

GEOLOGICAL SURVEY CIRCULAR 262



STRATIGRAPHIC SECTIONS OF THE
PHOSPHORIA FORMATION IN
IDAHO, 1947-48, PART 3

UNITED STATES DEPARTMENT OF THE INTERIOR
Douglas McKay, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

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By F. W. O'Malley, D. F. Davidson, R. A. Hoppin, and R. P. Sheldon

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INTRODUCTION

The U. S. Geological Survey has measured and sampled the Phosphoria formation at many localities in Idaho and other western states. These data will not be fully synthesized and analyzed for several 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 many of the sections in southeastern Idaho (fig. 1), is one of this series and is the third report of data gathered in Idaho during 1947 and 1948. The field and laboratory procedures adopted in these investigations are described rather fully in a companion report (McKelvey and others, 1953).

Many people have taken part in this investigation, which was organized and supervised by V. E. McKelvey. D. A. Bostwick, R. M. Campbell, R. A. Gulbrandsen, R. A. Harris, R. L. Parker, R. A. Smart, J. E. Smedley, R. H. Thurston, and R. G. Waring participated in the description of strata and the collection of samples referred to in this report. D. B. Dimick, Jack George, W. S. Hunziker, J. E. Jones, H. A. Larsen, and T. K. Rigby assisted in the preparation of trenches and the collection, 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.

All the P_2O_5 , F, 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 I. Barlow, A. B. Caemmerer, F. Cuttitta, J. L. Greene, N. Guttag, C. Hoy, E. H. Pendergrass, J. J. Rowe, and A. L. White.

Compilation of the data has been largely by R. P. Sheldon and F. D. Frieske under the supervision of R. W. Swanson. Organization of the tabular data has been largely by Anita Cozzetto.

ACKNOWLEDGMENTS

Special thanks are due W. W. Rubey, J. Steele Williams, and A. E. Weissenborn who have given much advice in planning and organizing the field program.

The cost of both the field and laboratory investigations has been partly borne by the Division of Raw Materials of the Atomic Energy Commission.

It is a pleasure to acknowledge the fine cooperation extended to the field party by the local residents, property owners, and operating phosphate companies, who furnished information and services and gave access to property. A. J. Winters, Superintendent of the Montpelier schools; E. M. Norris, C. T. Russell, and L. E. Traeger of the Anaconda Copper Mining Co.;

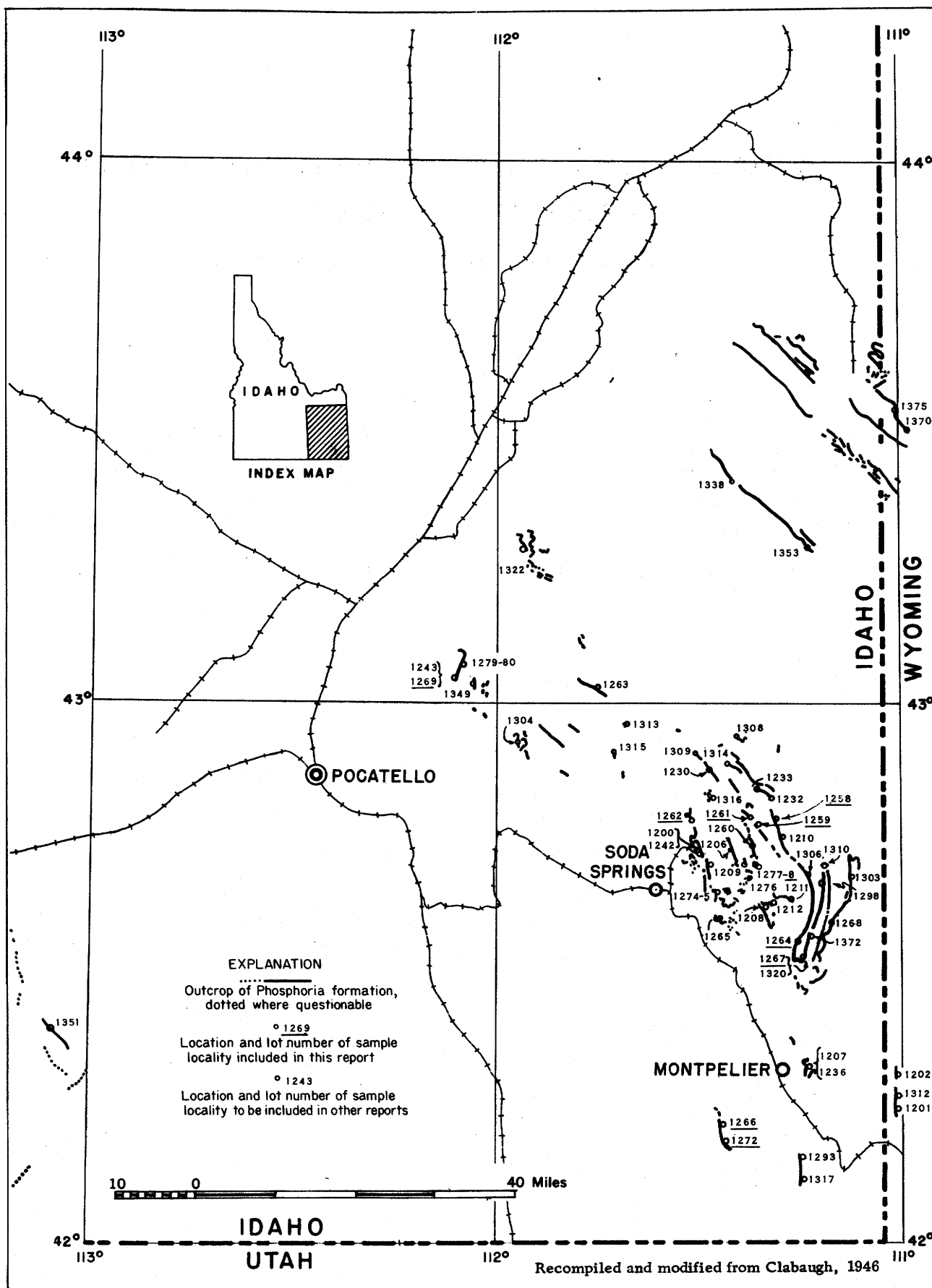


Figure 1.—Outcrops of the Phosphoria formation in Idaho and localities sampled.

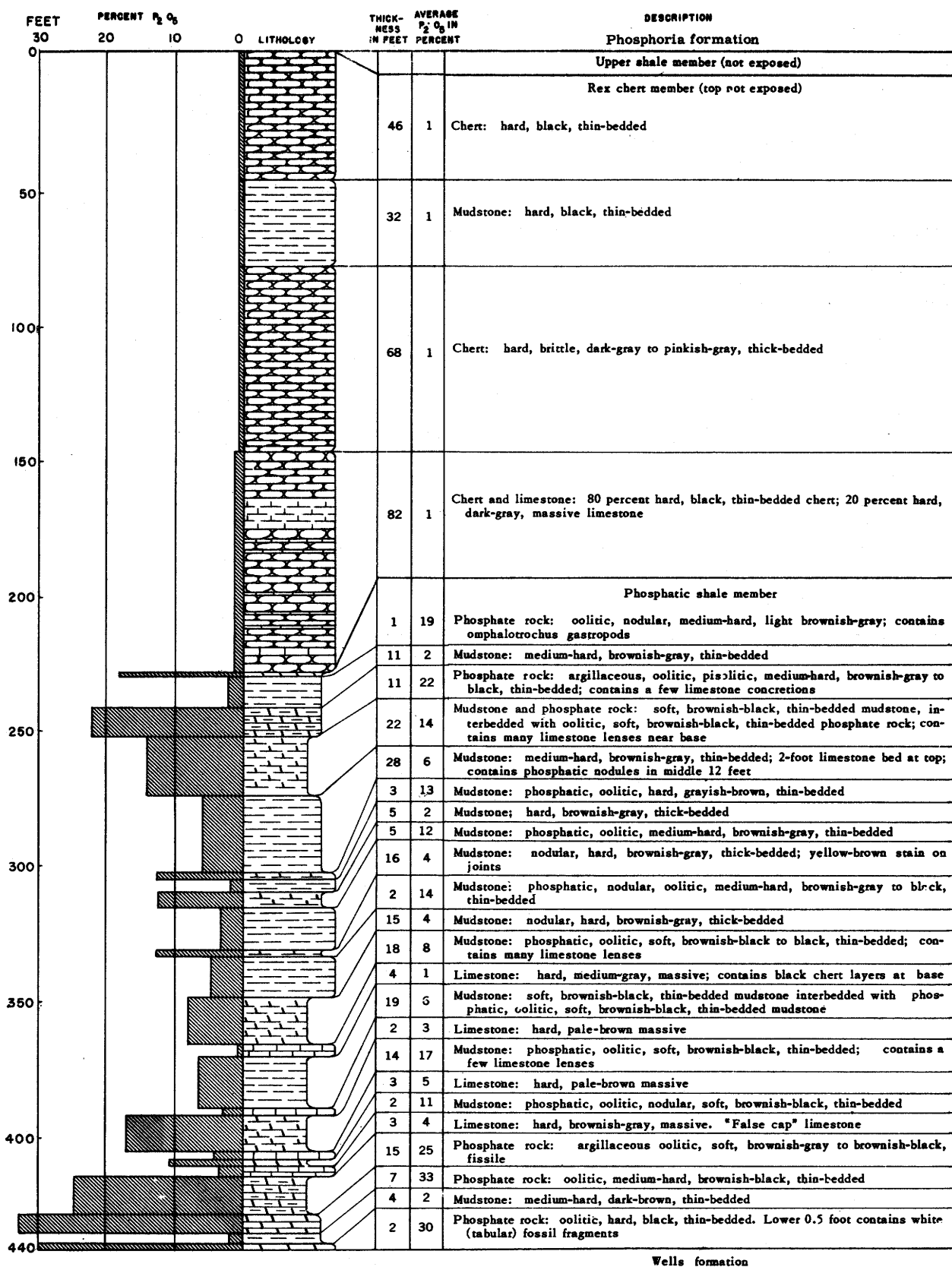


Figure 2.—Generalized section of the Phosphoria formation at Trail Canyon (lot no. 1206).

D. L. King of the San Francisco Chemical Co.; and G. A. McHugh and H. B. Fowler of the Simplot Fertilizer Co. have been especially helpful in this connection.

STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN SOUTHEASTERN IDAHO

At its type locality in southeastern Idaho (Richards and Mansfield, 1912), the Phosphoria formation consists of a lower member, the phosphatic shale, about 180 feet thick and an upper member, the Rex chert, about 240 feet thick; in most of southeastern Idaho and western Wyoming, however, another member, a thin-bedded cherty mudstone 15 to 75 feet thick, overlies the Rex chert member, though it is not well defined at the type locality.

The Phosphoria formation overlies the Wells formation of Pennsylvanian age and underlies the Dinwoody formation of Triassic age. The upper 50 to 75 feet of the Wells formation consists of gray fossiliferous cherty limestone that contains some thin phosphatic layers. It may be the correlative of the lowermost member (A member) of the Phosphoria formation in Montana and the lower limestone member of the Park City formation in Utah (McKelvey, 1949).

In southeastern Idaho most of the phosphatic beds are in the phosphatic shale member, and it is on this member that most of our studies have been focused. It consists of many thin layers, some of which persist

over the whole area. They may be grouped into several broad units, as yet unnamed, as shown on figure 2.

STRATIGRAPHIC SECTIONS

Abstracts of stratigraphic sections measured at 10 localities, and the available analytical data, are presented in the following pages. Their locations, as well as the locations of the sections reported (McKelvey, and others, 1953a, b) previously and of others to be reported later, are shown on figure 1.

REFERENCES

- Clabaugh, P. S., 1946, Permian phosphate deposits of Montana, Idaho, Wyoming, and Utah: U. S. Geol. Survey, Strategic Minerals Investigations Preliminary Map 3-198.
- McKelvey, V. E., 1949, Geological studies of the western phosphate field: Am. Inst. Min. Met. Eng. Mining Trans., v. 184, p. 270-279.
- McKelvey, V. E., Davidson, D. F., O'Malley, F. W., and Smith, L. E., 1953a, Stratigraphic sections of the Phosphoria formation in Idaho, 1947-48, part I: U. S. Geol. Survey Circ. 208.
- _____, Armstrong, F. C., Gulbrandsen, R. A., and Campbell, R. M., 1953b, Stratigraphic sections of Phosphoria formation in Idaho, 1947-48, part II: U. S. Geol. Survey Circ. 261.
- Richards, R. W., and Mansfield, G. R., 1912, The Bannock overthrust: a major fault in southeastern Idaho and northeastern Utah: Jour. Geology, v. 20, p. 684.

FORT HALL INDIAN RESERVATION, SIMPLOT FERTILIZER COMPANY MINE, IDAHO. LOT NO. 1269.

Lower part of phosphatic shale member of Phosphoria formation, weathered and unweathered sections, sampled in pits at Simplot mine, Fort Hall Indian Reservation, sec. 22, T. 4 S., R. 37 E., Bingham County, Idaho. Section measured by F. W. O' Malley and R. A. Harris and sampled by R. A. Smart in October 1948. Samples analyzed for P_2O_5 , fluorine, and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by Trace Elements Section Laboratory, U. S. Geological Survey, 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	F	Loss on ignition	Acid insoluble		

Phosphatic shale member of Phosphoria formation

Hard, unaltered section

Pit C

P-50	Mudstone	2721-WOM	1.5	1.5	--	--	--	--	83.2	1.5	2.25
P-49	Phosphate rock	2720-WOM	0.8	30.8	--	--	--	--	13.5	2.3	26.89
P-48	Mudstone	2718-WOM	10.0	0.6	--	--	--	--	85.5	12.3	32.89
P-47	Mudstone and phosphatic mudstone	2717-WOM	0.6	4.3	--	--	--	--	71.6	12.9	35.47
P-46	Mudstone	2716-WOM	1.8	5.1	--	--	--	--	75.1	14.7	44.65
P-45	Mudstone, phosphatic	2715-WOM	0.9	16.7	--	--	--	--	44.4	15.6	59.68
P-44	Mudstone, phosphatic	2714-WOM	1.6	7.9	--	--	--	--	61.3	17.2	72.32
P-43	Phosphate rock, argillaceous	2719-WOM	0.9	19.7	--	--	--	--	33.0	18.1	90.05
P-42	Phosphate rock, argillaceous	2713-WOM	1.1	25.0	--	--	--	--	21.8	19.2	117.55
P-41	Phosphate rock, argillaceous	2712-WOM	0.8	17.5	--	--	--	--	43.7	20.0	131.55
P-40	Mudstone, phosphatic	2711-WOM	1.1	16.2	--	--	--	--	46.8	21.1	149.37
P-39	Phosphate rock, argillaceous	2710-WOM	1.0	17.0	--	--	--	--	38.8	22.1	166.37
P-38	Mudstone, phosphatic	2709-WOM	1.2	15.7	--	--	--	--	44.9	23.3	185.21
P-37	Limestone, argillaceous	2708-WOM	1.6	1.6	--	--	--	--	23.4	24.9	187.77
P-36	Mudstone, phosphatic	2706-WOM	3.0	1.4	--	--	--	--	3.4	27.9	191.97
--	Limestone concretion	2707-WOM	(1.2)	14.6	--	--	--	--	44.8	--	--
P-35	Phosphate rock, argillaceous, calcareous	2705-WOM	4.2	17.9	--	--	--	--	31.2	32.1	267.15

About 10.0 feet of section not logged and sampled between bottom of pit C section and top of pit B section; rocks in pit B are stratigraphically below those measured in pit C, but exact correlation is not possible.

