8	260.68
P- 9	Mudstone, phosphatic, carbonatic ----------	4850- RAS	2.0	10.2	33.0	41.8	281.08
P- 8	Phosphate rock, argillaceous --------------	4849- RAS	1.2	21.4	16.8	43.0	306.76
P- 7	Phosphate rock----------	4848- RAS	2.4	23.6	11.3	45.4	363.40
P- 6	Carbonate rock----------	4847- RAS	2.6	2.4	2.4	48.0	369.64
P- 5	Carbonate rock----------	4846- RAS	2.2	2.4	1.6	50.2	374.92
P- 4	Phosphate rock----------	4845- RAS	.6	28.9	7.4	50.8	392.26
P- 3	Mudstone, carbonatic ----------	4844- RAS	1.1	4.4	47.3	51.9	397.10
P- 2	Phosphate rock----------	4843- RAS	.8	34.8	1.8	52.7	424.94
P- 1	Chert, phosphatic; fos. col. no. 12137-------	4842- RAS	.9	13.4	57.5	53.6	437.00
	Wells formation—top part only						
Cw-12	Carbonate rock and chert ----------	4841-MAW	3.4	0.4	10.0	3.4	--
Cw-11	Carbonate rock----------	--	4.5	--	--	7.9	--
Cw-10	Sandstone----------	--	4.6	--	--	12.5	--
Cw- 9	Sandstone----------	--	5.3	--	--	17.8	--
Cw- 8	Mudstone, cherty----------	--	3.4	--	--	21.2	--
Cw- 7	Carbonate rock and mudstone ----------	--	.7	--	--	21.9	--
Cw- 6	Carbonate rock----------	--	1.6	--	--	23.5	--
Cw- 5	Mudstone ----------	--	1.3	--	--	24.8	--
Cw- 4	Mudstone, carbonatic ----------	--	5.6	--	--	30.4	--
Cw- 3	Carbonate rock----------	--	3.1	--	--	33.5	--
Cw- 2	Carbonate rock----------	--	1.5	--	--	35.0	--
Cw- 1	Sandstone----------	--	50.0	--	--	85.0	--

Buck Creek, Wyo., lot 1332

Phosphatic shale and upper shale members of Phosphoria formation sampled in two hand trenches in Buck Creek Canyon 1/4 mile south of Hoback Forest Camp, SE¼, sec. 1, T. 38 N., R. 115 W., Teton County, Wyo., on the trough of a syncline in the overriding block of the Bear Creek thrust fault. Beds P-1 through P-33 sampled in trench on west side of Buck Creek and beds U-1 through U-9 on west side of Buck Creek and about 1/8 mile to the south. Beds in upper shale trench strike N. 10° E. and dip 15° E., beds in phosphatic shale trench strike N. 80° E. and dip 15° S. Section measured and sampled by R. G. Waring, H. W. Peirce, M. A. Warner, and J. W. Hill in July 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—not measured						
	Upper shale member of Phosphoria formation						
U- 9	Mudstone, carbonatic	4956-MAW	3.6	0.3	64.6	3.6	1.08
U- 8	Mudstone, phosphatic	4955-MAW	2.9	10.9	57.7	6.5	32.69
U- 7	Mudstone, carbonatic	4954-MAW	4.6	4.8	48.7	11.1	54.77
U- 6	Mudstone, carbonatic	4953-MAW	4.8	3.9	48.6	15.9	73.49
U- 5	Mudstone, carbonatic	4952-MAW	3.5	3.6	48.4	19.4	86.09
U- 4	Mudstone, carbonatic	4951-MAW	4.4	3.6	50.5	23.8	101.93
U- 3	Phosphate rock, argillaceous	4950-MAW	.9	22.8	19.0	24.7	122.45
U- 2	Mudstone, carbonatic	4949-MAW	4.4	3.3	57.4	29.1	136.97
U- 1	Phosphate rock, argillaceous; fos. col. no. 12151[1]	4948-MAW	1.0	26.5	24.8	30.1	163.47
	Rex chert member of Phosphoria formation—not measured						
	Phosphatic shale member of Phosphoria formation						
P-33	Carbonate rock; fos. col. no. 12150	4947-HWP	2.0	1.4	14.3	2.0	2.80
P-32	Phosphate rock	4946-HWP	.8	29.2	12.3	2.8	26.16
P-31	Carbonate rock, argillaceous	4945-HWP	.8	2.6	30.3	3.6	28.24
P-30	Phosphate rock and mudstone; fos. col. no. 12149	4944-HWP	2.0	20.8	26.1	5.6	69.84
P-29	Mudstone and carbonate rock	4943-HWP	1.1	.5	69.9	6.7	70.39
P-28	Mudstone, carbonatic	4942-HWP	.8	4.9	51.4	7.5	74.31
P-27	Mudstone, carbonatic	4941-HWP	1.3	3.4	60.1	8.8	78.73
P-26	Phosphate rock and mudstone	4940-HWP	3.2	1.1	63.3	12.0	82.25
P-25	Mudstone	4939-HWP	2.6	1.3	76.6	14.6	85.63
P-24	Phosphate rock, argillaceous	4938-HWP	.8	23.0	18.2	15.4	104.03
P-23	Carbonate rock, argillaceous and mudstone	4937-HWP	2.3	2.5	49.8	17.7	109.78
P-22	Phosphate rock, argillaceous and mudstone	4936-HWP	1.5	15.0	34.3	19.2	132.28
P-21	Carbonate rock	4935-RGW	1.7	.3	16.3	20.9	132.79
P-20	Mudstone, carbonatic	4934-RGW	1.2	7.4	49.2	22.1	141.67

P-19	Phosphate rock and mudstone	4933-RGW	1.0	9.3	21.8	23.1	150.97
P-18	Phosphate rock, argillaceous	4932-RGW	2.7	20.8	15.0	25.8	207.13
P-17	Carbonate rock	4931-RGW	.8	1.7	4.1	26.6	208.49
P-16	Mudstone and phosphatic mudstone	4930-RGW	1.1	8.5	50.1	27.7	217.84
P-15	Mudstone, carbonatic	4929-RGW	1.9	4.6	56.6	29.6	226.58
P-14	Carbonate rock, argillaceous	4928-RGW	1.0	.3	25.6	30.6	226.88
P-13	Mudstone, carbonatic	4927-RGW	1.4	5.1	41.1	32.0	234.02
P-12	Carbonate rock, argillaceous, and phosphatic mudstone	4926-RGW	2.0	6.2	35.5	34.0	246.42
P-11	Carbonate rock; fos. col. no. 12147	4925-RGW	1.2	2.4	16.6	35.2	249.30
P-10	Phosphate rock, argillaceous, carbonatic; fos. col. no. 12146	4924-RGW	1.0	12.6	26.2	36.2	261.90
P- 9	Carbonate rock, concretion	4923-RGW	.6	1.3	6.1	36.8	262.68
P- 8	Phosphate rock	4922-RGW	.8	24.2	11.0	37.6	282.04
P- 7	Phosphate rock, argillaceous	4921-RGW	.8	20.3	17.8	38.4	298.28
P- 6	Phosphate rock	4920-RGW	1.5	33.2	1.6	39.9	348.08
P- 5	Carbonate rock; fos. col. no. 12145	4919-RGW	.8	3.1	2.2	40.7	350.56
P- 4	Phosphate rock	4918-HWP	.6	30.4	5.4	41.3	368.80
P- 3	Mudstone	4917-HWP	1.2	3.9	62.0	42.5	373.48
P- 2	Phosphate rock	4916-HWP	1.5	28.0	10.9	44.0	415.48
P- 1	Phosphate rock	4915-HWP	1.0	30.5	10.8	45.0	445.98
	Wells formation—top bed only						
Cw-1	Carbonate rock, cherty	4914-HWP	1.8	5.7	19.6	1.8	--