Pit B

P-34	Phosphate rock, argillaceous	2275-WOM	1.5	24.7	--	--	--	--	22.8	33.6	304.20
P-33	Limestone	2274-WOM	1.5	3.5	--	--	--	--	4.5	35.1	309.45
P-32	Limestone, phosphatic, argillaceous	2273-WOM	1.7	13.3	--	--	--	--	25.1	36.8	332.06
P-31	Mudstone, calcareous, phosphatic	2272-WOM	0.4	9.4	--	--	--	--	39.7	37.2	335.82

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)						Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	F	Loss on ignition	Acid insoluble		
P-30	Phosphate rock, argillaceous	2271-WOM	1.7	21.0	--	--	--	--	25.7	38.9	371.52
P-29	Phosphate rock, argillaceous	2270-WOM	2.5	23.2	--	--	--	--	24.7	41.4	429.52
P-28	Phosphate rock, argillaceous, calcareous	2269-WOM	1.0	16.2	--	--	--	--	36.8	42.4	445.72
P-27	Mudstone	2160-WOM	1.2	6.9	--	--	--	--	58.9	43.6	454.00
P-26	Phosphate rock, argillaceous	2159-WOM	1.6	15.2	--	--	--	--	37.4	45.2	478.32
P-25	Limestone	2158-WOM	3.4	1.8	--	--	--	--	12.3	48.6	484.44
P-24	Phosphate rock	2157-WOM	1.0	32.0	--	--	--	--	9.9	49.6	516.44
P-23	Phosphate rock	2156-WOM	0.8	28.3	--	--	--	--	12.1	50.4	539.08
P-22	Phosphate rock	2155-WOM	1.7	27.2	--	--	--	--	12.3	52.1	585.32
P-21	Mudstone	2154-WOM	0.5	7.8	--	--	--	--	45.8	52.6	589.22
--	Limestone concretion	2153-WOM	(1.1)	1.5	--	--	--	--	3.3	--	--
P-20	Phosphate rock, argillaceous	2152-WOM	1.6	22.6	--	--	--	--	28.4	54.2	625.38
P-19	Limestone	2151-WOM	1.6	3.1	--	--	--	--	18.7	55.8	630.34
P-18	Mudstone, phosphatic	2150-WOM	1.2	14.6	--	--	--	--	45.3	57.0	647.86
P-17	Mudstone, phosphatic	2149-WOM	0.4	12.3	--	--	--	--	53.7	57.4	652.78
P-16	Phosphate rock	2148-WOM	1.4	33.1	0.63	0.37	--	7.32	7.1	58.8	699.12
P-15	Phosphate rock, argillaceous	2147-WOM	3.2	20.1	2.6	1.1	--	8.26	33.5	62.0	763.44
P-14	Phosphate rock, argillaceous	2146-WOM	0.6	23.4	3.2	1.3	--	8.74	23.3	62.6	777.48
P-13	Phosphate rock	2145-WOM	0.5	33.1	0.45	0.36	--	5.02	5.8	63.1	794.03
P-12	Phosphate rock	2144-WOM	0.7	32.4	1.3	0.67	--	5.76	7.7	63.8	816.71
--	Limestone concretion	2143-WOM	(0.6)	1.3	0.35	0.27	--	41.52	3.1	--	--
P-11	Phosphate rock	2142-WOM	1.7	27.7	1.4	0.66	--	9.56	14.5	65.5	863.80
P-10	Phosphate rock, argillaceous, calcareous, and argillaceous phosphate rock	2141-WOM	2.9	21.6	1.7	1.3	--	11.62	22.0	68.4	926.44
P-9	Limestone	2140-WOM	1.0	3.8	0.95	0.39	--	37.82	10.7	69.4	930.24
P-8	Phosphate rock	2139-WOM	0.5	28.4	1.2	0.49	2.77	8.92	15.7	69.9	944.44
P-7	Phosphate rock, argillaceous	2138-WOM	1.8	24.1	2.5	0.99	2.47	9.00	23.3	71.7	987.82
P-6	Limestone	2137-WOM	1.7	2.4	--	--	--	--	5.5	73.4	991.90
P-5	Limestone, phosphatic	2136-WOM	1.4	10.9	--	--	1.14	--	7.1	74.8	1,007.16
P-4	Phosphate rock	2279-WOM	2.3	34.2	0.41	0.43	3.53	6.16	4.4	77.1	1,085.82
P-3	Phosphate rock	2278-WOM	3.3	32.2	0.79	0.63	3.46	6.18	8.9	80.4	1,192.08
P-2	Mudstone, phosphatic	2277-WOM	1.0	11.8	--	--	--	--	51.7	81.4	1,203.88
P-1	Limestone, argillaceous	2276-WOM	2.7	1.2	--	--	--	--	43.1	84.1	1,207.12
Base of phosphatic shale member is not exposed; bed P-1 probably lies 3 to 8 feet above base.											

Soft, weathered section

Pit E

P-51	Phosphate rock	2704-WOM	1.2	31.3	--	--	--	--	12.7	1.2	37.56
P-50	Phosphate rock, argillaceous	2703-WOM	0.6	26.4	--	--	--	--	22.0	1.8	53.40
P-49	Phosphate rock, argillaceous	2702-WOM	0.7	23.2	--	--	--	--	31.0	2.5	69.64
P-48	Phosphate rock, argillaceous	2701-WOM	0.5	27.1	--	--	--	--	22.2	3.0	83.19
P-47	Mudstone, phosphatic	2700-WOM	0.3	7.9	--	--	--	--	53.7	3.3	85.56
P-46	Phosphate rock, argillaceous	2699-WOM	0.6	23.9	--	--	--	--	26.4	3.9	99.90
P-45	Phosphate rock, argillaceous	2698-WOM	1.0	23.7	--	--	--	--	27.9	4.9	123.60
P-44	Phosphate rock, argillaceous	2697-WOM	0.5	19.6	--	--	--	--	58.7	5.4	133.40
P-43	Mudstone, phosphatic	2696-WOM	0.7	13.1	--	--	--	--	55.8	6.1	142.57
P-42	Phosphate rock, argillaceous	2695-WOM	1.1	21.3	--	--	--	--	36.1	7.2	166.00
P-41	Mudstone, phosphatic	2694-WOM	0.6	17.6	--	--	--	--	46.2	7.8	176.56
P-40	Phosphate rock, argillaceous	2693-WOM	1.4	17.9	--	--	--	--	40.6	9.2	201.62
P-39	Mudstone, phosphatic	2692-WOM	1.1	8.6	--	--	--	--	58.8	10.3	211.08
P-38	Phosphate rock, argillaceous	2691-WOM	0.5	25.6	--	--	--	--	27.2	10.8	223.88
P-37	Limestone	2690-WOM	2.8	5.6	--	--	--	--	8.9	13.6	239.56
P-36	Phosphate rock	2689-WOM	0.5	26.8	--	--	--	--	18.7	14.1	252.96
P-35	Phosphate rock, argillaceous	2688-WOM	0.6	21.7	--	--	--	--	33.4	14.7	265.98
P-34	Limestone	2687-WOM	1.6	1.7	--	--	--	--	12.8	16.3	268.70
P-33	Phosphate rock	2686-WOM	0.6	34.3	--	--	--	--	6.3	16.9	289.28
P-32	Phosphate rock	2685-WOM	0.8	30.0	--	--	--	--	17.9	17.7	313.28
P-31	Phosphate rock	2684-WOM	0.2	29.1	--	--	--	--	16.5	17.9	319.10
P-30	Phosphate rock	2683-WOM	0.3	33.5	--	--	--	--	6.9	18.2	329.15
P-29	Phosphate rock, argillaceous	2667-WOM	0.7	25.8	--	--	--	--	22.8	18.9	347.21

Pit C north

Beds P-32 through P-29 were resampled in Pit C north; they are equivalent to beds of the same number in Pit E.

P-32	Phosphate rock	2682-WOM	(0.7)	34.4	0.87	0.59	--	3.36	7.4	--	--
P-31	Phosphate rock	2681-WOM	(0.5)	29.0	1.9	0.85	--	4.60	18.2	--	--
P-30	Phosphate rock	2680-WOM	(0.5)	33.9	1.2	0.48	--	4.32	8.2	--	--
P-29	Phosphate rock	2679-WOM	(0.7)	28.1	3.3	1.2	--	5.78	18.6	--	--
P-28	Phosphate rock	2678-WOM	1.2	32.9	1.6	0.71	--	4.26	10.0	20.1	386.69
P-27	Phosphate rock	2677-WOM	0.5	28.5	--	--	--	--	19.8	20.6	400.94
P-26	Phosphate rock, argillaceous	2676-WOM	0.6	25.2	--	--	--	--	28.9	21.2	416.06
P-25	Mudstone, phosphatic	2675-WOM	0.4	8.3	--	--	--	--	68.9	21.6	419.38
P-24	Phosphate rock, argillaceous	2674-WOM	0.6	23.7	--	--	--	--	31.7	22.2	433.60
P-23	Phosphate rock, argillaceous	2673-WOM	0.7	11.9	--	--	--	--	41.0	22.9	446.83
P-22	Phosphate rock, argillaceous	2672-WOM	1.2	27.4	--	--	--	--	23.2	24.1	479.71
P-21	Phosphate rock, argillaceous	2671-WOM	1.1	24.3	--	--	--	--	30.4	25.2	506.44
P-20	Mudstone, phosphatic	2670-WOM	1.2	8.8	--	--	--	--	60.2	26.4	517.00

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)						Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	F	Loss on ignition	Acid insoluble		
P-19	Mudstone, phosphatic	2669-WOM	1.9	14.5	--	--	--	--	52.5	28.3	544.55
P-18	Phosphate rock, argillaceous	2668-WOM	0.4	23.8	3.3	1.3	--	5.48	29.5	28.7	554.07
P-17	Phosphate rock	2666-WOM	1.4	34.0	0.74	0.43	--	5.28	7.0	30.1	601.67
P-16	Phosphate rock, argillaceous	2665-WOM	1.4	21.7	2.8	1.1	--	5.72	36.0	31.5	632.05
--	Chert concretion	2664-WOM	(0.6)	7.2	0.92	1.9	--	2.70	75.2	75.2	--
P-15	Phosphate rock, argillaceous	2663-WOM	1.3	26.3	3.0	1.1	--	5.46	24.9	32.8	666.24
P-14	Phosphate rock	2662-WOM	0.8	31.7	1.3	0.59	--	4.56	12.1	33.6	691.60
P-13	Phosphate rock	2661-WOM	1.5	29.4	2.3	0.84	--	5.84	16.3	35.1	735.70
P-12	Phosphate rock, argillaceous	2660-WOM	0.8	23.2	6.0	1.7	--	5.30	31.6	35.9	754.26
P-11	Phosphate rock	2659-WOM	0.7	31.6	2.2	0.77	--	4.36	13.4	36.6	776.38
P-10	Phosphate rock, argillaceous	2658-WOM	2.5	24.4	3.6	1.1	--	4.52	29.2	39.1	837.38
P- 9	Phosphate rock, argillaceous	2657-WOM	0.4	19.2	6.1	2.1	--	4.50	38.8	39.5	845.06
P- 8	Phosphate rock, argillaceous	2656-WOM	0.7	25.3	4.5	2.0	--	3.88	26.0	40.2	862.77
P- 7	Phosphate rock	2655-WOM	2.4	35.1	0.61	0.53	--	4.40	3.5	42.6	947.01
P- 6	Phosphate rock	2654-WOM	3.7	31.9	0.89	0.55	--	4.84	10.2	46.3	1,065.04
P- 5	Phosphate rock, argillaceous	2653-WOM	0.8	18.3	--	--	--	--	38.2	47.1	1,079.68
P- 4	Mudstone	2652-WOM	2.5	2.9	--	--	--	--	78.2	49.6	1,086.93
P- 3	Phosphate rock	2651-WOM	0.4	30.4	--	--	--	--	15.9	50.0	1,099.09
P- 2	Mudstone and chert	2650-WOM	1.7	2.6	--	--	--	--	83.4	51.7	1,103.51
P- 1	Mudstone, phosphatic	2280-WOM	0.9	43.9	--	--	--	--	50.5	52.6	1,116.02

WOODALL CREEK, IDAHO. LOT NO. 1262.