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

South Fork of Gypsum Creek, Wyo., lot 1336

Phosphoria formation measured and sampled on the South Fork of Gypsum Creek, NW¼ sec. 22, T. 38 N., R. 109 W., Sublette County, Wyo., on the east limb of an overturned syncline in the overridden block of a thrust fault. Beds have an average strike of N. 10° W. and dip from 80° W. to 45° E. A large fault partially repeats the section. Section measured and sampled at natural exposure by R. P. Sheldon, R. A. Smart, and R. G. Waring in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
	Dinwoody formation—basal beds only					
Trd-4	Carbonate rock	--	5.3	--	--	5.3
Trd-3	Carbonate rock; fos. col. no. 12247	--	3.5	--	--	8.8
Trd-2	Carbonate rock	--	1.7	--	--	10.5
Trd-1	Carbonate rock	--	.9	--	--	11.4
	E member of Phosphoria formation					
E-15	Carbonate rock, cherty	--	4.3	--	--	4.3
E-14	Carbonate rock, argillaceous	--	5.6	--	--	9.9
E-13	Carbonate rock, argillaceous; fos. col. no. 12246	--	5.2	--	--	15.1
E-12	Carbonate rock; fos. col. no. 12246	--	10.6	--	--	25.7
E-11	Carbonate rock, argillaceous; fos. col. no. 12246	--	5.3	--	--	31.0
E-10	Mudstone, carbonatic	--	3.2	--	--	34.2
E- 9	Mudstone, cherty	--	3.8	--	--	38.0
E- 8	Chert	--	3.1	--	--	41.1
E- 7	Chert	--	12.1	--	--	53.2
E- 6	Mudstone, phosphatic and phosphate rock	5263- RAS	1.3	19.7	24.5	54.5
E- 5	Chert	--	6.3	--	--	60.8
E- 4	Chert, argillaceous	--	2.3	--	--	63.1
E- 3	Mudstone	--	1.0	--	--	64.1
E- 2	Chert	--	3.2	--	--	67.3
E- 1	Chert, argillaceous	--	1.1	--	--	68.4
	D member of Phosphoria formation					
D-20	Mudstone	--	5.4	--	--	5.4
D-19	Mudstone	--	3.4	--	--	8.8
D-18	Mudstone	--	2.4	--	--	11.2
D-17	Phosphate rock and mudstone	5262- RAS	1.1	9.8	51.4	12.3
D-16	Chert, argillaceous	--	.8	--	--	13.1
D-15	Chert	--	2.8	--	--	15.9

D-14	Chert, argillaceous	--	.7	--	--	16.6
D-13	Chert	--	3.3	--	--	19.9
D-12	Mudstone, carbonatic and chert	--	2.9	--	--	22.8
D-11	Mudstone, phosphatic and phosphate rock	5261-RAS	.5	12.0	42.3	23.3
D-10	Mudstone, carbonatic	--	5.8	--	--	29.1
D- 9	Mudstone, carbonatic	--	4.1	--	--	33.2
D- 8	Mudstone	--	2.5	--	--	35.7
D- 7	Mudstone	--	6.6	--	--	42.3
D- 6	Mudstone	--	3.2	--	--	45.5
D- 5	Mudstone	--	2.7	--	--	48.2
D- 4	Carbonate rock, argillaceous	--	.7	--	--	48.9
D- 3	Mudstone, carbonatic	--	1.7	--	--	50.6
	Fault contact at this point.					
D- 2	Sandstone, phosphatic; fos. col. no. 12244	5260-RGW	1.0	13.0	41.2	51.6
D- 1	Sandstone, phosphatic; fos. col. no. 12244	5259-RGW	2.3	9.5	52.7	53.9
	C member of Phosphoria formation					
C-21	Sandstone; fos. col. no. 12242	--	3.9	--	--	3.9
C-20	Sandstone, carbonatic; fos. col. no. 12242	--	4.3	--	--	8.2
C-19	Sandstone, carbonatic; fos. col. no. 12242	--	7.2	--	--	15.4
C-18	Sandstone, carbonatic; fos. col. no. 12241	--	3.5	--	--	18.9
C-17	Carbonate rock; fos. col. no. 12241	--	7.7	--	--	26.6
C-16	Sandstone, carbonatic	--	7.1	--	--	33.7
C-15	Carbonate rock	--	8.8	--	--	42.5
C-14	Carbonate rock, sandy	--	4.7	--	--	47.2
C-13	Carbonate rock	--	6.4	--	--	53.6
C-12	Carbonate rock	--	1.6	--	--	55.2
C-11	Mudstone	--	3.2	--	--	58.4
C-10	Sandstone, carbonatic	--	4.5	--	--	62.9
C- 9	Carbonate rock, sandy	--	1.3	--	--	64.2
C- 8	Chert	--	.3	--	--	64.5
C- 7	Mudstone	--	2.6	--	--	67.1
C- 6	Sandstone, carbonatic	--	2.8	--	--	69.9
C- 5	Mudstone	--	5.0	--	--	74.9
C- 4	Mudstone, sandy, carbonatic	--	1.3	--	--	76.2
C- 3	Carbonate rock, sandy	--	1.5	--	--	77.7
C- 2	Sandstone, carbonatic	--	1.4	--	--	79.1
C- 1	Carbonate rock	--	.5	--	--	79.6
	A strike fault separates C-1 (above) and brecciated top of E-7 (next page); E units dip 80° W., overturned C units dip 65° E. Repeated unit numbers do not imply correlation.					

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

South Fork of Gypsum Creek—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
	E member of Phosphoria formation					
E- 7	Chert	--	18.0	--	--	18.0
E- 6	Chert	--	7.5	--	--	25.5
E- 5	Phosphate rock, chert, and phosphatic mudstone; fos. col. no. 12245	5258- RPS	1.3	16.2	52.4	26.8
E- 4	Chert	--	8.0	--	--	34.8
E- 3	Mudstone, cherty	--	3.0	--	--	37.8
E- 2	Mudstone and chert	--	1.1	--	--	38.9
E- 1	Chert, carbonatic	--	4.0	--	--	42.9
	D member of Phosphoria formation					
D-13	Mudstone	--	8.8	--	--	8.8
D-12	Phosphate rock	--	.3	--	--	9.1
D-11	Mudstone	--	.5	--	--	9.6
D-10	Chert	--	5.9	--	--	15.5
D- 9	Mudstone, carbonatic	--	1.9	--	--	17.4
D- 8	Mudstone, phosphatic	5257- RGW	.6	11.5	52.3	18.0
D- 7	Mudstone, carbonatic	--	7.3	--	--	25.3
D- 6	Covered interval	--	2.0	--	--	27.3
D- 5	Mudstone	--	6.0	--	--	33.3
D- 4	Mudstone, carbonatic	--	.8	--	--	34.1
D- 3	Mudstone, carbonatic	--	3.0	--	--	37.1
D- 2	Covered interval	--	3.0	--	--	40.1
D- 1	Sandstone, phosphatic; fos. col. no. 12243	5256- RGW	2.0	13.4	43.4	42.1
	C member of Phosphoria formation					
	Beds D-1 and C-13 separated by a fault contact.					
C-13	Carbonate rock; fos. col. no. 12240	--	3.0	--	--	3.0
C-12	Carbonate rock, argillaceous; fos. col. no. 12240	--	5.3	--	--	8.3
C-11	Carbonate rock, phosphatic, sandy; fos. col. no. 12239	5255- RGW	1.8	11.8	20.9	10.1
C-10	Carbonate rock; fos. col. no. 12238	--	1.7	--	--	11.8
C- 9	Mudstone; fos. col. no. 12238	--	.8	--	--	12.6
C- 8	Carbonate rock; fos. col. no. 12238	--	7.2	--	--	19.8
C- 7	Sandstone, carbonatic; fos. col. no. 12238	--	1.8	--	--	21.6
C- 6	Carbonate rock	--	5.1	--	--	26.7
C- 5	Carbonate rock, sandy; fos. col. no. 12237	--	7.7	--	--	34.4
C- 4	Covered	--	31.0	--	--	65.4

C- 3	Carbonate rock; fos. col. no. 12236 ----------	--	8.0	--	--	73.4
C- 2	Sandstone ----------	--	23.0	--	--	96.4
C- 1	Chert ----------	--	4.0	--	--	100.4
	B member of Phosphoria formation—top bed only					
B- 1	Sandstone, cherty, carbonatic ----------	--	1.0	--	--	1.0
--	Covered interval, probably includes Phosphoria-Tensleep contact. Dominantly carbonate rock float. ----------	--	45.0	--	--	46.0
	Tensleep formation—upper beds only, top not exposed					
T- 3	Sandstone ----------	--	15.0	--	--	15.0
T- 2	Covered interval. Shows sandstone float similar to bed T-1. ----------	--	15.0	--	--	30.0
T- 1	Sandstone ----------	--	20.0	--	--	50.0

Bartlett Creek, Wyo., lot 1334

Upper part of C member and part of D member of Phosphoria formation measured and sampled at natural exposure near Bartlett Creek, SE¼ sec. 23, T. 38 N., R. 111 W., Sublette County, Wyo., on the southwest limb of the Rock Creek anticline. Beds dip gently south. Section measured and sampled by M. A. Warner and H. W. Peirce in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
	D member of Phosphoria formation—top not exposed					
D-14	Mudstone, cherty	--	1.5	--	--	1.5
D-13	Mudstone; fos. col. no. 12218[1]	--	2.7	--	--	4.2
D-12	Mudstone	--	1.4	--	--	5.6
D-11	Mudstone	--	11.7	--	--	17.3
D-10	Mudstone	--	5.9	--	--	23.2
D- 9	Mudstone	--	4.6	--	--	27.8
D- 8	Mudstone, carbonatic; fos. col. no. 12217	--	3.2	--	--	31.0
D- 7	Mudstone; fos. col. no. 12216	--	6.8	--	--	37.8
D- 6	Phosphate rock	5233-HWP	1.0	26.5	12.8	38.8
D- 5	Mudstone, carbonatic; fos. col. no. 12215	5232-HWP	1.2	2.8	45.5	40.0
D- 4	Phosphate rock, argillaceous; fos. col. no. 12214	5231-HWP	1.2	20.5	26.8	41.2
D- 3	Sandstone, cherty	--	1.1	--	--	42.3
D- 2	Sandstone, cherty	5230-HWP	2.5	6.6	65.2	44.8
D- 1	Phosphate rock, carbonatic, argillaceous	5229-HWP	1.2	15.6	23.2	46.0
	C member of Phosphoria formation—upper beds only					
C- 5	Chert, sandy	--	3.0	--	--	3.0
C- 4	Carbonate rock, phosphatic	--	2.4	--	--	5.4
C- 3	Carbonate rock, argillaceous	--	3.4	--	--	8.8
C- 2	Carbonate rock, argillaceous	--	7.0	--	--	15.8
C- 1	Carbonate rock	--	15.0	--	--	30.8

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Bull Lake, Wyo., lot 1328

Phosphoria formation measured and sampled at natural exposure near the head of Bull Lake in sec. 6, T. 2 N., R. 3 W., Fremont County, Wyo. Beds strike N. 50° W. and dip 19° NE. Section measured and sampled by H. W. Peirce, R. G. Waring, R. A. Smart, and M. A. Warner in August 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
	Dinwoody formation—not measured					
Trd-1	Mudstone, calcareous	--	--	--	--	--
	E member of Phosphoria formation					
E-18	Carbonate rock	--	6.4	--	--	6.4
E-17	Carbonate rock, argillaceous	--	5.4	--	--	11.8
E-16	Carbonate rock	--	1.2	--	--	13.0
E-15	Carbonate rock	--	1.8	--	--	14.8
E-14	Carbonate rock	--	5.4	--	--	20.2
E-13	Carbonate rock	--	3.2	--	--	23.4
E-12	Carbonate rock	--	3.0	--	--	26.4
E-11	Carbonate rock; fos. col. no. 12269[1]	--	1.6	--	--	28.0
E-10	Carbonate rock; fos. col. no. 12268	--	3.5	--	--	31.5
E- 9	Mudstone	--	.3	--	--	31.8
E- 8	Carbonate rock, cherty; fos. col. no. 12267	--	3.8	--	--	35.6
E- 7	Mudstone; fos. col. no. 12266	--	.9	--	--	36.5
E- 6	Chert and carbonatic mudstone; fos. col. no. 12265	--	1.0	--	--	37.5
E- 5	Chert; fos. col. no. 12265	--	4.8	--	--	42.3
E- 4	Chert and carbonatic mudstone; fos. col. no. 12265	--	3.2	--	--	45.5
E- 3	Mudstone, carbonatic	--	2.5	--	--	48.0
E- 2	Carbonate rock	--	4.9	--	--	52.9
E- 1	Chert and carbonate rock	--	2.0	--	--	54.9
	D member of Phosphoria formation					
D-19	Mudstone, phosphatic	5173-RGW	1.1	10.5	45.7	1.1
D-18	Mudstone, carbonatic	--	2.4	--	--	3.5
D-17	Chert and carbonatic mudstone	--	9.7	--	--	13.2
D-16	Mudstone, carbonatic	--	5.0	--	--	18.2
D-15	Mudstone, carbonatic	--	7.0	--	--	25.2
D-14	Mudstone, phosphatic	5172-HWP	.9	14.1	46.4	26.1
D-13	Carbonate rock, argillaceous	--	4.6	--	--	30.7

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
D-12	Mudstone, carbonatic	--	1.8	--	--	32.5
D-11	Chert, argillaceous	--	.5	--	--	33.0
D-10	Mudstone	--	3.8	--	--	36.8
D- 9	Mudstone	--	4.5	--	--	41.3
D- 8	Phosphate rock	--	.1	--	--	41.4
D- 7	Mudstone	--	1.1	--	--	42.5
D- 6	Phosphate rock, argillaceous	5171-RAS	.6	18.4	33.2	43.1
D- 5	Carbonate rock	--	1.4	--	--	44.5
D- 4	Mudstone	--	4.7	--	--	49.2
D- 3	Mudstone	--	3.8	--	--	53.0
D- 2	Mudstone, carbonatic	--	4.4	--	--	57.4
D- 1	Phosphate rock, argillaceous; fos. col. no. 12264	5170-RAS	.8	18.4	35.1	58.2
	C member of Phosphoria formation					
C-52	Carbonate rock, argillaceous	--	2.1	--	--	2.1
C-51	Mudstone, carbonatic; fos. col. no. 12263	--	3.8	--	--	5.9
C-50	Mudstone, carbonatic; fos. col. no. 12262	--	3.2	--	--	9.1
C-49	Mudstone, carbonatic; fos. col. no. 12261	--	3.2	--	--	12.3
C-48	Chert; fos. col. no. 12260	--	4.0	--	--	16.3
C-47	Mudstone, carbonatic; fos. col. no. 12259	--	1.6	--	--	17.9
C-46	Mudstone, carbonatic; fos. col. no. 12259	--	.5	--	--	18.4
C-45	Mudstone, carbonatic; fos. col. no. 12258	--	2.0	--	--	20.4
C-44	Carbonate rock, argillaceous; fos. col. no. 12258	--	1.1	--	--	21.5
C-43	Mudstone, carbonatic; fos. col. no. 12257	--	1.8	--	--	23.3
C-42	Carbonate rock, argillaceous	--	3.6	--	--	26.9
C-41	Limestone; fos. col. no. 12256	--	2.9	--	--	29.8
C-40	Limestone	--	4.2	--	--	34.0
C-39	Sandstone, carbonatic	--	1.1	--	--	35.1
C-38	Carbonate rock and chert	--	6.5	--	--	41.6
C-37	Carbonate rock	--	8.0	--	--	49.6
C-36	Carbonate rock	--	2.8	--	--	52.4
C-35	Sandstone, carbonatic and carbonate rock	--	3.9	--	--	56.3
C-34	Carbonate rock	--	.9	--	--	57.2
C-33	Carbonate rock	--	1.0	--	--	58.2
C-32	Chert	--	.3	--	--	58.5
C-31	Mudstone, carbonatic	--	.6	--	--	59.1
C-30	Mudstone	--	.1	--	--	59.2
C-29	Carbonate rock	--	5.3	--	--	64.5
C-28	Carbonate rock	--	1.1	--	--	65.6