Phosphatic shale member of Phosphoria formation sampled in bulldozer trench, NW $\frac{1}{4}$ sec. 26, T. 7 S., R. 42 E., Caribou County, Idaho, on east limb of faulted anticline. Beds strike N. 5° W. and dip 35° E. Section measured by V. E. McKelvey, R. A. Gulbrandsen, F. W. O' Malley, R. L. Parker, R. P. Sheldon, and R. G. Waring and sampled by Waring and T. K. Rigby in August 1948. Samples analyzed for P₂O₅ and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by Trace Elements Section Laboratory, U. S. Geological Survey, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—basal beds only										
R- 2	Mudstone	1177-WOM	6.0	0.7	--	--	--	85.9	6.0	4.20
R- 1	Chert	1176-WOM	2.0	0.7	--	--	--	91.7	8.0	5.60
Phosphatic shale member of Phosphoria formation										
P-92	Mudstone	1175-WOM	1.1	2.3	--	--	--	79.5	1.1	2.53
P-91	Mudstone; fos. col. no. 48-JES-205 ¹	1174-WOM	1.5	0.6	--	--	--	81.5	2.6	3.43
P-90	Mudstone	1170-WOM	0.6	0.7	--	--	--	79.8	3.2	3.85
P-89	Mudstone; fos. col. no. 48-JES-204	1169-WOM	0.9	3.1	--	--	--	72.9	4.1	6.64
P-88	Mudstone, phosphatic; fos. col. no. 48-JES-203	1168-WOM	1.5	8.8	--	--	--	63.2	5.6	19.84
P-87	Phosphate rock, argillaceous; fos. col. no. 48-JES-202	1167-WOM	0.9	19.5	--	--	--	41.0	6.5	37.39
P-86	Mudstone	1166-WOM	0.8	5.0	--	--	--	68.5	7.3	41.39
P-85	Phosphate rock	1165-WOM	2.7	31.2	1.8	1.1	3.16	13.6	10.0	125.63
P-84	Phosphate rock, argillaceous	1164-WOM	0.5	24.2	5.3	1.9	4.08	25.9	10.5	137.73
From 1164-WOM to top of section units are weathered, slumped, and poorly exposed making thicknesses measured of questionable value.										
P-83	Phosphate rock, argillaceous	2000-WOM	0.4	21.1	5.3	1.8	5.34	34.1	10.9	146.17
P-82	Phosphate rock and phosphatic mudstone	1999-WOM	0.5	19.1	5.7	1.9	5.88	39.0	11.4	155.72
P-81	Phosphate rock	1998-WOM	0.6	31.7	2.8	1.0	6.10	10.9	12.0	174.74
P-80	Phosphate rock, argillaceous	1997-WOM	1.2	23.1	4.4	1.5	11.08	24.9	13.2	202.46
P-79	Phosphate rock, argillaceous	1996-WOM	3.7	21.7	5.3	1.9	13.38	25.8	16.9	282.75
P-78	Phosphate rock, argillaceous	1995-WOM	1.9	22.8	5.3	2.1	8.66	27.9	18.8	326.07
P-77	Phosphate rock, argillaceous	1994-WOM	1.8	21.9	5.5	2.2	6.30	33.2	20.6	365.49
P-76	Mudstone	1993-WOM	1.0	7.1	9.5	3.6	5.64	73.0	21.6	372.59
P-75	Phosphate rock, argillaceous	1992-WOM	1.2	21.0	5.6	2.5	6.02	35.3	22.8	397.79
P-74	Phosphate rock, argillaceous	1991-WOM	0.4	27.1	1.8	1.2	3.44	24.3	23.2	408.63
P-73	Mudstone, phosphatic; fos. col. no. 48-JES-201	1990-WOM	3.3	8.4	--	--	--	68.2	26.5	436.35
P-72	Mudstone	1989-WOM	1.9	4.4	--	--	--	79.0	28.4	444.71

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	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
P-71	Phosphate rock, argillaceous; fos. col. no. 48-JES-200	1988-WOM	1.3	20.5	--	--	--	42.1	29.7	471.36
P-70	Mudstone	1987-WOM	1.2	4.9	--	--	--	79.3	30.9	477.24
P-69	Mudstone, phosphatic; fos. col. no. 48-JES-199	1986-WOM	1.0	16.4	--	--	--	49.9	31.9	493.64
P-68	Mudstone, phosphatic; fos. col. no. 48-JES-198	1985-WOM	2.5	8.3	--	--	--	68.1	34.4	514.39
P-67	Mudstone, phosphatic; fos. col. no. 48-JES-197	1984-WOM	1.2	9.2	--	--	--	65.9	35.6	525.43
P-66	Phosphate rock, argillaceous	1983-WOM	0.6	22.5	--	--	--	37.1	36.2	538.93
P-65	Mudstone, phosphatic	1982-WOM	0.9	15.1	--	--	--	50.9	37.1	552.52
P-64	Mudstone	1981-WOM	2.5	7.2	--	--	--	69.5	39.6	570.52
P-63	Mudstone	1970-WOM	1.1	6.7	--	--	--	71.5	40.7	577.89
P-62	Phosphate rock and mudstone	1969-WOM	0.6	22.0	--	--	--	33.3	41.3	591.09
P-61	Mudstone, phosphatic	1968-WOM	1.4	14.7	--	--	--	49.1	42.7	611.67
P-60	Phosphate rock, argillaceous	1967-WOM	0.5	22.8	--	--	--	33.5	43.2	623.07
P-59	Mudstone, phosphatic	1966-WOM	1.4	15.1	--	--	--	46.8	44.6	644.21
P-58	Mudstone	1965-WOM	2.0	3.6	--	--	--	79.1	46.6	651.41
P-57	Mudstone	2620-WOM	0.7	0.0	--	--	--	87.6	47.3	651.41
P-56	Mudstone	2619-WOM	3.3	1.0	--	--	--	86.7	50.6	654.71
P-55	Mudstone; fos. col. no. 48-JES-196	2618-WOM	2.4	5.7	--	--	--	71.1	53.0	668.39
P-54	Mudstone	2617-WOM	1.6	4.9	--	--	--	76.6	54.6	676.23
P-53	Mudstone; fos. col. no. 48-JES-195	2616-WOM	1.0	1.0	--	--	--	87.9	55.6	677.23
P-52	Phosphate rock, argillaceous	2615-WOM	0.3	28.3	--	--	--	21.7	55.9	685.72
P-51	Mudstone; fos. col. no. 48-JES-194	2614-WOM	2.5	6.1	--	--	--	73.7	58.4	700.97
P-50	Mudstone	2613-WOM	1.1	5.5	--	--	--	75.0	59.5	707.02
P-49	Phosphate rock, argillaceous	2612-WOM	0.6	27.0	--	--	--	23.5	60.1	723.22
P-48	Mudstone, phosphatic	2611-WOM	0.6	10.0	--	--	--	63.7	60.7	729.22
P-47	Phosphate rock	2610-WOM	0.4	33.5	--	--	--	10.3	61.1	742.62
P-46	Mudstone	2609-WOM	1.5	0.8	--	--	--	88.1	62.6	743.82
P-45	Mudstone	2608-WOM	0.9	2.4	--	--	--	85.0	63.5	745.98
P-44	Phosphate rock, argillaceous	2607-WOM	0.8	20.8	--	--	--	33.1	64.3	762.62
P-43	Mudstone; fos. col. no. 48-JES-193	2606-WOM	2.4	5.5	--	--	--	74.1	66.7	775.82
P-42	Mudstone	2605-WOM	0.8	1.2	--	--	--	84.5	67.5	776.78
P-41	Mudstone	2604-WOM	0.9	6.7	--	--	--	68.1	68.4	782.81
P-40	Mudstone	2603-WOM	0.6	1.2	--	--	--	86.0	69.0	783.53
P-39	Mudstone	2602-WOM	0.8	3.1	--	--	--	80.6	69.8	786.01
P-38	Mudstone, phosphatic and chert	2601-WOM	1.1	9.8	--	--	--	59.0	70.9	796.79
P-37	Mudstone and phosphatic mudstone	1190- RPS	1.5	3.5	--	--	--	78.1	72.4	802.04
P-36	Mudstone, phosphatic; fos. col. no. 48-JES-192	1189- RPS	1.7	12.6	--	--	--	52.3	74.1	823.46

P-35	Mudstone	1188- RPS	0.3	2.9	--	--	--	76.3	74.4	824.33
P-34	Mudstone	1187-WOM	4.2	3.7	--	--	--	77.0	78.6	839.87
P-33	Mudstone	1186-WOM	0.5	1.2	--	--	--	84.0	79.1	840.47
1186-WOM is interrupted in trench, possibly due to a fault, and next few beds below are weathered and hard to distinguish.										
P-32	Mudstone, phosphatic	1199-WOM	1.0	8.1	--	--	--	62.3	80.1	848.57
P-31	Mudstone, phosphatic	1198-WOM	1.7	9.8	--	--	--	58.7	81.8	865.23
P-30	Mudstone	1197-WOM	0.5	3.9	--	--	--	74.3	82.3	867.12
P-29	Phosphate rock, argillaceous	1975- RGW	3.0	23.2	--	--	--	27.2	85.3	936.78
P-28	Phosphate rock, argillaceous	1974- RGW	1.7	24.2	--	--	--	24.6	87.0	977.92
P-27	Phosphate rock and mudstone	1973- RGW	1.8	18.3	--	--	--	40.3	88.8	1,010.86
P-26	Mudstone, phosphatic	1972- RGW	2.0	11.1	--	--	--	51.8	90.8	1,033.06
P-25	Chert	1971- RGW	1.4	6.1	--	--	--	77.5	92.2	1,041.60
P-24	Phosphate rock, argillaceous; fos. col. no. 48-JES-191	1196- RPS	1.4	18.0	--	--	--	39.0	93.6	1,066.80
P-23	Phosphate rock	1195- RPS	0.4	35.2	1.3	1.6	3.60	3.6	94.0	1,080.88
P-22	Phosphate rock	1194- RPS	0.3	33.4	1.4	1.2	4.66	6.4	94.3	1,090.90
P-21	Phosphate rock	1193- RPS	1.6	32.3	1.9	1.0	4.92	9.1	95.9	1,142.58
P-20	Phosphate rock, argillaceous, and phosphatic mudstone	1192- RPS	0.5	24.8	4.8	1.8	4.48	25.7	96.4	1,154.98
P-19	Mudstone and phosphatic mudstone	1191- RPS	0.3	14.1	7.5	2.2	4.10	53.8	96.7	1,159.21
P-18	Phosphate rock	1185- VEM	1.0	35.6	0.89	0.59	4.08	3.0	97.7	1,194.81
P-17	Phosphate rock	1184- VEM	0.7	28.3	3.8	1.5	4.80	18.2	98.4	1,214.62
P-16	Phosphate rock	1183- VEM	1.7	33.4	1.7	0.80	3.64	8.5	100.1	1,271.40
P-15	Phosphate rock	1182- VEM	1.2	31.6	1.8	0.75	4.90	11.3	101.3	1,309.32
P-14	Mudstone and argillaceous phosphate rock	1181- VEM	0.7	20.3	7.3	2.3	2.28	36.1	102.0	1,323.53
P-13	Mudstone and phosphate rock	1173- RAG	1.0	25.6	5.4	2.2	5.88	21.5	103.0	1,349.13
--	Chert lens	--	(0.0-0.25)	--	--	--	--	--	--	--
P-12	Phosphate rock and phosphatic mudstone	1172- RAG	1.05	25.5	2.5	1.3	5.38	24.6	104.05	1,375.91
P-11	Phosphate rock and phosphatic mudstone	1171- RAG	1.38	26.9	4.0	1.4	5.74	18.9	105.43	1,413.03
P-10	Mudstone, phosphatic	1163- RPS	2.3	10.6	7.6	3.32	7.06	54.6	107.73	1,437.41
P-9	Phosphate rock	1162- RPS	1.1	31.7	2.3	1.07	5.94	8.3	108.83	1,472.28
P-8	Mudstone, phosphatic	1161- RPS	0.9	10.4	5.8	2.34	5.58	59.9	109.73	1,481.64
P-7	Phosphate rock and cherty phosphate rock	1155- RLP	1.9	34.0	1.3	0.80	5.42	4.4	111.63	1,546.24
P-6	Phosphate rock	1154- RLP	2.2	33.4	0.93	0.61	5.20	5.9	113.83	1,619.72
P-5	Phosphate rock	1153- RLP	1.2	34.3	0.96	0.64	4.94	3.2	115.03	1,660.88
P-4	Chert and phosphatic mudstone	1152- RLP	0.5	13.1	2.5	2.7	4.30	53.4	115.53	1,667.43
P-3	Phosphate rock	1151- RLP	1.5	31.7	2.5	1.1	3.64	11.0	117.03	1,714.98
P-2	Mudstone	1160-WOM	0.8	1.8	--	--	--	73.0	117.83	1,716.42
P-1	Mudstone, phosphatic	1159-WOM	2.9	8.5	--	--	--	50.7	120.73	1,741.07

* Cumulative data incomplete due to missing information. Computations start from zero after interruption.

** Note incompleteness of cumulative data.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Wells formation—top beds only										
Cw-1	Chert	1158-WOM	3.5	4.6	--	--	--	77.3	3.5	16.10
Cw-2	Mudstone	1157-WOM	3.6	3.9	--	--	--	57.9	7.1	30.14
	Unit 1157-WOM contains gouge and breccia, possibly formed by faulting.									
CW-3	Limestone; fos. col. no. 48-JES-190	1156-WOM	0.7	0.39	--	--	--	4.6	7.8	30.41

BLACKFOOT NARROWS, IDAHO. LOT NO. 1261.

Phosphatic shale member of Phosphoria formation sampled in trench at Blackfoot Narrows approximately 500 yards north of road, sec. 24, T. 7 S., R. 43 E., Caribou County, Idaho, on west limb of Dry Valley anticline. Beds strike N. 70° W. and dip 70° S. Section measured by F. W. O' Malley, R. A. Smart, and R. P. Sheldon and sampled by R. G. Waring in August 1948. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by Trace Elements Section Laboratory, U. S. Geological Survey, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—basal beds only										
R- 8	Chert, argillaceous	1940-WOM	3.0	1.3	--	--	--	89.2	3.0	3.90
R- 7	Mudstone, cherty	1939-WOM	1.0	0.5	--	--	--	88.5	4.0	4.40
R- 6	Mudstone	1938-WOM	0.9	0.5	--	--	--	77.8	4.9	4.85
R- 5	Chert, argillaceous	1937-WOM	0.5	0.6	--	--	--	89.7	5.4	5.15
R- 4	Mudstone	1936-WOM	0.8	0.4	--	--	--	82.5	6.2	5.47
R- 3	Chert	1935-WOM	2.3	2.8	--	--	--	81.9	8.5	11.91
R- 2	Mudstone	1934-WOM	0.7	0.3	--	--	--	82.7	9.2	12.12
R- 1	Chert	1933-WOM	2.4	6.5	--	--	--	72.7	11.6	27.72
Phosphatic shale member of Phosphoria formation										
P-114	Mudstone, calcareous, phosphatic	1932-WOM	0.3	9.8	--	--	--	48.3	0.3	2.94
P-113	Mudstone	1931-WOM	1.0	2.5	--	--	--	74.2	1.3	5.44
P-112	Mudstone	1950-WOM	1.5	1.3	--	--	--	74.5	2.8	7.39
P-111	Mudstone; fos. col. no. 48-JES-147 ¹	1949-WOM	3.0	2.6	--	--	--	70.9	5.8	15.19
P-110	Phosphate rock, argillaceous	1948-WOM	0.8	28.1	--	--	--	21.8	6.6	37.67
P-109	Mudstone; fos. col. no. 48-JES-146	1947-WOM	2.5	2.7	--	--	--	71.1	9.1	44.42
P-108	Mudstone; fos. col. no. 48-JES-145	1946-WOM	3.0	0.7	--	--	--	77.5	12.1	46.52
P-107	Phosphate rock	1945-WOM	0.6	34.5	1.2	0.44	2.16	10.1	12.7	67.22
P-106	Phosphate rock, argillaceous	1944-WOM	0.3	18.2	6.4	2.4	5.68	41.3	13.0	72.68
P-105	Mudstone, phosphatic	1943-WOM	0.6	12.8	6.9	3.0	5.30	54.3	13.6	80.36
P-104	Phosphate rock	1942-WOM	0.7	32.1	1.4	1.0	2.88	13.3	14.3	102.83
P-103	Mudstone	1941-WOM	0.3	6.4	9.4	2.9	6.44	65.3	14.6	104.75
P-102	Phosphate rock	1930-WOM	0.9	30.2	2.5	1.1	4.42	16.1	15.5	131.93
P-101	Phosphate rock	1929-WOM	0.6	31.7	1.4	0.85	3.18	14.7	16.1	150.95
P-100	Phosphate rock	1960-WOM	0.5	28.5	3.1	1.6	4.38	19.9	16.6	165.20
P- 99	Phosphate rock, argillaceous; fos. col. no. 48-JES-144	1959-WOM	2.9	26.8	3.7	0.56	6.28	22.7	19.5	242.92
P- 98	Phosphate rock	1958-WOM	0.4	33.4	1.6	0.67	4.60	7.8	19.9	256.28
P- 97	Phosphate rock	1957-WOM	2.4	32.5	2.0	0.71	6.06	8.3	22.3	334.28
P- 96	Phosphate rock	1956-WOM	4.8	27.9	3.0	2.3	9.42	14.1	27.1	468.20

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	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
P- 95	Phosphate rock, argillaceous, calcareous	1955-WOM	3.1	15.8	7.7	2.2	12.82	37.5	30.2	517.18
P- 94	Mudstone; fos. col. no. 48-JES-143	1954-WOM	2.2	7.3	--	--	--	58.5	32.4	533.24
P- 93	Mudstone, phosphatic	1953-WOM	1.8	15.0	--	--	--	45.8	34.2	560.24
P- 92	Mudstone	1952-WOM	1.2	2.9	--	--	--	70.8	35.4	563.72
P- 91	Mudstone, phosphatic, and argillaceous phosphate rock	1951-WOM	2.0	22.4	--	--	--	28.7	37.4	608.52
P- 90	Mudstone, phosphatic	1964-WOM	0.8	11.8	--	--	--	52.2	38.2	617.96
P- 89	Mudstone; fos. col. nos. 48-JES-142 and 48-JES-141	1963-WOM	4.5	7.4	--	--	--	64.1	42.7	651.26
P- 88	Mudstone, phosphatic	1962-WOM	0.4	13.2	--	--	--	50.7	43.1	656.54
P- 87	Mudstone, phosphatic	1961-WOM	2.2	9.2	--	--	--	65.5	45.3	676.78
P- 86	Mudstone, phosphatic; fos. col. no. 48-JES-140	1928- RAS	1.3	13.4	--	--	--	57.4	46.6	694.20
P- 85	Mudstone; fos. col. no. 48-JES-139	1927- RAS	0.7	1.3	--	--	--	86.3	47.3	695.11
P- 84	Mudstone	1926- RAS	2.5	7.6	--	--	--	69.9	49.8	714.11
P- 83	Limestone, phosphatic	1925- RAS	1.6	9.4	--	--	--	6.3	51.4	729.15
P- 82	Mudstone	1924- RAS	2.6	6.2	--	--	--	71.6	54.0	745.27
P- 81	Mudstone	1923- RAS	1.2	3.2	--	--	--	77.0	55.2	749.11
P- 80	Phosphate rock, argillaceous	1922- RPS	1.4	17.5	--	--	--	41.1	56.6	773.61
P- 79	Mudstone	1921- RPS	0.8	4.4	--	--	--	75.0	57.4	777.13
P- 78	Mudstone and argillaceous phosphate rock	1920- RPS	1.5	9.4	--	--	--	56.2	58.9	791.23
P- 77	Mudstone and phosphatic mudstone	1919- RAS	1.6	3.7	--	--	--	75.7	60.5	797.15
P- 76	Phosphate rock and phosphatic mudstone	1918- RAS	1.6	18.1	--	--	--	35.0	62.1	826.11
P- 75	Mudstone, phosphatic	1917- RAS	0.7	13.7	--	--	--	50.0	62.8	835.70
P- 74	Mudstone, phosphatic; fos. col. no. 48-JES-138	1916- RAS	2.3	10.7	--	--	--	49.6	65.1	860.31
P- 73	Mudstone, phosphatic	1877- RAS	1.8	14.8	--	--	--	45.5	66.9	886.95
P- 72	Mudstone	1880- RAS	1.2	1.4	--	--	--	85.4	68.1	888.63
P- 71	Mudstone	1879- RAS	3.2	2.5	--	--	--	82.5	71.3	896.63
P- 70	Mudstone	1878- RAS	1.7	0.45	--	--	--	87.3	73.0	897.40
P- 69	Mudstone	1876-WOM	1.4	0.4	--	--	--	90.1	74.4	897.96
P- 68	Phosphate rock, argillaceous	1875-WOM	0.4	25.5	--	--	--	27.3	74.8	908.16
P- 67	Mudstone	1874-WOM	1.7	1.7	--	--	--	84.6	76.5	911.05
P- 66	Mudstone	1873-WOM	2.2	0.6	--	--	--	88.1	78.7	912.37
P- 65	Mudstone and phosphatic mudstone	1872-WOM	1.0	4.6	--	--	--	78.1	79.7	916.97
P- 64	Mudstone	1871-WOM	2.6	1.8	--	--	--	85.5	82.3	921.65
P- 63	Mudstone	1915-WOM	1.4	0.5	--	--	--	87.7	83.7	922.35
P- 62	Mudstone	1914-WOM	1.0	0.6	--	--	--	87.8	84.7	922.95
P- 61	Phosphate rock, argillaceous	1913-WOM	0.4	28.4	--	--	--	20.0	85.1	934.31

P- 60	Mudstone	1912-WOM	0.5	5.5	--	--	--	70.6	85.6	937.06
P- 59	Phosphate rock, argillaceous	1911-WOM	0.4	22.1	--	--	--	36.5	86.0	945.90
P- 58	Mudstone	1910-WOM	2.5	1.2	--	--	--	85.7	88.5	948.90
P- 57	Phosphate rock, argillaceous	1909-WOM	0.4	27.3	--	--	--	21.4	88.9	959.82
P- 56	Mudstone	1908-WOM	1.6	1.6	--	--	--	84.3	90.5	962.38
P- 55	Phosphate rock	1907-WOM	0.3	30.3	--	--	--	15.5	90.8	971.47
P- 54	Mudstone	1906-WOM	0.8	1.6	--	--	--	82.4	91.6	972.75
P- 53	Phosphate rock	1905-WOM	0.4	30.6	--	--	--	15.3	92.0	984.99
P- 52	Mudstone	1904-WOM	2.0	5.9	--	--	--	74.3	94.0	996.79
P- 51	Phosphate rock, argillaceous	1903-WOM	0.3	21.4	--	--	--	34.3	94.3	1,003.21
P- 50	Mudstone	1902-WOM	0.8	7.7	--	--	--	63.1	95.1	1,009.37
P- 49	Mudstone	1901-WOM	0.8	0.6	--	--	--	87.4	95.9	1,009.85
P- 48	Mudstone, phosphatic	1900-WOM	1.2	10.7	--	--	--	55.2	97.1	1,022.69
P- 47	Mudstone	1899-WOM	0.6	0.6	--	--	--	88.5	97.7	1,023.05
P- 46	Mudstone	1898-WOM	0.8	4.4	--	--	--	73.8	98.5	1,026.57
P- 45	Mudstone, phosphatic	1897-WOM	3.3	13.1	--	--	--	35.1	101.8	1,069.80
P- 44	Mudstone, phosphatic	1896-WOM	2.5	10.3	--	--	--	53.6	104.3	1,095.55
P- 43	Mudstone	1895-WOM	0.4	2.6	--	--	--	78.6	104.7	1,096.59
P- 42	Mudstone, phosphatic	1894-WOM	1.2	10.1	--	--	--	45.9	105.9	1,108.71
P- 41	Mudstone, phosphatic	1893-WOM	3.0	8.3	--	--	--	52.6	108.9	1,133.61
P- 40	Mudstone and chert	1892-WOM	0.9	6.6	--	--	--	59.3	109.8	1,139.55
P- 39	Mudstone, phosphatic	1891-WOM	2.0	11.9	--	--	--	49.4	111.8	1,163.35
P- 38	Mudstone; fos. col. nos. 438-JES-137 and 48-JES-131	1890-WOM	2.0	6.8	--	--	--	64.5	113.8	1,176.95
P- 37	Mudstone; fos. col. no. 48-JES-130	1889-WOM	1.1	1.7	--	--	--	81.6	114.9	1,178.82
P- 36	Mudstone	1888-WOM	2.0	7.1	--	--	--	65.0	116.9	1,193.02
P- 35	Mudstone; fos. col. no. 48-JES-132	1887-WOM	0.6	3.6	--	--	--	79.1	117.5	1,195.18
P- 34	Mudstone	1886-WOM	4.2	1.9	--	--	--	79.0	121.7	1,203.16
P- 33	Mudstone; fos. col. no. 48-JES-129	1885-WOM	3.7	5.5	--	--	--	70.7	125.4	1,223.51
P- 32	Mudstone	1884-WOM	0.8	0.5	--	--	--	87.9	126.2	1,223.91
P- 31	Mudstone; fos. col. no. 48-JES-133	1883-WOM	0.8	1.2	--	--	--	84.8	127.0	1,224.87
P- 30	Limestone, argillaceous, phosphatic; fos. col. no. 48-JES-134	1882-WOM	3.7	9.6	--	--	--	25.8	130.7	1,260.39
P- 29	Mudstone, phosphatic	1881-WOM	0.5	12.3	--	--	--	54.4	131.2	1,266.54
P- 28	Mudstone, phosphatic	1870-WOM	3.0	16.1	--	--	--	41.0	134.2	1,314.84
P- 27	Mudstone	1869-WOM	0.9	4.0	--	--	--	78.0	135.1	1,318.44
P- 26	Mudstone, phosphatic	1868-WOM	1.7	8.0	--	--	--	64.2	136.8	1,332.04
P- 25	Mudstone, phosphatic; fos. col. no. 48-JES-135	1867-WOM	2.3	15.3	--	--	--	42.9	139.1	1,367.23
P- 24	Phosphate rock, argillaceous	1866-WOM	2.0	22.8	--	--	--	28.7	141.1	1,412.83
P- 23	Phosphate rock	1865-WOM	1.2	30.4	--	--	--	10.6	142.3	1,449.31
P- 22	Mudstone, phosphatic	1864-WOM	2.6	12.3	--	--	--	40.6	144.9	1,481.29
P- 21	Phosphate rock	1863-WOM	0.9	26.8	--	--	--	16.7	145.8	1,505.41
P- 20	Mudstone, phosphatic, and argillaceous phosphate rock	1862-WOM	1.0	19.0	--	--	--	32.0	146.8	1,524.41

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- 19	Mudstone, phosphatic, and argillaceous phosphate rock	1861-WOM	1.6	15.8	--	--	--	49.0	148.4	1,549.69
P- 18	Mudstone, phosphatic	1860-WOM	0.9	15.2	--	--	--	46.0	149.3	1,563.37
P- 17	Phosphate rock	1859-WOM	0.9	28.5	3.1	1.1	4.70	19.7	150.2	1,589.02
P- 16	Phosphate rock	1858-WOM	2.7	32.0	1.6	0.89	5.60	11.1	152.9	1,675.42
P- 15	Phosphate rock, argillaceous	1857-WOM	0.4	18.0	5.4	2.4	5.48	42.7	153.3	1,682.62
P- 14	Phosphate rock	1856-WOM	2.4	34.5	0.85	0.61	4.38	5.8	155.7	1,765.42
P- 13	Phosphate rock	1855-WOM	3.0	34.0	3.2	0.60	3.12	6.9	158.7	1,867.42
P- 12	Phosphate rock, argillaceous	1854-WOM	0.3	17.3	7.8	2.0	6.46	43.7	159.0	1,872.61
P- 11	Phosphate rock	1853-WOM	1.1	29.6	2.0	0.96	5.36	16.0	160.1	1,905.17
P- 10	Phosphate rock, calcareous	1852-WOM	0.5	19.3	6.1	2.8	9.78	3.3	160.6	1,914.82
P- 9	Phosphate rock	1851-WOM	2.0	28.3	3.1	1.0	7.64	15.4	162.6	1,971.42
P- 8	Phosphate rock, argillaceous; fos. col. no. 48-JES-136	1840-WOM	0.5	20.4	5.8	2.1	11.06	28.1	163.1	1,981.62
P- 7	Phosphate rock	1839-WOM	2.6	28.6	2.5	0.89	7.28	14.7	165.7	2,055.98
P- 6	Phosphate rock	1838-WOM	0.9	26.7	2.5	1.3	6.18	19.4	166.6	2,080.01
P- 5	Phosphate rock	1837-WOM	2.0	34.0	0.71	0.48	5.92	3.1	168.6	2,148.01
P- 4	Phosphate rock	1836-WOM	3.5	30.6	1.9	0.62	5.94	9.7	172.1	2,255.11
P- 3	Mudstone	1835-WOM	0.7	1.8	7.9	3.5	11.92	66.7	172.8	2,256.37
P- 2	Mudstone	1834-WOM	2.0	0.8	8.7	3.2	14.50	61.0	174.8	2,257.97
P- 1	Phosphate rock	1833-WOM	0.3	33.7	0.85	0.59	3.82	6.0	175.1	2,268.08
Wells formation—top beds only										
Cw- 1	Limestone	1832-WOM	2.4	0.7	--	--	--	4.3	2.4	1.68
Cw- 2	Limestone	1831-WOM	1.6	0.3	--	--	--	3.4	4.0	2.16

NORTH DRY VALLEY, IDAHO. LOT NO. 1259.