C-27	Mudstone, carbonatic	--	2.6	--	--	68.2
C-26	Carbonate rock	--	3.4	--	--	71.6
C-25	Carbonate rock	--	3.2	--	--	74.8
C-24	Carbonate rock	--	7.4	--	--	82.2
C-23	Carbonate rock, cherty	--	.7	--	--	82.9
C-22	Chert	--	.9	--	--	83.8
C-21	Carbonate rock, cherty	--	.9	--	--	84.7
C-20	Chert, carbonatic	--	2.7	--	--	87.4
C-19	Chert, carbonatic	--	3.6	--	--	91.0
C-18	Chert	--	.7	--	--	91.7
C-17	Mudstone	--	.7	--	--	92.4
C-16	Chert	--	1.3	--	--	93.7
C-15	Carbonate rock	--	2.0	--	--	95.7
C-14	Carbonate rock	--	3.7	--	--	99.4
C-13	Carbonate rock	--	3.0	--	--	102.4
C-12	Carbonate rock	--	.5	--	--	102.9
C-11	Carbonate rock	--	1.8	--	--	104.7
C-10	Carbonate rock, argillaceous	--	1.9	--	--	106.6
C- 9	Carbonate rock, argillaceous	--	5.1	--	--	111.7
C- 8	Carbonate rock, argillaceous	--	2.2	--	--	113.9
C- 7	Sandstone	5169-RAS	1.6	1.3	63.8	115.5
C- 6	Mudstone	--	1.6	--	--	117.1
C- 5	Mudstone	--	1.0	--	--	118.1
C- 4	Chert and mudstone	--	1.1	--	--	119.2
C- 3	Chert, argillaceous	--	.9	--	--	120.1
C- 2	Chert and carbonate rock	--	1.2	--	--	121.3
C- 1	Chert and mudstone	--	4.7	--	--	126.0
	B member of Phosphoria formation					
B- 8	Phosphate rock	--	0.1	--	--	0.1
B- 7	Mudstone	--	.1	--	--	0.2
B- 6	Sandstone, contains pyrite	--	.2	--	--	0.4
B- 5	Sandstone, phosphatic	5168-RAS	.7	13.3	45.2	1.1
B- 4	Carbonate rock; fos. col. no. 12255	--	1.6	--	--	2.7
B- 3	Carbonate rock; fos. col. no. 12255	--	.5	--	--	3.2
B- 2	Mudstone, carbonatic; fos. col. no. 12254	--	.6	--	--	3.8
B- 1	Sandstone; fos. col. no. 12253	5167-RAS	3.1	15.0	41.1	6.9
	A member of Phosphoria formation					
A-21	Sandstone	--	2.4	--	--	2.4
A-20	Sandstone and chert; fos. col. no. 12252	--	.4	--	--	3.1
A-19	Carbonate rock, sandy; fos. col. no. 12251	--	1.1	--	--	4.2
A-18	Carbonate rock; fos. col. no. 12250	--	3.2	--	--	7.4

Bull Lake—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)
				P_2O_5	Acid insoluble	
A-17	Carbonate rock, cherty; fos. col. no. 12249 ---	--	2.0	--	--	9.4
A-16	Carbonate rock ----------	--	2.4	--	--	11.8
A-15	Sandstone ----------	--	1.6	--	--	13.4
A-14	Carbonate rock ----------	--	2.1	--	--	15.5
A-13	Chert ----------	--	2.2	--	--	17.7
A-12	Carbonate rock; fos. col. no. 12248----------	--	7.1	--	--	24.8
A-11	Chert ----------	--	4.8	--	--	29.6
A-10	Sandstone, carbonatic ----------	--	5.0	--	--	34.6
A- 9	Chert ----------	--	3.5	--	--	38.1
A- 8	Limestone, carbonatic ----------	--	3.5	--	--	41.6
A- 7	Sandstone, carbonatic ----------	--	5.3	--	--	46.9
A- 6	Sandstone, carbonatic, sandstone, and carbonate rock ----------	--	2.7	--	--	49.6
A- 5	Sandstone, carbonatic ----------	--	1.0	--	--	50.6
A- 4	Sandstone, carbonatic, and carbonatic chert --	--	1.6	--	--	52.2
A- 3	Mudstone, carbonatic----------	--	1.8	--	--	54.0
A- 2	Sandstone, carbonatic ----------	--	1.1	--	--	55.1
A- 1	Sandstone, carbonatic ----------	--	2.7	--	--	57.8
	Phosphoria formation unconformable on Tensleep formation with up to 2 feet of relief at contact.					
	Tensleep formation—not measured					
T- 1	Sandstone ----------	--	--	--	--	--

Conant Creek, Wyo., lot 1330

Phosphoria formation measured and sampled in a bulldozer trench near Conant Creek, S½SE¼ sec. 31, T. 33 N., R. 93 W., Fremont County, Wyo. Beds strike N. 35° W. and dip 31° N. Section measured and sampled by H. W. Peirce, M. A. Warner, R. A. Smart, and R. G. Waring in August 1950. Due to weathering, probable faulting, and covered intervals, the section is poorly represented and not divisible into members. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Dinwoody formation—not measured						
	Phosphoria formation—base not exposed						
P-64	Carbonate rock, argillaceous	--	13.7	--	--	13.7	--
P-63	Carbonate rock, argillaceous	--	5.8	--	--	19.5	--
P-62	Carbonate rock, argillaceous	--	2.3	--	--	21.8	--
P-61	Mudstone	--	4.4	--	--	26.2	--
P-60	Mudstone	--	3.6	--	--	29.8	--
P-59	Chert, argillaceous	--	2.2	--	--	32.0	--
P-58	Mudstone	--	4.6	--	--	36.6	--
P-57	Mudstone, cherty	--	4.9	--	--	41.5	--
P-56	Mudstone; fos. col. no. 12235[1]	--	2.6	--	--	44.1	--
P-55	Carbonate rock; fos. col. no. 12235	--	1.8	--	--	45.9	--
P-54	Mudstone	--	2.7	--	--	48.6	--
P-53	Chert and phosphatic mudstone	--	3.9	--	--	52.5	--
P-52	Mudstone and chert	--	1.3	--	--	53.8	--
P-51	Mudstone and chert	--	1.5	--	--	55.3	--
P-50	Chert	--	1.9	--	--	57.2	--
P-49	Mudstone	--	1.2	--	--	58.4	--
P-48	Mudstone	--	1.3	--	--	59.7	--
P-47	Chert and mudstone; fos. col. no. 12234	5213-RAS	1.5	4.3	64.9	61.2	6.45
P-46	Mudstone and argillaceous phosphate rock	5212-RAS	1.8	11.6	39.9	63.0	27.33
P-45	Phosphate rock, argillaceous, carbonatic	5211-RAS	1.0	14.9	27.4	64.0	42.23
P-44	Mudstone, carbonatic; fos. col. no. 12233	5210-RAS	2.5	2.7	42.4	66.5	48.98
P-43	Mudstone, carbonatic; fos. col. no. 12232	5179-RAS	2.9	3.9	41.8	69.4	60.29
P-42	Mudstone, carbonatic; fos. col. no. 12231	5178-RAS	1.0	3.2	42.1	70.4	63.49
P-41	Phosphate rock, argillaceous; fos. col. no. 12230	5177-RAS	.5	16.4	40.2	70.9	71.69
P-40	Chert	5176-RAS	.6	.8	60.2	71.5	72.17
P-39	Mudstone, phosphatic, carbonatic	5175-RAS	1.6	8.0	44.1	73.1	84.97
P-38	Mudstone, phosphatic, carbonatic	5174-RAS	2.0	9.2	30.6	75.1	**103.37

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.
** Note incompleteness of cumulative data.