Part of phosphatic shale member of Phosphoria formation sampled in bulldozer trench on west slope of North Dry Valley about 100 feet above valley bottom, sec. 31, T. 7 S., R. 44 E., Caribou County, Idaho, on east limb of Schmid syncline. Section measured by R. A. Hoppin, D. F. Davidson, R. P. Sheldon, and F. W. O' Malley and sampled by R. A. Smart and R. G. Waring in August 1948. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by Trace Elements Section Laboratory, U. S. Geological Survey, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—basal beds only										
R- 4	Chert	1697-WOM	7.0	0.3	--	--	--	94.7	7.0	2.10
R- 3	Chert, argillaceous	1696-WOM	1.2	0.2	--	--	--	92.3	8.2	2.34
R- 2	Chert, argillaceous	1695-WOM	2.5	0.1	--	--	--	93.7	10.7	2.59
R- 1	Chert	1694-WOM	1.9	1.3	--	--	--	89.6	12.6	5.06
Phosphatic shale member of Phosphoria formation—base not exposed										
P-101	Mudstone; fos. col. no. 48-JES-164 ¹	1693-WOM	4.8	1.6	--	--	--	73.6	4.8	7.68
P-100	Mudstone; fos. col. no. 48-JES-163	1692-WOM	5.0	2.6	--	--	--	71.8	9.8	20.68
P- 99	Phosphate rock, argillaceous	1691-WOM	0.8	18.4	--	--	--	41.4	10.6	35.40
P- 98	Mudstone; fos. col. no. 48-JES-162	1690-WOM	4.5	1.6	--	--	--	75.3	15.1	42.60
P- 97	Phosphate rock	1689-WOM	0.5	35.3	1.6	0.56	2.74	6.6	15.6	60.25
P- 96	Phosphate rock, argillaceous	1688-WOM	0.5	18.6	5.8	2.33	4.08	41.6	16.1	69.55
P- 95	Phosphate rock	1687-WOM	0.6	35.1	1.5	0.68	2.74	6.6	16.7	90.61
P- 94	Mudstone	1686-WOM	0.4	7.5	9.3	2.84	4.68	65.6	17.1	93.61
P- 93	Phosphate rock	1685-WOM	0.7	33.2	1.5	0.69	8.70	9.4	17.8	116.85
P- 92	Mudstone, phosphatic	1684-WOM	0.5	10.7	8.2	2.78	5.70	57.1	18.3	122.20
P- 91	Phosphate rock	1683-WOM	0.7	34.2	1.4	0.58	3.18	7.9	19.0	146.14
P- 90	Phosphate rock	1682-WOM	1.2	29.5	3.3	1.12	3.52	17.3	20.2	181.54
P- 89	Mudstone, phosphatic; fos. col. no. 48-JES-161	1681-WOM	0.6	9.1	9.8	3.58	6.14	57.6	20.8	187.00
P- 88	Phosphate rock	1661-WOM	0.4	33.3	1.6	0.83	3.46	9.2	21.2	200.32
P- 87	Mudstone, phosphatic	1660-WOM	0.9	9.8	8.2	3.17	6.50	58.0	22.1	209.14
P- 86	Phosphate rock	1659-WOM	0.6	33.5	2.2	0.98	3.90	8.3	22.7	229.24
P- 85	Phosphate rock	1658-WOM	2.4	34.1	2.0	0.76	3.78	7.4	25.1	311.08
P- 84	Phosphate rock; fos. col. no. 48-JES-160	1657-WOM	4.4	29.4	3.3	1.36	5.98	15.0	29.5	440.44
P- 83	Phosphate rock, argillaceous; fos. col. no. 48-JES-159	1656-WOM	3.4	23.4	4.6	2.23	7.98	25.6	32.9	520.00
P- 82	Phosphate rock, argillaceous; fos. col. no. 48-JES-158	1655- RPS	2.6	17.9	--	--	--	34.5	35.5	566.54
P- 81	Mudstone, phosphatic	1654- RPS	0.5	12.3	--	--	--	47.8	36.0	572.69

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 ₂ O ₅ (cumulative) ⁵
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
P- 80	Mudstone, phosphatic	1653- RPS	0.8	8.3	--	--	--	55.6	36.8	579.33
P- 79	Phosphate rock, argillaceous	1652- RPS	0.7	19.1	--	--	--	37.3	37.5	592.70
P- 78	Mudstone and phosphate rock	1651- RPS	0.9	12.4	--	--	--	55.7	38.4	603.86
P- 77	Mudstone	1650- RPS	1.0	1.6	--	--	--	79.7	39.4	605.46
P- 76	Mudstone	1700-WOM	1.5	18.8	--	--	--	38.8	40.9	633.66
P- 75	Phosphate rock, argillaceous	1699-WOM	0.4	24.0	--	--	--	29.5	41.3	643.26
P- 74	Mudstone, phosphatic; fos. col. no. 48-JES-157	1698-WOM	5.0	8.1	--	--	--	67.4	46.3	683.76
P- 73	Mudstone, phosphatic	1720-WOM	1.5	13.0	--	--	--	58.0	47.8	703.26
P- 72	Phosphate rock, argillaceous	1719-WOM	0.7	27.2	--	--	--	23.4	48.5	722.30
P- 71	Mudstone; fos. col. no. 48-JES-156	1718-WOM	3.3	5.1	--	--	--	76.8	51.8	739.13
P- 70	Mudstone, phosphatic	1717-WOM	2.8	10.3	--	--	--	62.6	54.6	767.97
P- 69	Mudstone; fos. col. no. 48-JES-155	1716-WOM	2.2	5.7	--	--	--	74.4	56.8	780.51
P- 68	Mudstone	1715-WOM	1.0	4.8	--	--	--	72.7	57.8	785.31
P- 67	Mudstone, phosphatic	1714-WOM	1.3	8.6	--	--	--	65.9	59.1	796.49
P- 66	Phosphate rock, argillaceous	1713-WOM	0.7	20.5	--	--	--	39.0	59.8	810.84
P- 65	Mudstone, phosphatic; fos. col. no. 48-JES-165	1712-WOM	3.2	8.7	--	--	--	63.0	63.0	838.68
P- 64	Mudstone	1711-WOM	0.4	4.5	--	--	--	66.4	63.4	840.48
P- 63	Mudstone	1727- DFD	1.3	6.2	--	--	--	70.7	64.7	848.54
P- 62	Phosphate rock, argillaceous	1726- DFD	0.6	24.1	--	--	--	28.0	65.3	863.00
P- 61	Mudstone; fos. col. no. 48-JES-154	1725- DFD	0.7	5.8	--	--	--	71.2	66.0	867.06
P- 60	Mudstone, phosphatic	1724- DFD	1.6	12.3	--	--	--	51.0	67.6	886.74
P- 59	Phosphate rock, argillaceous	1723- DFD	1.1	18.5	--	--	--	37.7	68.7	907.09
P- 58	Mudstone, phosphatic	1722- DFD	0.6	9.8	--	--	--	58.8	69.3	912.97
P- 57	Mudstone, phosphatic	1721- DFD	0.5	11.3	--	--	--	56.3	69.8	918.62
P- 56	Mudstone	1710- DFD	3.7	4.5	--	--	--	76.8	73.5	935.27
P- 55	Mudstone	1709- DFD	4.2	2.0	--	--	--	78.5	77.7	943.67
P- 54	Mudstone	1708- DFD	1.7	1.7	--	--	--	81.5	79.4	946.56
P- 53	Mudstone	1707- DFD	2.0	3.3	--	--	--	81.3	81.4	953.16
P- 52	Mudstone	1706- DFD	3.1	1.5	--	--	--	82.0	84.5	957.81
P- 51	Mudstone, phosphatic	1705- DFD	0.8	10.9	--	--	--	60.5	85.3	966.53
P- 50	Mudstone	1704- DFD	1.0	4.9	--	--	--	78.3	86.3	971.43
P- 49	Limestone, argillaceous	1703- DFD	1.4	3.9	--	--	--	29.7	87.7	976.89
P- 48	Mudstone; fos. col. no. 48-JES-153	1702- DFD	1.4	4.7	--	--	--	76.3	89.1	983.47
P- 47	Mudstone	1701- DFD	1.4	3.6	--	--	--	77.9	90.5	988.51
P- 46	Phosphate rock	1680- DFD	1.1	32.0	--	--	--	13.2	91.6	1,023.71
P- 45	Mudstone, phosphatic	1679- DFD	1.1	15.8	--	--	--	45.8	92.7	1,041.09
P- 44	Mudstone	1678- DFD	1.7	4.2	--	--	--	76.5	94.4	1,048.23
P- 43	Mudstone	1677- DFD	1.2	4.4	--	--	--	71.8	95.6	1,053.51
P- 42	Mudstone, phosphatic	1676- DFD	0.9	10.1	--	--	--	57.8	96.5	1,062.60

P- 41	Mudstone, phosphatic	1675- DFD	2.9	12.3	--	--	--	48.3	99.4	1,098.27
P- 40	Mudstone, phosphatic	1674- DFD	1.0	8.5	--	--	--	57.0	100.4	1,106.77
P- 39	Mudstone	1673- DFD	0.6	2.4	--	--	--	76.8	101.0	1,108.21
P- 38	Mudstone	1672- DFD	1.5	6.1	--	--	--	53.7	102.5	1,117.36
P- 37	Mudstone, phosphatic; fos. col. no. 48-JES-152	1671- DFD	2.7	12.5	--	--	--	48.0	105.2	1,151.11
P- 36	Mudstone	1649- DFD	1.3	7.7	--	--	--	60.0	106.5	1,161.12
P- 35	Mudstone	1648- DFD	0.6	3.7	--	--	--	74.2	107.1	1,163.34
P- 34	Mudstone	1647- DFD	1.1	2.3	--	--	--	76.7	108.2	1,165.87
P- 33	Chert	1646- DFD	0.8	1.3	--	--	--	83.3	109.0	1,166.91
P- 32	Mudstone	1645- DFD	1.9	2.1	--	--	--	78.7	110.9	1,170.90
P- 31	Mudstone; fos. col. no. 48-JES-151	1644- DFD	2.5	3.3	--	--	--	75.3	113.4	1,179.15
P- 30	Mudstone	1643- DFD	0.7	4.4	--	--	--	75.5	114.1	1,182.23
P- 29	Mudstone	1642- DFD	0.9	7.2	--	--	--	63.5	115.0	1,188.71
P- 28	Mudstone	1641- DFD	0.9	2.3	--	--	--	80.5	115.9	1,190.78
P- 27	Mudstone	1640- DFD	0.9	1.5	--	--	--	81.8	116.8	1,192.13
P- 26	Mudstone, phosphatic	1670-WOM	2.7	9.3	--	--	--	59.8	119.5	1,217.24
P- 25	Mudstone; fos. col. no. 48-JES-150	1669-WOM	2.2	6.2	--	--	--	66.3	121.7	1,230.88
P- 24	Phosphate rock, argillaceous	1668-WOM	1.4	19.0	--	--	--	38.6	123.1	1,257.48
P- 23	Phosphate rock, argillaceous; fos. col. no. 48-JES-149	1667-WOM	0.6	20.7	--	--	--	32.3	123.7	1,269.90
P- 22	Mudstone, phosphatic	1666-WOM	1.8	10.0	--	--	--	57.0	125.5	1,287.90
P- 21	Mudstone, phosphatic; fos. col. no. 48-JES-148	1665-WOM	2.3	15.7	--	--	--	44.3	127.8	1,324.01
P- 20	Mudstone, phosphatic	1664-WOM	2.6	14.0	--	--	--	48.1	130.4	1,360.41
P- 19	Phosphate rock, argillaceous	1663-WOM	3.3	25.6	--	--	--	23.0	133.7	1,444.89
P- 18	Mudstone, phosphatic	1662-WOM	1.1	9.5	--	--	--	56.7	134.8	1,455.34
P- 17	Mudstone	1634-WOM	1.6	5.8	--	--	--	54.7	136.4	1,464.62
P- 16	Mudstone, phosphatic	1635-WOM	0.6	14.5	--	--	--	40.7	137.0	1,473.32
P- 15	Mudstone, phosphatic	1636-WOM	0.6	14.0	--	--	--	51.6	137.6	1,481.72
P- 14	Phosphate rock	1637-WOM	0.5	29.2	--	--	--	14.7	138.1	1,496.32
P- 13	Mudstone, phosphatic	1638-WOM	1.0	13.4	--	--	--	53.3	139.1	1,509.72
P- 12	Mudstone, phosphatic	1639-WOM	1.2	15.2	--	--	--	44.2	140.3	1,527.96
P- 11	Phosphate rock, argillaceous	1738- RAH	1.2	20.7	--	--	--	34.5	141.5	1,552.80
P- 10	Phosphate rock, argillaceous	1737- RAH	2.0	18.8	--	--	--	36.7	143.5	1,590.40
P- 9	Phosphate rock	1736- RAH	0.6	32.2	1.3	0.79	4.28	8.8	144.1	1,609.72
P- 8	Phosphate rock	1735- RAH	1.1	31.8	1.9	0.86	4.88	9.5	145.2	1,644.70
P- 7	Phosphate rock and mudstone	1734- RAH	1.0	23.0	4.3	1.75	5.40	28.5	146.2	1,667.70
P- 6	Phosphate rock	1733-WOM	4.0	30.9	2.3	1.04	5.36	11.0	150.2	1,791.30
P- 5	Phosphate rock, argillaceous	1732-WOM	0.7	20.9	6.3	1.97	6.10	32.5	150.9	1,805.93
P- 4	Phosphate rock	1731-WOM	0.6	29.2	3.6	1.17	5.26	12.8	151.5	1,823.45
P- 3	Phosphate rock, argillaceous, calcareous	1730-WOM	0.6	14.7	12.	2.62	8.80	37.0	152.1	1,832.27
P- 2	Phosphate rock	1729-WOM	2.0	28.0	3.4	1.00	5.94	14.5	154.1	1,888.27
P- 1	Phosphate rock	1728-WOM	3.5	30.4	1.6	0.91	6.02	8.5	157.6	1,994.67

KENDALL CANYON, IDAHO. LOT NO. 1258.

Phosphoria formation and upper part of Wells formation sampled in bulldozer trench on northwest side of Kendall Canyon approximately 100 feet above creek, sec. 28, T. 7 S., R. 44 E., Caribou County, Idaho, on west limb of Georgetown syncline. Beds strike N. 30° W. and dip 70° W. Section measured by R. A. Hoppin, D. F. Davidson, R. P. Sheldon, and F. W. O' Malley and sampled by R. A. Smart and R. G. Waring in August 1948. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by Trace Elements Section Laboratory, U. S. Geological Survey, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—top not exposed										
R-11	Mudstone	1633-WOM	10.0	0.7	--	--	--	86.2	10.0	7.00
R-10	Mudstone	1632-WOM	1.6	3.1	--	--	--	77.7	11.6	11.96
R- 9	Mudstone	1631-WOM	2.2	4.6	--	--	--	67.8	13.8	22.08
R- 8	Mudstone, phosphatic	1630-WOM	1.0	7.9	--	--	--	56.8	14.8	29.98
R- 7	Mudstone	1629-WOM	2.0	2.0	--	--	--	77.4	16.8	33.98
R- 6	Limestone, argillaceous	1628-WOM	1.0	0.2	--	--	--	22.2	17.8	34.18
R- 5	Mudstone, calcareous; fos. col. no. 48-JES-123 ¹	1627-WOM	3.5	1.1	--	--	--	75.9	21.3	38.03
R- 4	Mudstone	1626-WOM	4.5	4.3	--	--	--	72.9	25.8	57.38
R- 3	Mudstone	1625- DFD	0.8	3.2	--	--	--	79.4	26.6	59.94
R- 2	Mudstone; fos. col. no. 48-JES-121	1624- DFD	1.2	3.0	--	--	--	82.2	27.8	63.54
R- 1	Chert	1623- DFD	1.1	3.5	--	--	--	83.8	28.9	67.39
Phosphatic shale member of Phosphoria formation										
P-99	Phosphate rock, argillaceous; fos. col. no. 48-JES-122	1622- DFD	0.5	22.7	--	--	--	36.6	0.5	11.35
P-98	Mudstone; fos. col. no. 48-JES-120	1621- DFD	1.8	2.5	--	--	--	76.8	2.3	15.85
P-97	Mudstone; fos. col. no. 48-JES-119	1620- DFD	0.5	1.5	--	--	--	82.3	2.8	16.60
P-96	Mudstone; fos. col. no. 48-JES-118	1619- DFD	0.8	1.6	--	--	--	82.6	3.6	17.88
P-95	Mudstone	1618- DFD	1.3	1.2	--	--	--	80.5	4.9	19.44
P-94	Phosphate rock	1617- DFD	1.2	36.3	0.61	0.32	10.22	3.3	6.1	63.00
P-93	Mudstone, phosphatic	1616- DFD	1.2	9.5	7.7	3.09	5.42	65.1	7.3	74.40
P-92	Mudstone	1615- DFD	0.5	2.1	11.	3.67	4.34	82.9	7.8	75.45
P-91	Phosphate rock and mudstone	1614- DFD	0.5	28.5	1.0	0.68	4.02	21.1	8.3	89.70
P-90	Phosphate rock	1613- DFD	0.6	34.6	3.2	1.71	3.46	7.5	8.9	110.46
P-89	Phosphate rock	1612- DFD	0.8	30.6	2.6	1.15	4.60	16.6	9.7	134.94
P-88	Mudstone, phosphatic	1609-WOM	0.8	9.25	7.4	2.61	5.78	62.9	10.5	142.34
P-87	Phosphate rock	1608-WOM	0.5	35.8	1.9	0.85	7.92	2.8	11.0	160.24
P-86	Phosphate rock	1607-WOM	0.8	30.6	0.68	0.38	6.30	12.5	11.8	184.72
P-85	Phosphate rock, argillaceous	1606-WOM	1.7	23.8	2.9	1.50	1.26	28.5	13.5	225.18
P-84	Mudstone, phosphatic	1605-WOM	1.0	15.8	6.3	2.49	7.96	45.5	14.5	240.98

P-83	Phosphate rock	1604-WOM	0.6	37.1	0.51	0.51	4.96	2.0	15.1	263.24
P-82	Phosphate rock	1603-WOM	2.0	33.1	0.96	0.51	6.94	7.3	17.1	329.44
P-81	Phosphate rock	1602-WOM	3.4	25.4	3.3	1.48	--	19.3	20.5	415.80
P-80	Phosphate rock	1601-WOM	2.2	24.7	3.0	1.35	12.60	19.3	22.7	470.14
P-79	Phosphate rock, argillaceous; fos. col. no. 48-JES-117	1600-WOM	2.4	21.8	5.3	1.67	13.26	27.1	25.1	522.46
P-78	Mudstone, phosphatic; fos. col. no. 48-JES-116	1579- RAH	4.2	9.7	--	--	--	54.3	29.3	563.20
P-77	Mudstone	1578- RAH	1.2	7.4	--	--	--	67.1	30.5	572.08
P-76	Mudstone	1577- RAH	1.3	2.1	--	--	--	81.3	31.8	574.81
P-75	Mudstone, phosphatic	1599-WOM	2.3	14.3	--	--	--	42.1	34.1	607.70
P-74	Phosphate rock, argillaceous	1598-WOM	0.5	16.2	--	--	--	32.7	34.6	615.80
P-73	Mudstone and argillaceous phosphate rock; fos. col. no. 48-JES-115	1597-WOM	5.0	9.7	--	--	--	40.6	39.6	664.30
P-72	Phosphate rock, argillaceous	1596-WOM	2.0	19.2	--	--	--	41.8	41.6	702.70
P-71	Mudstone; fos. col. no. 48-JES-114	1595-WOM	3.7	6.4	--	--	--	74.0	45.3	726.38
P-70	Mudstone, phosphatic	1594-WOM	1.8	12.7	--	--	--	54.0	47.1	749.24
P-69	Mudstone; fos. col. no. 48-JES-113	1593-WOM	3.0	7.7	--	--	--	69.6	50.1	772.34
P-68	Mudstone	1592-WOM	1.0	4.1	--	--	--	77.7	51.1	776.44
P-67	Mudstone, phosphatic	1591-WOM	1.3	10.6	--	--	--	60.3	52.4	790.22
P-66	Mudstone, phosphatic	1590-WOM	1.0	13.8	--	--	--	46.8	53.4	804.02
P-65	Mudstone	1589-WOM	1.7	7.2	--	--	--	64.6	55.1	816.26
P-64	Mudstone, phosphatic	1588-WOM	1.0	7.8	--	--	--	63.5	56.1	824.06
P-63	Limestone, argillaceous	1587-WOM	0.8	4.1	--	--	--	25.3	56.9	827.34
P-62	Mudstone and argillaceous phosphate rock; fos. col. no. 48-JES-112	1586-WOM	1.5	12.3	--	--	--	54.6	58.4	845.79
P-61	Mudstone; fos. col. no. 48-JES-111	1585-WOM	0.8	4.7	--	--	--	74.1	59.2	849.55
P-60	Mudstone	1611- DFD	1.0	7.2	--	--	--	52.3	60.2	856.75
P-59	Mudstone, phosphatic	1569- DFD	0.7	12.7	--	--	--	40.7	60.9	865.64
P-58	Phosphate rock, argillaceous; fos. col. no. 48-JES-110	1568- DFD	0.5	23.8	--	--	--	23.0	61.4	877.54
P-57	Mudstone, phosphatic	1567- DFD	1.0	14.6	--	--	--	47.8	62.4	892.14
P-56	Mudstone	1566- DFD	1.7	1.5	--	--	--	87.4	64.1	894.69
P-55	Mudstone	1565- DFD	1.2	2.0	--	--	--	84.4	65.3	897.09
P-54	Mudstone	1584-WOM	5.0	2.1	--	--	--	81.7	70.3	907.59
P-53	Phosphate rock, argillaceous	1583-WOM	1.5	22.3	--	--	--	35.0	71.8	941.04
P-52	Mudstone	1564- DFD	1.1	0.5	--	--	--	86.8	72.9	941.59
P-51	Phosphate rock	1610- DFD	0.6	28.5	--	--	--	19.5	73.5	958.69
P-50	Mudstone	1563- DFD	4.7	5.4	--	--	--	75.0	78.2	984.07
P-49	Phosphate rock, argillaceous	1562- DFD	1.1	19.8	--	--	--	35.3	79.3	1,005.85
P-48	Mudstone; fos. col. no. 48-JES-109	1561- DFD	2.5	3.0	--	--	--	80.6	81.8	1,013.35
P-47	Mudstone	1560- DFD	1.1	0.9	--	--	--	98.0	82.9	1,014.34

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_3	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
P- 46	Mudstone, phosphatic	1582-WOM	0.4	10.9	--	--	--	57.1	83.3	1,018.70
P- 45	Phosphate rock, argillaceous, calcareous	1581-WOM	1.5	17.5	--	--	--	29.8	84.8	1,044.95
P- 44	Mudstone	1580-WOM	2.3	7.4	--	--	--	59.5	87.1	1,061.97
P- 43	Mudstone, calcareous, phosphatic; fos. col. no. 48-JES-108	1559-WOM	4.5	7.9	--	--	--	56.5	91.6	1,097.52
P- 42	Mudstone, calcareous, phosphatic	1558-WOM	2.5	8.6	--	--	--	50.9	94.1	1,119.02
P- 41	Mudstone, calcareous; fos. col. no. 48-JES-102	1557-WOM	2.0	1.7	--	--	--	58.2	96.1	1,122.42
P- 40	Limestone; fos. col. no. 48-JES-100	1556-WOM	3.7	0.3	--	--	--	11.2	99.8	1,123.53
P- 39	Mudstone; fos. col. no. 48-JES-101	1555-WOM	3.0	2.3	--	--	--	80.7	102.8	1,130.43
P- 38	Mudstone	1554-WOM	2.0	3.9	--	--	--	73.0	104.8	1,138.23
P- 37	Mudstone, phosphatic; fos. col. no. 48-JES-99	1553-WOM	1.8	8.1	--	--	--	63.4	106.6	1,152.81
P- 36	Mudstone	1552-WOM	0.6	1.7	--	--	--	86.3	107.2	1,153.83
P- 35	Mudstone, phosphatic; fos. col. no. 48-JES-98	1551-WOM	3.5	8.0	--	--	--	62.2	110.7	1,181.83
P- 34	Mudstone, phosphatic; fos. col. no. 48-JES-97	1550-WOM	2.6	12.1	--	--	--	52.6	113.3	1,213.29
P- 33	Phosphate rock, argillaceous, calcareous	1549- DFD	0.6	16.8	--	--	--	33.7	113.9	1,223.37
P- 32	Mudstone, phosphatic	1548- DFD	0.8	8.5	--	--	--	65.3	114.7	1,230.17
P- 31	Mudstone, phosphatic; fos. col. no. 48-JES-96	1547- DFD	0.5	9.3	--	--	--	63.1	115.2	1,234.82
P- 30	Phosphate rock, argillaceous	1546- DFD	3.3	19.7	--	--	--	32.4	118.5	1,299.83
P- 29	Mudstone and phosphate rock	1545- DFD	0.9	26.2	--	--	--	14.9	119.4	1,323.41
P- 28	Phosphate rock and mudstone	1544- DFD	0.7	26.4	--	--	--	16.7	120.1	1,341.89
P- 27	Mudstone, phosphatic	1576- RAH	1.4	10.2	--	--	--	43.3	121.5	1,356.17
P- 26	Phosphate rock	1575- RAH	2.0	27.4	--	--	--	15.3	123.5	1,410.97
P- 25	Mudstone, phosphatic	1574- RAH	1.5	7.5	--	--	--	42.9	125.0	1,422.22
P- 24	Phosphate rock	1573- RAH	0.5	31.7	--	--	--	5.7	125.5	1,438.07
P- 23	Mudstone, phosphatic	1572- RAH	1.1	13.0	--	--	--	47.7	126.6	1,452.37
P- 22	Mudstone, phosphatic	1571- RAH	2.3	13.7	--	--	--	49.3	128.9	1,483.88
P- 21	Mudstone and argillaceous phosphate rock	1570- RAH	0.7	17.1	--	--	--	40.6	129.6	1,495.85
P- 20	Phosphate rock and mudstone	1509- RAH	0.6	23.3	--	--	--	28.6	130.2	1,509.83
P- 19	Phosphate rock	1508- RAH	1.5	33.4	0.78	0.44	17.54	6.1	131.7	1,559.93
P- 18	Phosphate rock	1507- RAH	1.8	29.5	2.1	0.85	7.08	13.3	133.5	1,613.03
P- 17	Phosphate rock, argillaceous and mudstone; fos. col. no. 48-JES-95	1506- RAH	1.0	18.8	5.0	2.00	7.02	38.3	134.5	1,631.83
P- 16	Mudstone	1505- RAH	0.5	5.3	9.1	3.11	6.74	69.5	135.0	1,634.48
P- 15	Phosphate rock	1504- RAH	1.9	33.0	1.4	0.66	6.36	7.6	136.9	1,697.18
P- 14	Phosphate rock	1503- RAH	0.5	35.8	0.88	0.32	4.12	4.3	137.4	1,715.08

P- 13	Phosphate rock; fos. col. no. 48-JES-94	1502- RAH	2.5	32.0	1.5	0.71	7.82	9.0	139.9	1,795.08
P- 12	Mudstone and argillaceous phosphate rock; fos. col. no. 48-JES-93	1501- RAH	1.2	24.2	3.8	1.26	8.32	27.0	141.1	1,824.12
P- 11	Phosphate rock, argillaceous	1500- RAH	0.9	22.7	5.1	1.51	4.94	24.3	142.0	1,844.55
P- 10	Phosphate rock; fos. col. no. 48-JES-92	1539-WOM	2.9	27.1	--	--	--	15.9	144.9	1,923.14
P- 9	Phosphate rock, argillaceous; fos. col. no. 48-JES-91	1538-WOM	0.5	27.0	2.6	1.33	6.74	20.5	145.4	1,936.64
P- 8	Phosphate rock; fos. col. no. 48-JES-90	1537-WOM	3.7	32.6	1.4	0.58	8.32	4.8	149.1	2,057.26
P- 7	Phosphate rock	1536-WOM	2.2	32.4	0.94	0.38	8.40	4.1	151.3	2,128.54
P- 6	Phosphate rock	1535-WOM	1.3	30.65	1.5	0.66	6.16	10.7	152.6	2,168.39
P- 5	Mudstone	1534-WOM	1.3	0.6	--	--	--	76.8	153.9	2,169.17
P- 4	Limestone, argillaceous	1533-WOM	1.5	0.17	--	--	--	41.7	155.4	2,169.42
P- 3	Mudstone	1532- RPS	1.9	0.33	--	--	--	61.6	157.3	2,170.05
P- 2	Mudstone	1531- RPS	0.6	5.8	--	--	--	49.6	157.9	2,173.53
P- 1	Phosphate rock, calcareous and chert	1530- RPS	0.5	24.7	--	--	--	10.0	158.4	2,185.88

Wells formation—upper part only

Cw- 1	Limestone	999- DFD	3.0	0.6	--	--	--	3.2	3.0	1.80
Cw- 2	Limestone; fos. col. no. 48-JES-89	1543- DFD	1.2	0.5	--	--	--	4.3	4.2	2.40
Cw- 3	Limestone; fos. col. no. 48-JES-88	1542- DFD	9.4	0.9	--	--	--	13.3	13.6	10.86
Cw- 4	Limestone; fos. col. no. 48-JES-87	1541- DFD	10.0	0.6	--	--	--	2.5	23.6	16.86
Cw- 5	Limestone, argillaceous; fos. col. no. 48-JES-86	1540- DFD	10.0	0.6	--	--	--	20.8	33.6	22.86
Cw- 6	Limestone and chert	1519- DFD	4.6	1.5	--	--	--	15.9	38.2	29.76
Cw- 7	Limestone	1518- DFD	10.0	1.8	--	--	--	19.6	48.2	47.76
Cw- 8	Limestone	1517- DFD	10.0	0.7	--	--	--	10.7	58.2	54.76
Cw- 9	Mudstone and limestone	1516- DFD	2.5	0.5	--	--	--	37.3	60.7	56.01
Cw-10	Mudstone and argillaceous limestone	1515- DFD	1.9	0.4	--	--	--	73.5	62.6	56.77
Cw-11	Limestone and mudstone	1514- DFD	1.7	0.5	--	--	--	32.5	64.3	57.62
Cw-12	Limestone and chert	1513- DFD	1.6	0.5	--	--	--	26.6	65.9	58.42
Cw-13	Limestone, argillaceous	1512- DFD	3.4	0.7	--	--	--	30.0	69.3	60.80
Cw-14	Limestone	1511- DFD	3.5	0.6	--	--	--	14.3	72.8	62.90
Cw-15	Mudstone	1510- DFD	4.2	0.5	--	--	--	83.9	77.0	65.00
Cw-16	Limestone and chert	1499- DFD	3.1	0.6	--	--	--	20.7	80.1	66.86
Cw-17	Limestone, sandy	1498- DFD	2.0	0.6	--	--	--	33.5	82.1	68.06
Cw-18	Sandstone, calcareous	1497- DFD	2.2	0.5	--	--	--	71.7	84.3	69.16
Cw-19	Sandstone, calcareous	1496- DFD	4.6	0.5	--	--	--	90.0	88.9	71.46
Cw-20	Limestone, argillaceous	1495- DFD	3.6	0.7	--	--	--	43.3	92.5	73.98
Cw-21	Limestone and chert	1494- DFD	3.4	0.6	--	--	--	39.6	95.9	76.02
Cw-22	Mudstone, calcareous	1493- DFD	3.8	0.3	--	--	--	78.5	99.7	77.16

SLUG CREEK VALLEY, IDAHO. LOT NO. 1278.