Conant Creek—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
P-37	Carbonate rock; fos. col. no. 12228	--	2.2	--	--	77.3	--
P-36	Carbonate rock	--	1.3	--	--	78.6	--
P-35	Carbonate rock	--	2.6	--	--	81.2	--
P-34	Carbonate rock	--	1.6	--	--	82.8	--
P-33	Carbonate rock	--	2.8	--	--	85.6	--
P-32	Carbonate rock	--	4.8	--	--	90.4	--
P-31	Carbonate rock	--	2.5	--	--	92.9	--
P-30	Carbonate rock	--	4.6	--	--	97.5	--
P-29	Carbonate rock	--	3.1	--	--	100.6	--
P-28	Carbonate rock	--	3.7	--	--	104.3	--
P-27	Carbonate rock	--	3.4	--	--	107.7	--
P-26	Carbonate rock	--	3.7	--	--	111.4	--
P-25	Carbonate rock, argillaceous	--	4.5	--	--	115.9	--
P-24	Mudstone, carbonatic	--	3.0	--	--	118.9	--
P-23	Mudstone, carbonatic	--	5.3	--	--	124.2	--
P-22	Mudstone, carbonatic	--	2.1	--	--	126.3	--
P-21	Mudstone	--	6.7	--	--	133.0	--
P-20	Mudstone	--	30.3	--	--	163.3	--
P-19	Covered interval	--	38.0	--	--	201.3	--
P-18	Mudstone	--	3.8	--	--	205.1	--
P-17	Mudstone	--	4.2	--	--	209.3	--
P-16	Mudstone	--	6.6	--	--	215.9	--
P-15	Mudstone, carbonatic	--	3.2	--	--	219.1	--
P-14	Mudstone	--	4.2	--	--	223.3	--
P-13	Mudstone	--	6.6	--	--	229.9	--
P-12	Mudstone, carbonatic	--	5.9	--	--	235.8	--
P-11	Carbonate rock	--	7.0	--	--	242.8	--
P-10	Carbonate rock	--	4.1	--	--	246.9	--
P- 9	Carbonate rock	--	5.4	--	--	252.3	--
P- 8	Mudstone, carbonatic	--	4.4	--	--	256.7	--
P- 7	Carbonate rock	--	6.3	--	--	263.0	--
P- 6	Carbonate rock, argillaceous	--	1.6	--	--	264.6	--
P- 5	Carbonate rock, argillaceous	--	1.8	--	--	266.4	--
P- 4	Carbonate rock	--	1.4	--	--	267.8	--
P- 3	Sandstone, carbonatic and carbonate rock	--	2.0	--	--	269.8	--
P- 2	Sandstone, carbonatic	--	7.0	--	--	276.8	--
P- 1	Carbonate rock, argillaceous	3.0	3.0	--	--	279.8	--

Poison Creek, Wyo., lot 1331

Phosphoria formation sampled in bulldozer trench on west flank of anticline near the head of Poison Creek, NE¼NE¼ sec. 23, T. 30 N., R. 117 W., 4 miles northwest of Labarge Ranger Station, Lincoln County, Wyo. Beds strike N. 14° W. and dip 44° W. Section measured and sampled by R. G. Waring and M. A. Warner in July 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Rex chert member of Phosphoria formation—basal bed only						
R- 1	Sandstone, carbonatic	--	11.0	--	--	11.0	--
	Phosphatic shale member of Phosphoria formation						
P-61	Mudstone	5143-RGW	0.3	4.4	58.1	0.3	1.32
P-60	Mudstone, carbonatic	5142-RGW	1.8	.9	46.4	2.1	2.94
P-59	Mudstone, carbonatic	5141-RGW	3.8	1.0	53.4	5.9	6.74
P-58	Mudstone, cherty and mudstone	5140-RGW	1.5	1.1	65.5	7.4	8.39
P-57	Carbonate rock, argillaceous	5139-RGW	1.8	.3	31.6	9.2	8.93
P-56	Mudstone, carbonatic	5138-RGW	3.2	1.7	59.0	12.4	14.37
P-55	Carbonate rock, phosphatic	5137-RGW	.8	11.3	11.1	13.2	23.41
P-54	Phosphate rock	5136-RGW	.6	31.5	6.2	13.8	42.31
P-53	Phosphate rock	5135-RGW	1.0	34.8	2.8	14.8	77.11
P-52	Mudstone, carbonatic	5134-RGW	2.0	.4	61.0	16.8	77.91
P-51	Phosphate rock	5133-RGW	1.5	32.2	5.8	18.3	126.21
P-50	Phosphate rock	5132-RGW	.7	31.5	11.3	19.0	148.26
P-49	Mudstone and phosphate rock	5131-MAW	1.2	11.7	56.6	20.2	162.30
P-48	Mudstone	5130-MAW	2.0	1.3	77.0	22.2	164.90
P-47	Mudstone and phosphate rock	5129-MAW	1.8	5.4	65.3	24.0	174.62
P-46	Phosphate rock and mudstone	5128-MAW	1.0	21.0	25.6	25.0	195.62
P-45	Phosphate rock, argillaceous	5127-MAW	.7	16.2	32.7	25.7	206.96
P-44	Mudstone	5126-MAW	.8	.5	72.4	26.5	207.36
P-43	Mudstone	5125-MAW	.5	.3	67.4	27.0	207.51
P-42	Mudstone; fos. col. no. 12314[1]	5124-MAW	.7	.4	71.7	27.7	207.79
P-41	Mudstone	5123-MAW	1.3	2.3	71.6	29.0	210.78
P-40	Mudstone	5122-MAW	1.1	2.7	76.9	30.1	213.75
P-39	Mudstone	5121-MAW	1.0	5.8	67.6	31.1	219.55
P-38	Mudstone	5120-MAW	.9	7.7	62.5	32.0	226.48
P-37	Mudstone, carbonatic	5119-MAW	3.5	.9	57.5	35.5	229.63

[1] Fossil collection made by J. E. Smedley, Paleontology and Stratigraphy Branch, U. S. Geological Survey.

Poison Creek—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
P-36	Mudstone, carbonatic	5118-MAW	2.4	7.2	46.8	37.9	246.91
P-35	Mudstone	5117-MAW	1.9	8.6	53.7	39.8	263.25
P-34	Mudstone, phosphatic, carbonatic	5116-MAW	3.8	8.5	40.9	43.6	295.55
P-33	Carbonate rock, argillaceous	5115-MAW	4.2	1.7	40.8	47.8	302.69
P-32	Mudstone, phosphatic, carbonatic	5114-MAW	2.7	9.7	41.3	50.5	328.88
P-31	Phosphate rock, argillaceous	5113-MAW	2.1	19.3	25.8	52.6	369.41
P-30	Phosphate rock, argillaceous	5112-MAW	2.6	23.4	18.2	55.2	430.25
P-29	Carbonate rock	5111-MAW	2.3	2.5	11.7	57.5	436.00
P-28	Carbonate rock, phosphatic	5110-MAW	2.5	9.8	17.0	60.0	460.50
P-27	Phosphate rock, argillaceous	5109-MAW	2.5	19.6	23.8	62.5	509.50
P-26	Phosphate rock and phosphatic mudstone	5108-MAW	1.2	16.7	35.2	63.7	529.54
P-25	Phosphate rock; fos. col. no. 12313	5107-MAW	2.4	34.4	7.7	66.1	612.10
P-24	Phosphate rock and mudstone	5106-MAW	1.0	23.8	24.6	67.1	635.90
P-23	Carbonate rock, argillaceous	4999-MAW	3.2	.2	29.6	70.3	636.54
P-22	Carbonate rock	4998-MAW	3.7	.6	11.8	74.0	638.76
	A fault occurs at the base of sample 4998-MAW. Sample 4997-MAW repeats lower part of sample 5107-MAW and upper part of sample 5106-MAW.						
P-24 and P-25	Phosphate rock and mudstone	4997-MAW	(2.2)	23.0	32.8	--	--
	A fault occurs at the base of sample 4997-MAW. Beds P-25 through P-22 are repeated.						
P-25	Phosphate rock; fos. col. no. 12312	4996-MAW	(2.4)	34.2	5.6	--	--
P-24	Mudstone and phosphate rock	4995-MAW	(1.1)	15.7	47.7	--	--
P-23	Limestone	4994-MAW	(3.3)	.6	12.7	--	--
--	Carbonate rock, argillaceous lens	4993-MAW	(1.8)	.4	44.1	--	--
P-22	Mudstone	4992-MAW	(2.1)	.9	76.4	--	--
P-21	Mudstone	4991-MAW	1.8	.5	84.9	75.8	639.66
P-20	Mudstone	4990-MAW	2.8	.6	71.2	78.6	641.34
P-19	Mudstone, cherty and chert	4989-RGW	2.5	.5	78.7	81.1	642.59
P-18	Mudstone, carbonatic	4988-RGW	2.1	.6	69.9	83.2	643.85
P-17	Mudstone, carbonatic	4987-RGW	2.1	.4	62.1	85.3	644.69
P-16	Mudstone, carbonatic	4986-RGW	1.5	.6	53.5	86.8	645.59
P-15	Mudstone, carbonatic	4985-RGW	2.2	1.5	53.1	89.0	648.89

P-14	Mudstone, carbonatic	4984-RGW	1.0	1.4	51.5	90.0	650.29
P-13	Chert and mudstone	4983-RGW	1.7	.6	56.4	91.7	651.31
P-12	Mudstone, carbonatic, and cherty mudstone; fos. col. no. 12311	4982-RGW	1.8	2.5	54.4	93.5	655.81
P-11	Carbonate rock, argillaceous	4981-RGW	1.7	.4	21.7	95.2	656.49
P-10	Carbonate rock, argillaceous; fos. col. nos. 12310 and 12309	4980-RGW	2.4	1.5	27.0	97.6	660.09
P- 9	Carbonate rock	4979-RGW	1.3	.6	6.4	98.9	660.87
P- 8	Carbonate rock, argillaceous	4978-RGW	1.8	3.9	20.6	100.7	667.89
P- 7	Carbonate rock, argillaceous	4977-RGW	3.2	.6	34.5	103.9	669.81
P- 6	Carbonate rock, argillaceous	4976-RGW	2.0	.8	23.3	105.9	671.41
P- 5	Carbonate rock, argillaceous	4975-RGW	2.8	1.2	23.0	108.7	674.77
P- 4	Carbonate rock, argillaceous	4974-RGW	1.0	1.1	38.5	109.7	675.87
P- 3	Carbonate rock, argillaceous	4973-RGW	1.0	1.7	26.0	110.7	677.57
P- 2	Carbonate rock	4972-RGW	1.1	1.8	10.8	111.8	679.55
P- 1	Phosphate rock, argillaceous; fos. col. no. 12308	4971-RGW	.6	18.4	19.8	112.4	690.59
	Wells formation—top part only						
Cw-8	Carbonate rock	--	2.0	--	--	2.0	--
Cw-7	Carbonate rock	--	4.0	--	--	6.0	--
Cw-6	Carbonate rock	--	3.7	--	--	9.7	--
Cw-5	Carbonate rock	--	1.9	--	--	11.6	--
Cw-4	Sandstone	--	4.0	--	--	15.6	--
Cw-3	Carbonate rock	--	.5	--	--	16.1	--
Cw-2	Sandstone	--	2.0	--	--	18.1	--
Cw-1	Carbonate rock	--	2.0	--	--	20.1	--

Raymond Canyon, Wyo., lot 1312

Upper phosphate zone of the phosphatic shale member of Phosphoria formation measured and sampled on east limb of the Sublette anticline in Raymond Canyon crosscut, NW¼NE¼ sec. 6, T. 26 N., R. 119 W., Lincoln County, Wyo. Beds are vertical and strike north and south. Section measured by M. E. Thompson and R. A. Smart and sampled by Smart in September 1949. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Acid insoluble		
	Phosphatic shale member of Phosphoria formation—upper part only, top not exposed						
P-16	Phosphate rock, argillaceous	4558- RAS	0.4	24.3	15.5	0.4	9.72
P-15	Mudstone	4559- RAS	1.0	4.7	60.6	1.4	14.42
P-14	Mudstone, carbonatic	4556- RAS	4.4	.9	58.0	5.8	18.38
P-13	Mudstone, carbonatic	4555- RAS	1.1	4.2	56.0	6.9	23.00
P-12	Carbonate rock, argillaceous	4560- RAS	1.1	5.4	29.3	8.0	28.94
P-11	Phosphate rock	4554- RAS	.8	24.4	13.3	8.8	48.46
P-10	Phosphate rock, carbonatic	4553- RAS	2.1	18.1	2.8	10.9	86.47
P- 9	Phosphate rock, argillaceous, carbonatic	4552- RAS	.4	15.3	27.9	11.3	92.59
P- 8	Phosphate rock, argillaceous	4551- RAS	.9	27.8	28.0	12.2	117.61
P- 7	Phosphate rock	4550- RAS	1.1	30.3	6.7	13.3	150.94
P- 6	Phosphate rock, argillaceous	4559- RAS	1.1	22.3	23.7	14.4	175.47
P- 5	Mudstone, carbonatic	4543-MET	2.1	2.2	40.2	16.5	180.09
P- 4	Phosphate rock	4542-MET	3.2	25.0	14.2	19.7	260.09
P- 3	Phosphate rock, argillaceous	4541-MET	2.2	15.3	35.6	21.9	293.75
P- 2	Mudstone, carbonatic	4540-MET	3.2	4.8	50.0	25.1	309.11
P- 1	Carbonate rock, argillaceous, phosphatic	4539-MET	4.6	9.6	26.2	29.7	353.27

Cokeville, Wyo., lot 1289

Phosphoria formation sampled 1½ miles northeast of Cokeville, Wyo., NW¼ sec. 4, T. 24 N., R. 119 W., Lincoln County, Wyo., on east limb of a faulted north-plunging anticline. Samples were cut from two hand trenches in the phosphatic shale member. Beds strike N. 30° W. and dip 60° E. Section measured by R. P. Sheldon, R. G. Waring, D. F. Davidson, R. A. Smart, F. J. Anderson, and W. R. Record and sampled by Waring, Smart, M. A. Warner, and A. M. Gutstadt in June 1949. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines laboratory, Albany, Oreg., and for other constituents by Trace Elements Section laboratory, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
	Rex member of Phosphoria formation—basal bed only									
R- 1	Chert and carbonate rock	--	5.0	--	--	--	--	--	5.0	--
	Phosphatic shale member of Phosphoria formation—base not exposed									
	Upper trench									
P-199	Carbonate rock, argillaceous	3751- RPS	0.6	1.2	--	--	--	30.2	0.6	0.72
P-198	Mudstone, carbonatic	3746- RPS	.4	1.5	--	--	--	47.3	1.0	1.32
P-197	Carbonate rock, argillaceous	3747- RPS	.4	.9	--	--	--	29.5	1.4	1.68
P-196	Mudstone, carbonatic	3748- RPS	.4	1.8	--	--	--	51.5	1.8	2.40
P-195	Carbonate rock, argillaceous	3749- RPS	.7	.9	--	--	--	29.5	2.5	3.03
P-194	Mudstone, carbonatic	3750- RPS	.8	4.2	--	--	--	51.2	3.3	6.39
P-193	Mudstone, carbonatic	3721- RPS	.7	1.5	--	--	--	66.3	4.0	7.44
P-192	Mudstone, carbonatic	3722- RPS	3.2	3.2	--	--	--	58.1	7.2	17.68
P-191	Phosphate rock, carbonatic, and carbonatic mudstone	3723- RPS	.4	18.8	--	--	--	19.7	7.6	25.20
P-190	Carbonate rock, argillaceous	3724- RPS	3.4	.7	--	--	--	24.3	11.0	27.58
P-189	Mudstone, carbonatic	3711- RAS	1.1	2.6	--	--	--	40.8	12.1	30.44
P-188	Phosphate rock, argillaceous	3712- RAS	.8	17.2	--	--	--	38.8	12.9	44.20
P-187	Mudstone, phosphatic	3713- RAS	1.3	9.4	--	--	--	54.0	14.2	56.42
P-186	Carbonate rock, argillaceous	3714- RAS	1.5	.3	--	--	--	20.2	15.7	56.87
P-185	Mudstone, carbonatic	3715- RAS	1.6	.7	--	--	--	49.3	17.3	57.99
P-184	Mudstone, carbonatic	3716- RAS	1.2	.7	--	--	--	48.8	18.5	58.83
P-183	Mudstone	3717- RAS	2.3	1.0	--	--	--	69.2	20.8	61.13
P-182	Mudstone, carbonatic	3718- RAS	2.0	1.0	--	--	--	50.3	22.8	63.13
P-181	Mudstone, carbonatic	3719- RAS	.4	3.0	--	--	--	57.0	23.2	64.33
P-180	Carbonate rock, argillaceous	3720- RAS	1.4	1.0	--	--	--	35.0	24.6	65.73
P-179	Carbonate rock, argillaceous	3691- RAS	1.9	.5	--	--	--	19.6	26.5	66.68
P-178	Carbonate rock, argillaceous	3692- RAS	1.7	1.5	--	--	--	39.4	28.2	69.23
P-177	Phosphate rock, argillaceous	3693- RAS	.9	19.3	--	--	--	32.0	29.1	86.60
P-176	Mudstone, carbonatic	3694- RAS	1.1	2.0	--	--	--	61.7	30.2	88.80
P-175	Mudstone, carbonatic	3695- RAS	1.0	1.1	--	--	--	56.5	31.2	89.90