Part of phosphatic shale member of Phosphoria formation cored in diamond drill hole no. 7 on crest of hill rising above Slug Creek Valley, sec. 30, T. 8 S., R. 44 E., Caribou County, Idaho, on west limb of Schmid syncline. Beds strike north and dip 8° E. Hole drilled in September and October 1948 by U. S. Bureau of Mines, A. E. Long in charge, and core measured and sampled by D. F. Davidson. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Acid insoluble		
Phosphatic shale member of Phosphoria formation—partial section only							
P-103	Mudstone	2722-DFD	0.3	1.1	83.7	0.3	--
P-102	Core missing	--	2.8	--	--	3.1	--
--	Mudstone	2723-DFD	(0.4)	5.6	69.3	--	--
Sample 2723-DFD represents part of bed P-102.							
P-101	Mudstone	2724-DFD	1.1	4.5	70.5	4.2	--
P-100	Mudstone	2725-DFD	0.5	4.6	72.8	4.7	--
P- 99	Core missing	--	3.4	--	--	8.1	--
--	Phosphate rock, argillaceous	2726-DFD	(0.6)	28.4	22.1	--	--
Sample 2726-DFD represents part of bed P-99.							
P- 98	Phosphate rock	2727-DFD	0.4	29.3	19.5	8.5	--
P- 97	Core missing	--	0.3	--	--	8.8	--
P- 96	Phosphate rock and mudstone	2728-DFD	1.9	28.7	22.3	10.7	--
P- 95	Core missing	--	5.1	--	--	15.8	--
--	Mudstone	2729-DFD	(0.7)	4.7	68.6	--	--
Sample 2729-DFD represents part of bed P-95.							
P- 94	Phosphate rock, argillaceous	2730-DFD	3.6	22.7	25.6	19.4	--
P- 93	Phosphate rock, argillaceous	2731-DFD	0.9	27.3	24.0	20.3	--
P- 92	Core missing	--	2.6	--	--	22.9	--
P- 91	Phosphate rock, argillaceous	2732-DFD	0.5	24.5	31.4	23.4	--
P- 90	Core missing	--	1.0	--	--	24.4	--
P- 89	Mudstone, phosphatic	2733-DFD	1.1	19.1	48.6	25.5	--
P- 88	Mudstone	2734-DFD	1.1	4.5	81.7	26.6	--
P- 87	Mudstone, phosphatic	2735-DFD	2.1	13.3	58.2	28.7	--
P- 86	Mudstone, phosphatic	2736-DFD	1.1	11.3	59.5	29.8	--
P- 85	Core missing	--	2.5	--	--	32.3	--
P- 84	Mudstone, phosphatic	2737-DFD	2.0	8.2	67.9	34.3	--
P- 83	Mudstone, phosphatic	2738-DFD	2.1	9.2	63.8	36.4	--

P- 82	Mudstone	2739-DFD	1.8	6.1	70.6	38.2	--
P- 81	Mudstone, phosphatic	2740-DFD	1.6	9.7	60.5	39.8	--
P- 80	Mudstone	2741-DFD	1.2	5.5	74.0	41.0	--
P- 79	Core missing	--	1.0	--	--	42.0	--
P- 78	Mudstone, phosphatic	2742-DFD	1.7	10.2	59.6	43.7	--
P- 77	Mudstone	2743-DFD	1.4	3.0	77.3	45.1	--
P- 76	Mudstone, phosphatic	2744-DFD	0.5	8.1	63.5	45.6	--
P- 75	Core missing	--	1.6	--	--	47.2	--
P- 74	Mudstone	2745-DFD	0.8	4.6	77.6	48.0	--
P- 73	Mudstone	2746-DFD	2.6	0.4	89.0	50.6	--
P- 72	Mudstone, phosphatic	2747-DFD	0.9	17.6	48.0	51.5	--
P- 71	Mudstone	2748-DFD	1.0	1.1	84.5	52.5	--
P- 70	Core missing	--	2.4	--	--	54.9	--
P- 69	Mudstone	2749-DFD	0.8	0.3	89.1	55.7	--
P- 68	Core missing	--	3.1	--	--	58.8	--
P- 67	Mudstone	2750-DFD	2.2	2.2	83.7	61.0	--
P- 66	Core missing	--	0.6	--	--	61.6	--
P- 65	Mudstone	2751-DFD	0.8	2.8	82.6	62.4	--
P- 64	Mudstone	2752-DFD	1.3	0.9	88.5	63.7	--
P- 63	Mudstone	2753-DFD	0.6	6.7	73.4	64.3	--
P- 62	Mudstone, phosphatic	2754-DFD	1.6	19.7	37.0	65.9	--
P- 61	Mudstone	2755-DFD	3.8	4.7	80.6	69.7	--
P- 60	Mudstone, phosphatic	2756-DFD	0.7	12.3	49.4	70.4	--
P- 59	Core missing	--	2.4	--	--	72.8	--
P- 58	Mudstone, phosphatic	2757-DFD	2.2	9.9	55.6	75.0	21.78
P- 57	Mudstone, phosphatic	2758-DFD	2.3	10.5	47.3	77.3	45.93
P- 56	Mudstone, phosphatic	2759-DFD	0.7	13.5	50.7	78.0	55.38
P- 55	Mudstone	2760-DFD	1.8	6.4	57.6	79.8	66.90
P- 54	Mudstone	2761-DFD	1.7	3.0	79.1	81.5	72.00
P- 53	Mudstone	2762-DFD	1.1	0.7	87.6	82.6	72.77
P- 52	Mudstone	2763-DFD	0.6	7.5	59.6	83.2	77.27
P- 51	Mudstone	2764-DFD	0.3	5.9	69.7	83.5	79.04
P- 50	Mudstone	2765-DFD	0.4	3.8	76.5	83.9	80.56
P- 49	Mudstone	2766-DFD	0.9	3.9	80.0	84.8	84.07
P- 48	Mudstone	2767-DFD	0.6	6.3	71.1	85.4	87.85
P- 47	Mudstone	2768-DFD	2.0	2.3	82.8	87.4	92.45
P- 46	Mudstone, phosphatic, calcareous	2769-DFD	1.9	10.3	49.3	89.3	112.02
P- 45	Mudstone	2770-DFD	0.5	3.9	77.8	89.8	113.97
P- 44	Mudstone, phosphatic	2771-DFD	0.7	8.4	60.7	90.5	119.85
P- 43	Mudstone, calcareous	2772-DFD	0.5	2.5	49.1	91.0	121.10
P- 42	Mudstone, phosphatic	2773-DFD	1.8	13.4	45.8	92.8	145.22
P- 41	Phosphate rock, argillaceous, calcareous	2774-DFD	1.7	14.2	35.1	94.5	169.36
P- 40	Limestone, argillaceous	2775-DFD	2.9	4.1	30.2	97.4	181.25
P- 39	Mudstone, phosphatic	2776-DFD	0.7	14.7	44.6	98.1	191.54

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)		Cumulative thickness (feet)	Thickness x percent P_2O_5 (cumulative) ⁵
				P_2O_5	Acid insoluble		
P- 38	Mudstone, phosphatic	2777-DFD	2.0	14.0	47.4	100.1	219.54
P- 37	Mudstone, phosphatic	2778-DFD	2.0	13.4	43.8	102.1	246.34
P- 36	Mudstone, calcareous, phosphatic	2779-DFD	1.7	12.7	40.6	103.8	267.93
P- 35	Limestone	2780-DFD	0.8	7.4	18.6	104.6	273.85
P- 34	Phosphate rock, argillaceous, calcareous	2781-DFD	1.8	21.0	25.1	106.4	311.65
P- 33	Core missing	--	1.1	--	--	107.5	--
P- 32	Phosphate rock, calcareous	2782-DFD	0.8	24.6	15.4	108.3	19.68
P- 31	Limestone and phosphate rock	2783-DFD	0.8	16.6	10.5	109.1	32.96
P- 30	Limestone	2784-DFD	1.4	6.6	13.2	110.5	42.20
P- 29	Phosphate rock	2785-DFD	1.6	26.8	14.7	112.1	85.08
P- 28	Limestone	2786-DFD	2.8	4.4	15.1	114.9	97.40
P- 27	Mudstone, phosphatic	2787-DFD	1.5	12.8	47.0	116.4	116.60
P- 26	Mudstone, calcareous, phosphatic	2788-DFD	1.7	8.1	45.0	118.1	130.37
P- 25	Limestone, argillaceous	2789-DFD	2.7	0.8	19.8	120.8	132.53
P- 24	Phosphate rock	2790-DFD	1.9	26.9	18.1	122.7	183.64
P- 23	Phosphate rock	2791-DFD	2.2	28.8	18.0	124.9	247.00
P- 22	Phosphate rock, argillaceous	2792-DFD	1.2	18.4	41.6	126.1	269.08
P- 21	Limestone, argillaceous	2793-DFD	1.2	2.4	27.1	127.3	271.96
P- 20	Phosphate rock	2794-DFD	1.1	32.6	9.5	128.4	307.82
P- 19	Phosphate rock, argillaceous	2795-DFD	1.5	27.6	20.3	129.9	349.22
P- 18	Phosphate rock	2796-DFD	1.1	32.6	8.6	131.0	385.08
P- 17	Phosphate rock	2797-DFD	0.9	29.8	13.9	131.9	411.90
P- 16	Phosphate rock	2798-DFD	0.7	29.7	15.1	132.6	432.69
P- 15	Phosphate rock, calcareous	2799-DFD	2.2	16.2	16.9	134.8	468.33
P- 14	Phosphate rock, calcareous	2800-DFD	1.0	23.0	16.7	135.8	491.33
P- 13	Phosphate rock, argillaceous	3036-DFD	1.3	23.5	22.8	137.1	521.88
P- 12	Limestone, phosphatic	3020-DFD	1.0	14.5	12.9	138.1	536.38
P- 11	Limestone	3024-DFD	1.3	8.4	7.1	139.4	547.30
P- 10	Phosphate rock	2524-DFD	0.8	32.0	5.0	140.2	572.90
P- 9	Phosphate rock	2525-DFD	1.8	32.4	3.3	142.0	631.22
P- 8	Phosphate rock	2929-DFD	1.7	34.3	2.9	143.7	689.53
P- 7	Phosphate rock	2930-DFD	1.7	34.1	2.6	145.4	747.50
P- 6	Phosphate rock	3028-DFD	1.8	31.5	8.5	147.2	804.20
P- 5	Mudstone	3029-DFD	1.1	4.2	70.5	148.3	808.82
P- 4	Limestone, argillaceous	3030-DFD	1.3	0.45	37.9	149.6	809.40
P- 3	Mudstone	3031-DFD	1.7	3.0	69.9	151.3	814.50
P- 2	Phosphate rock	3032-DFD	0.3	31.7	4.5	151.6	824.02
P- 1	Phosphate rock	3033-DFD	1.1	33.6	2.8	152.7	860.98

WEST GEORGETOWN CANYON, IDAHO. LOT NO. 1264.

Phosphatic shale member of Phosphoria formation sampled in trench on west wall of Georgetown Canyon, SE $\frac{1}{4}$ sec. 1, T. 10 S., R. 44 E., Bear Lake County, Idaho, on west limb of Georgetown syncline. Beds strike N. 30° E. and dip 50° E. Section measured by D. F. Davidson and F. W. O' Malley and sampled by R. A. Smart and R. G. Waring in September 1948. Samples analyzed for P₂O₅ and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by laboratories of the U. S. Geological Survey, Geochemistry and Petrology Branch, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—basal beds only										
R- 7	Chert	2640-WOM	9.0	0.5	--	--	--	92.5	9.0	4.50
R- 6	Chert	2639-WOM	1.2	0.9	--	--	--	91.9	10.2	5.58
R- 5	Mudstone	2638-WOM	0.6	2.1	--	--	--	72.5	10.8	6.84
R- 4	Mudstone	2637-WOM	0.8	2.2	--	--	--	80.8	11.6	8.60
R- 3	Chert	2636-WOM	3.9	1.1	--	--	--	91.9	15.5	12.89
R- 2	Chert	2635-WOM	3.3	0.9	--	--	--	91.2	18.8	15.86
R- 1	Chert	2634-WOM	5.0	0.9	--	--	--	92.1	23.8	20.36
Probable fault contact between Rex and Phosphatic shale members.										