Cokeville—Continued

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
P-174	Carbonate rock, argillaceous	3696- RAS	2.3	0.5	--	--	--	36.4	33.5	91.05
P-173	Mudstone, carbonatic	3697- RAS	2.0	.4	--	--	--	57.8	35.5	91.85
P-172	Mudstone	3698- RAS	.8	1.1	--	--	--	72.9	36.3	92.73
P-171	Phosphate rock, argillaceous, and phosphatic mudstone	3699- RAS	2.2	18.9	--	--	--	40.8	38.5	134.31
P-170	Mudstone	3700- RAS	2.1	1.5	--	--	--	67.3	40.6	137.46
P-169	Carbonate rock, argillaceous	3601- DFD	.9	.6	--	--	--	32.7	41.5	138.00
P-168	Mudstone, carbonatic	3602- DFD	1.8	1.0	--	--	--	62.0	43.3	139.80
P-167	Mudstone	3603- DFD	.5	7.1	--	--	--	61.5	43.8	143.35
P-166	Mudstone	3604- DFD	.9	.7	--	--	--	71.8	44.7	143.98
P-165	Mudstone	3605- DFD	.9	.3	--	--	--	77.4	45.6	144.25
P-164	Mudstone, carbonatic	3606- DFD	1.1	.3	--	--	--	60.8	46.7	144.58
P-163	Mudstone, carbonatic	3607- DFD	.8	.3	--	--	--	65.6	47.5	144.82
P-162	Mudstone	3608- DFD	.9	.4	--	--	--	71.9	48.4	145.18
P-161	Carbonate rock	3609- DFD	.4	3.8	--	--	--	4.0	48.8	146.70
P-160	Phosphate rock, carbonatic	3610- DFD	.8	16.0	--	--	--	14.3	49.6	159.50
P-159	Phosphate rock	3621- DFD	.6	33.2	0.99	0.99	4.72	5.7	50.2	179.42
P-158	Mudstone, carbonatic and carbonate rock	3622- DFD	.6	2.7	3.9	1.77	21.38	41.8	50.8	181.04
P-157	Mudstone, phosphatic, carbonatic	3623- DFD	.9	9.1	4.2	2.30	14.10	42.6	51.7	189.23
P-156	Phosphate rock	3611-RGW	1.0	33.7	.65	.54	5.30	3.5	52.7	222.93
P-155	Phosphate rock	3612-RGW	1.0	32.7	1.3	.75	5.46	7.8	53.7	255.63
P-154	Mudstone, phosphatic	3613-RGW	.6	13.9	5.8	2.97	9.64	43.5	54.3	263.97
P-153	Phosphate rock	3614-RGW	.5	34.3	--	--	--	4.7	54.8	281.12
P-152	Phosphate rock	3615-RGW	.55	28.9	2.0	1.00	8.10	11.8	55.35	297.02
P-151	Phosphate rock	3616-RGW	1.0	32.8	.92	.57	6.92	5.8	56.35	329.82
P-150	Phosphate rock	3617-RGW	1.1	29.2	1.9	.93	7.30	13.6	57.45	361.94
P-149	Mudstone, phosphatic	3618-RGW	.75	12.9	6.0	2.31	6.00	51.6	58.20	371.61
P-148	Carbonate rock, argillaceous, and carbonatic mudstone	3619-RGW	2.4	1.1	4.2	1.94	24.40	38.7	60.60	374.25
P-147	Phosphate rock	3631-RGW	1.2	32.7	1.1	.81	5.30	6.3	61.80	413.49
P-146	Phosphate rock and mudstone	3632-RGW	2.0	27.7	2.3	1.30	4.84	18.3	63.80	468.89
P-145	Phosphate rock and mudstone	3633-RGW	2.4	22.1	4.2	2.00	4.32	32.2	66.20	521.93
P-144	Phosphate rock	3634-RGW	1.4	32.1	1.5	1.50	2.32	11.0	67.60	566.87
P-143	Mudstone, carbonatic	3635-RGW	2.2	1.7	--	--	--	65.8	69.80	570.61
--	Carbonate rock, argillaceous, lens (?) in bed P-143	3636-RGW	(1.4)	.9	--	--	--	36.2	--	--
P-142	Mudstone	3637-RGW	.55	1.8	--	--	--	81.5	70.35	571.60
P-141	Phosphate rock and carbonatic phosphate rock	3638-RGW	.8	17.5	--	--	--	12.5	71.15	585.60

P-140	Carbonate rock, argillaceous, phosphatic	3639-RGW	1.2	9.1	--	--	--	22.3	72.35	596.52
P-139	Carbonate rock, argillaceous	3640-RGW	1.2	.9	--	--	--	37.0	73.55	597.60
P-138	Carbonate rock	3651-RGW	.8	5.6	--	--	--	1.7	74.35	602.08
P-137	Mudstone, phosphatic, carbonatic	3652-RGW	3.0	11.3	--	--	--	34.2	77.35	635.98
P-136	Carbonate rock	3653-RGW	1.7	1.5	--	--	--	12.7	79.05	638.53
P-135	Carbonate rock	3654-RGW	1.5	.8	--	--	--	5.8	80.55	639.73
P-134	Carbonate rock	3655-RGW	.6	1.8	--	--	--	12.7	81.15	640.81
P-133	Phosphate rock, argillaceous	3624- RPS	.4	22.6	--	--	--	28.0	81.55	649.85
P-132	Mudstone	3625- RPS	.5	3.6	--	--	--	66.4	82.05	651.65
P-131	Mudstone, carbonatic	3626- RPS	.6	.4	--	--	--	65.6	82.65	651.89
P-130	Mudstone	3627- RPS	1.2	1.3	--	--	--	75.3	83.85	653.45
P-129	Mudstone	3628- RPS	.7	5.6	--	--	--	64.1	84.55	657.37
--	Carbonate rock, argillaceous, lens in bed P-128	3629- RPS	(.0-.6)	.9	--	--	--	29.3	--	--
P-128	Mudstone	3630- RPS	1.0	3.0	--	--	--	70.7	85.55	660.37
P-127	Mudstone	3641- RPS	.8	6.7	--	--	--	64.9	86.35	665.73
P-126	Mudstone, phosphatic	3642- RPS	1.0	11.2	--	--	--	46.2	87.35	676.93
P-125	Mudstone	3643- RPS	1.3	1.5	--	--	--	81.8	88.65	678.88
P-124	Mudstone, phosphatic	3644- RPS	2.5	10.4	--	--	--	75.8	91.15	704.88
P-123	Carbonate rock, argillaceous	3645- RPS	1.0	1.8	--	--	--	40.5	92.15	706.68
P-122	Mudstone, phosphatic	3646- RPS	.8	9.6	--	--	--	54.4	92.95	714.36
P-121	Mudstone, phosphatic	3647- RPS	.5	10.7	--	--	--	46.5	93.45	719.71
P-120	Mudstone, phosphatic	3648- RPS	1.3	13.2	--	--	--	38.8	94.75	736.87
P-119	Mudstone, carbonatic	3649- RPS	1.6	1.4	--	--	--	51.0	96.35	739.11
P-118	Mudstone	3656-RGW	.8	3.4	--	--	--	68.3	97.15	741.83
P-117	Phosphate rock, argillaceous	3657-RGW	.5	18.2	--	--	--	30.2	97.65	750.93
P-116	Carbonate rock	3658-RGW	1.1	1.9	--	--	--	15.0	98.75	753.02
P-115	Phosphate rock, argillaceous	3659-RGW	.5	18.1	--	--	--	29.0	99.25	762.07
P-114	Carbonate rock, argillaceous, phosphatic	3660-RGW	.7	8.4	--	--	--	18.5	99.95	767.95
P-113	Phosphate rock, argillaceous, carbonatic	3671-RGW	1.4	13.6	--	--	--	22.3	101.35	786.99
P-112	Carbonate rock	3672-RGW	1.0	1.9	--	--	--	1.5	102.35	788.89
P-111	Phosphate rock, argillaceous	3673-RGW	.55	18.1	--	--	--	27.0	102.90	798.84
--	Carbonate rock, lens in bed P-110	3674-RGW	(.8)	1.2	--	--	--	1.7	--	--
P-110	Phosphate rock, argillaceous	3675-RGW	.75	20.4	--	--	--	26.8	103.65	814.14
P-109	Mudstone, carbonatic	3676-RGW	(1.15)	1.1	--	--	--	46.8	--	--
P-108	Carbonate rock	3677-RGW	(.6)	1.1	--	--	--	14.7	--	--
P-107	Phosphate rock, argillaceous	3678-RGW	(.95)	19.7	--	--	--	28.0	--	--
P-106	Mudstone, phosphatic	3679-RGW	(.5)	10.9	--	--	--	46.0	--	--
P-105	Phosphate rock, argillaceous	3680-RGW	(.6)	17.4	--	--	--	30.3	--	--
P-104	Phosphate rock, argillaceous	3701-RGW	(1.8)	20.3	--	--	--	22.2	--	--
P-103	Mudstone, phosphatic	3702-RGW	(1.65)	12.4	--	--	--	39.8	--	--
P-102	Mudstone, carbonatic	3703-RGW	(.6)	4.4	--	--	--	55.0	--	--
P-101	Phosphate rock, argillaceous	3704-RGW	(.8)	16.7	--	--	--	34.0	--	--

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative)
				P_2O_5	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
	Lower trench An overlap probably exists between the two partial sections of the phosphatic shale. The most probable correlation is that bed P-110 in lower trench is equivalent to bed P-38 in upper trench, although considerable uncertainty exists.									
P- 44	Mudstone	3709- RPS	(1.6)	7.6	--	--	--	67.3	--	--
P- 43	Carbonate rock, phosphatic	3710- RPS	(1.3)	15.0	--	--	--	9.3	--	--
P- 42	Phosphate rock, carbonatic	3741- RPS	(.6)	22.2	--	--	--	3.3	--	--
P- 41	Phosphate rock	3742- RPS	(.7)	22.9	--	--	--	11.4	--	--
P- 40	Mudstone, phosphatic, carbonatic	3743- RPS	(1.0)	11.7	--	--	--	25.8	--	--
P- 39	Phosphate rock	3744- RPS	(.7)	30.4	--	--	--	5.0	--	--
P- 38	Phosphate rock	3745- RPS	(1.7)	31.2	--	--	--	5.8	--	--
P- 37	Carbonate rock	3690- RPS	.8	3.5	--	--	--	14.2	104.45	816.94
P- 36	Mudstone, phosphatic	3735- RPS	3.3	12.2	--	--	--	40.5	107.75	857.20
P- 35	Mudstone, phosphatic	3736- RPS	.7	8.2	--	--	--	49.7	108.45	862.94
P- 34	Mudstone, carbonatic	3737-RGW	1.8	7.0	--	--	--	45.8	110.25	875.54
P- 33	Mudstone, carbonatic	3738-RGW	.85	1.9	--	--	--	48.0	111.10	877.16
P- 32	Mudstone, carbonatic	3739-RGW	.9	1.8	--	--	--	47.4	112.00	878.78
P- 31	Carbonate rock, argillaceous	3740-RGW	2.8	.4	--	--	--	44.7	114.80	879.90
P- 30	Carbonate rock	3731-WRR	.7	4.2	--	--	--	16.0	115.50	882.84
P- 29	Mudstone, phosphatic	3732-WRR	.9	10.3	--	--	--	47.8	116.40	892.10
P- 28	Carbonate rock, argillaceous	3725- RPS	2.9	2.3	--	--	--	36.1	119.30	898.78
P- 27	Carbonate rock	3726- RPS	1.1	.9	--	--	--	15.1	120.40	899.76
P- 26	Mudstone, carbonatic	3727- RPS	.7	3.3	--	--	--	42.3	121.10	902.08
P- 25	Mudstone, carbonatic	3728- RPS	1.0	3.9	--	--	--	38.0	122.10	905.98
P- 24	Phosphate rock, argillaceous	3729- RPS	1.3	22.2	--	--	--	29.7	123.40	934.84
P- 23	Phosphate rock, argillaceous	3730- RPS	.5	25.4	--	--	--	27.8	123.90	947.54
P- 22	Phosphate rock, argillaceous, and phosphatic mudstone	3650- RPS	1.0	19.8	--	--	--	32.2	124.90	967.34
P- 21	Mudstone, carbonatic	3661- RPS	.8	7.3	--	--	--	42.3	125.70	973.18
P- 20	Carbonate rock, argillaceous	3662- RPS	1.2	1.1	--	--	--	30.8	126.90	974.50
P- 19	Mudstone	3663- RPS	.6	2.6	--	--	--	74.2	127.50	976.06
P- 18	Mudstone, phosphatic	3664- RPS	1.4	15.6	--	--	--	41.9	128.90	997.90
P- 17	Mudstone	3665- RPS	2.1	3.6	--	--	--	74.2	131.00	1,005.46
P- 16	Mudstone, carbonatic	3666- RPS	1.0	2.7	--	--	--	55.3	132.00	1,008.16
P- 15	Mudstone	3667- RPS	1.0	2.1	--	--	--	76.3	133.00	1,010.26

P- 14	Mudstone, phosphatic, and argillaceous phosphate rock	3668- RPS	1.0	14.7	6.1	1.95	7.52	47.7	134.00	1,024.96
P- 13	Carbonate rock, argillaceous	3669- RPS	1.7	2.6	4.5	1.46	24.78	38.5	135.70	1,029.38
P- 12	Phosphate rock	3670- RPS	1.9	27.7	.88	2.2	8.70	14.3	137.60	1,082.00
--	Carbonate rock, lens in bed P-11	--	(.4)	--	--	--	--	--	--	--
P- 11	Phosphate rock	3705-RGW	1.8	29.6	1.7	.63	7.12	11.7	139.40	1,135.28
P- 10	Phosphate rock	3706-RGW	1.3	29.5	1.7	.68	7.76	12.2	140.70	1,173.64
P- 9	Phosphate rock	3681- FJA	.6	29.8	1.6	.50	7.80	9.0	141.30	1,191.52
P- 8	Phosphate rock	3682- FJA	1.4	28.0	2.2	.58	8.54	13.0	142.70	1,230.72
P- 7	Carbonate rock	3683- FJA	1.2	6.8	--	--	--	7.4	143.90	1,238.88
P- 6	Carbonate rock	3684- FJA	.6	6.1	--	--	--	9.0	144.50	1,242.54
P- 5	Carbonate rock	3685- FJA	.4	1.9	--	--	--	7.4	144.90	1,243.30
P- 4	Phosphate rock, argillaceous	3686- FJA	.6	16.2	--	--	--	31.4	145.50	1,253.02
P- 3	Mudstone, phosphatic, carbonatic	3687- FJA	1.8	13.2	--	--	--	32.8	147.30	1,276.78
P- 2	Carbonate rock	3688- FJA	2.0	1.8	--	--	--	13.6	149.30	1,280.38
P- 1	Phosphate rock, carbonatic	3689- RPS	1.1	16.6	--	--	--	15.0	150.40	1,298.64
	Wells formation—top bed only									
Cw- 1	Carbonate rock A fault separates beds Cw-1 and P-1. Missing stratigraphic interval is unknown.	--	--	--	--	--	--	--	--	--

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