Phosphatic shale member of Phosphoria formation

P-86	Mudstone	2633-WOM	2.6	1.5	--	--	--	86.5	2.6	3.90
P-85	Phosphate rock, argillaceous	2632-WOM	0.3	25.4	--	--	--	25.3	2.9	11.52
P-84	Mudstone	2631-WOM	2.0	4.0	--	--	--	73.9	4.9	19.52
P-83	Mudstone; fos. col. no. 48-JES-217 ¹	2630-WOM	2.5	1.1	--	--	--	80.1	7.4	22.27
P-82	Mudstone; fos. col. no. 48-JES-216	2629-WOM	2.8	2.7	--	--	--	74.8	10.2	29.83
P-81	Mudstone	2628-WOM	2.5	5.1	--	--	--	71.1	12.7	42.58
P-80	Phosphate rock and calcareous phosphatic mudstone	2627-WOM	0.7	28.5	--	--	--	19.2	13.4	62.53
P-79	Mudstone, phosphatic	2626-WOM	0.4	8.0	--	--	--	64.1	13.8	65.73
P-78	Phosphate rock	2625-WOM	0.7	31.2	--	--	--	16.5	14.5	87.57
P-77	Phosphate rock, argillaceous	2624-WOM	0.4	18.3	--	--	--	39.5	14.9	94.89
P-76	Phosphate rock	2623-WOM	0.7	30.4	--	--	--	12.7	15.6	116.17
P-75	Phosphate rock	2622-WOM	1.3	37.3	--	--	--	7.2	16.9	164.66
P-74	Phosphate rock, argillaceous	2621-WOM	2.8	23.8	--	--	--	19.8	19.7	231.30
P-73	Mudstone	1841-WOM	0.3	3.3	--	--	--	74.1	20.0	232.29
P-72	Mudstone, phosphatic; fos. col. no. 48-JES-215	1830-WOM	1.4	16.5	--	--	--	49.5	21.4	255.39
P-71	Mudstone, phosphatic	1180-WOM	2.0	8.5	--	--	--	68.1	23.4	272.39
P-70	Mudstone, phosphatic	1179-WOM	0.6	8.3	--	--	--	66.9	24.0	277.37
P-69	Mudstone	2895-WOM	2.1	6.3	--	--	--	68.7	26.1	290.60
P-68	Mudstone	2894-WOM	0.4	7.5	--	--	--	60.3	26.5	293.60

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 ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
P-67	Mudstone	1178-WOM	1.1	4.8	--	--	--	63.2	27.6	298.88
P-66	Mudstone	2649-WOM	0.7	4.8	--	--	--	74.5	28.3	302.24
P-65	Mudstone	2648-WOM	0.5	0.9	--	--	--	86.1	28.8	302.69
P-64	Mudstone	2647-WOM	2.0	2.5	--	--	--	80.4	30.8	307.69
P-63	Mudstone, phosphatic, calcareous	2646-WOM	1.8	14.3	--	--	--	41.5	32.6	333.43
P-62	Mudstone	2645-WOM	0.8	1.4	--	--	--	87.6	33.4	334.55
P-61	Mudstone	2644-WOM	1.9	3.2	--	--	--	82.9	35.3	340.63
P-60	Mudstone and argillaceous phosphate rock	2643-WOM	2.0	2.6	--	--	--	83.5	37.3	345.83
P-59	Phosphate rock; fos. col. no. 48-JES-214	2642-WOM	0.5	30.7	--	--	--	14.9	37.8	361.18
P-58	Mudstone, phosphatic; fos. col. no. 48-JES-213	2641-WOM	1.1	8.3	--	--	--	68.5	38.9	370.31
P-57	Phosphate rock; fos. col. no. 48-JES-212	2900-WOM	0.6	33.8	--	--	--	8.2	39.5	390.59
P-56	Mudstone, phosphatic	2893-WOM	0.3	15.3	--	--	--	45.5	39.8	395.18
P-55	Phosphate rock	2899-WOM	0.9	31.0	--	--	--	11.4	40.7	423.08
P-54	Mudstone, phosphatic	2898-WOM	0.6	9.3	--	--	--	62.2	41.3	428.66
P-53	Mudstone, phosphatic, calcareous	2897-WOM	0.5	15.1	--	--	--	41.3	41.8	436.21
P-52	Mudstone	2896-WOM	1.3	3.6	--	--	--	78.9	43.1	440.89
P-51	Phosphate rock, argillaceous	2892-WOM	0.3	19.4	--	--	--	33.3	43.4	446.71
P-50	Mudstone	2891-WOM	1.8	2.1	--	--	--	81.2	45.2	450.49
Beds P-49 and P-50 are separated by a fault.										
P-49	Phosphate rock, calcareous, argillaceous	2888-WOM	1.1	16.1	--	--	--	29.1	46.3	468.20
P-48	Mudstone	2887-WOM	1.8	5.4	--	--	--	70.3	48.1	477.92
P-47	Mudstone, phosphatic, calcareous; fos. col. no. 48-JES-211	2886-WOM	2.6	13.4	--	--	--	43.1	50.7	512.76
P-46	Mudstone, phosphatic; fos. col. no. 48-JES-210	2885-WOM	1.2	8.2	--	--	--	61.1	51.9	522.60
--	Limestone concretion, argillaceous	2884-WOM	(2.4)	0.6	--	--	--	19.5	--	--
P-45	Chert	2883-WOM	0.3	0.6	--	--	--	90.0	52.2	522.78
P-44	Mudstone	2882-WOM	3.6	2.7	--	--	--	78.3	55.8	532.50
P-43	Mudstone; fos. col. no. 48-JES-209	2881-WOM	2.0	4.1	--	--	--	71.3	57.8	540.70
P-42	Mudstone; fos. col. no. 48-JES-208	2880-WOM	3.4	3.9	--	--	--	76.7	61.2	553.96
P-41	Mudstone	2879-WOM	1.6	2.2	--	--	--	83.5	62.8	557.48
P-40	Mudstone, phosphatic	2871-WOM	2.1	11.0	--	--	--	58.9	64.9	580.58
P-39	Mudstone, phosphatic	2878-WOM	0.3	8.2	--	--	--	64.3	65.2	583.04
P-38	Phosphate rock, argillaceous	2877-WOM	1.1	17.6	--	--	--	37.1	66.3	602.40
P-37	Mudstone	2876-WOM	0.3	3.4	--	--	--	78.5	66.6	603.42
P-36	Mudstone, phosphatic	2875-WOM	0.8	8.2	--	--	--	66.1	67.4	609.98
P-35	Mudstone, phosphatic	2928- DFD	0.6	15.8	--	--	--	41.8	68.0	619.46
P-34	Phosphate rock and phosphatic mudstone	2927- DFD	0.8	15.4	--	--	--	40.6	68.8	631.78

P-33	Mudstone, phosphatic	2926- DFD	0.5	11.8	--	--	--	51.0	69.3	637.68
P-32	Phosphate rock, argillaceous	2925- DFD	0.7	18.3	--	--	--	34.4	70.0	650.49
P-31	Phosphate rock, argillaceous	2924- DFD	0.5	17.5	--	--	--	40.7	70.5	659.24
P-30	Phosphate rock	2923- DFD	0.6	23.9	--	--	--	15.4	71.1	673.58
P-29	Mudstone, calcareous	2922- DFD	0.35	3.8	--	--	--	43.6	71.45	674.91
P-28	Phosphate rock and phosphatic mudstone	2870- DFD	1.5	23.0	--	--	--	23.6	72.95	709.41
P-27	Mudstone, phosphatic	2869- DFD	0.70	10.7	--	--	--	56.1	73.65	716.90
P-26	Limestone	2868- DFD	1.3	2.8	--	--	--	17.8	74.95	720.54
P-25	Mudstone, phosphatic	2867- DFD	1.0	10.6	--	--	--	55.5	75.95	731.14
P-24	Mudstone, phosphatic	2866- DFD	2.3	9.6	--	--	--	58.2	78.25	753.22
P-23	Limestone, argillaceous	2865- DFD	1.1	0.9	--	--	--	23.5	79.35	754.21
P-22	Phosphate rock	2864- DFD	0.9	26.5	--	--	--	19.9	80.25	778.06
P-21	Phosphate rock	2863- DFD	0.85	26.3	--	--	--	18.3	81.10	800.42
P-20	Phosphate rock, argillaceous	2862- DFD	0.75	22.8	--	--	--	29.4	81.85	817.52
--	Limestone concretion	2861- DFD	(1.0-1.2)	4.2	--	--	--	5.5	--	--
P-19	Phosphate rock	2910- DFD	2.0	27.8	--	--	--	13.4	83.85	873.12
P-18	Phosphate rock, argillaceous	2909- DFD	2.1	24.1	--	--	--	23.5	85.95	923.73
P-17	Mudstone, calcareous, phosphatic	2908- DFD	0.8	8.3	--	--	--	49.4	86.75	930.37
P-16	Mudstone, phosphatic	2907- DFD	0.7	14.5	--	--	--	47.7	87.45	940.52
--	Limestone concretion; fos. col. no. 48-JES-207	2906- DFD	(0.9)	4.1	--	--	--	19.5	--	--
P-15	Mudstone, phosphatic	2905- DFD	1.6	13.7	--	--	--	50.2	89.05	962.44
P-14	Phosphate rock	2904- DFD	1.8	27.4	3.0	1.2	9.16	17.7	90.85	1,011.76
P-13	Phosphate rock, argillaceous	2903- DFD	1.6	26.4	2.5	0.89	7.96	22.3	92.45	1,054.00
P-12	Phosphate rock, argillaceous	2902- DFD	1.3	24.4	3.6	2.5	9.62	23.9	93.75	1,085.72
P-11	Phosphate rock, argillaceous	2901- DFD	1.0	25.7	3.3	1.2	8.18	23.7	94.75	1,111.42
P-10	Mudstone, phosphatic	2920- DFD	0.6	12.5	8.3	2.5	8.32	55.1	95.35	1,118.92
P- 9	Mudstone, phosphatic	2919- DFD	1.0	13.7	8.2	2.4	7.06	52.8	96.35	1,132.62
P- 8	Phosphate rock, argillaceous	2918- DFD	2.2	26.5	3.7	1.3	7.74	21.4	98.55	1,190.92
P- 7	Phosphate rock	2917- DFD	4.0	27.2	1.2	0.86	6.60	19.2	102.55	1,299.72
P- 6	Mudstone, phosphatic	2916- DFD	1.4	16.8	6.6	2.0	7.02	44.1	103.95	1,323.24
P- 5	Phosphate rock, argillaceous	2915- DFD	1.0	21.5	5.0	1.4	5.82	32.6	104.95	1,344.74
P- 4	Phosphate rock	2914- DFD	1.4	32.6	1.2	0.60	6.26	6.1	106.35	1,390.38
P- 3	Phosphate rock, argillaceous, calcareous	2913- DFD	0.7	13.4	5.9	2.2	13.10	33.6	107.05	1,399.76
P- 2	Limestone; fos. col. no. 48-JES-206	2912- DFD	0.5	6.5	2.7	1.1	35.30	10.3	107.55	1,403.01
P- 1	Phosphate rock	2911- DFD	0.22	34.7	1.5	0.90	3.02	5.6	107.77	1,410.64
Fault contact between Phosphoria and Wells formations.										
Wells formation										
Cw-1	Limestone	2921- DFD	0.5	3.3	--	--	--	5.0	0.5	1.65

EAST GEORGETOWN CANYON, IDAHO. LOT NO. 1267.

Phosphatic shale member of Phosphoria formation sampled in bulldozer trench of Central Farmers' Fertilizer Cooperative, on east side of canyon about 1,000 feet above Georgetown Creek, NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 30, T. 10 S., R. 45 E., Bear Lake County, Idaho, on east limb of Georgetown syncline. Beds strike 10° E. and dip 70° W. Section measured by R. A. Harris and F. W. O' Malley and sampled by R. A. Harris and R. A. Smart in October 1948. Samples analyzed for P₂O₅ and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by laboratories of the U. S. Geological Survey, Geochemistry and Petrology Branch, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—basal beds only										
R- 3	Chert	3240-WOM	3.0	0.8	--	--	--	91.3	3.0	2.40
R- 2	Chert	3260-WOM	3.5	1.1	--	--	--	90.6	6.5	6.25
R- 1	Mudstone, calcareous	3259-WOM	1.0	1.5	--	--	--	69.8	7.5	7.75
Phosphatic shale member of Phosphoria formation—base not exposed										
P-108	Mudstone	3258-WOM	0.5	3.6	--	--	--	80.6	0.5	1.80
P-107	Mudstone	3257-WOM	0.6	3.0	--	--	--	80.9	1.1	3.60
P-106	Phosphate rock	3256-WOM	0.3	26.1	--	--	--	23.2	1.4	11.43
P-105	Mudstone	3255-WOM	1.0	3.3	--	--	--	75.8	2.4	14.73
P-104	Mudstone, phosphatic	3254-WOM	1.0	8.4	--	--	--	61.2	3.4	23.13
P-103	Mudstone	3253-WOM	3.3	1.0	--	--	--	81.1	6.7	26.93
P-102	Mudstone, calcareous	3252-WOM	3.0	0.8	--	--	--	74.9	9.7	28.83
P-101	Mudstone	3251-WOM	1.5	2.9	--	--	--	74.5	11.2	33.18
P-100	Mudstone; fos. col. no. 48-JES-370 ¹	3250-WOM	2.0	2.4	--	--	--	76.8	13.2	37.98
P- 99	Mudstone	3249-WOM	0.3	6.1	--	--	--	64.3	13.5	39.81
P- 98	Mudstone; fos. col. no. 48-JES-369	3248-WOM	2.5	2.7	--	--	--	77.5	16.0	46.56
P- 97	Mudstone, calcareous; fos. col. no. 48-JES-368	3247-WOM	2.5	3.7	--	--	--	49.9	18.5	55.81
P- 96	Phosphate rock, argillaceous	3246-WOM	0.3	24.0	--	--	--	25.8	18.8	63.01
P- 95	Mudstone	3245-WOM	0.9	4.5	--	--	--	74.7	19.7	67.06
P- 94	Mudstone, phosphatic	3244-WOM	0.3	11.5	--	--	--	58.0	20.0	70.51
P- 93	Mudstone	3243-WOM	3.0	1.1	--	--	--	84.2	23.0	73.81
P- 92	Mudstone, phosphatic	3242-WOM	0.5	8.8	--	--	--	62.1	23.5	78.21
P- 91	Mudstone, phosphatic	3241-WOM	1.0	9.5	--	--	--	52.4	24.5	87.71
P- 90	Phosphate rock	3239-WOM	0.6	32.4	1.1	0.88	3.34	11.9	25.1	107.15
P- 89	Mudstone, phosphatic	3238-WOM	1.0	8.1	9.0	3.4	5.52	64.3	26.1	115.25
P- 88	Phosphate rock	3237-WOM	2.0	36.3	0.50	0.35	3.00	4.7	28.1	187.85
P- 87	Mudstone	3236-WOM	1.3	7.1	4.0	2.8	4.92	67.6	29.4	197.08
P- 86	Phosphate rock and phosphatic mudstone	3235-WOM	1.0	28.5	6.6	1.2	3.08	20.9	30.4	225.58
P- 85	Mudstone and phosphate rock	3234-WOM	0.8	20.0	5.2	2.1	4.40	39.3	31.2	241.58
P- 84	Phosphate rock	3233-WOM	1.1	30.2	1.6	0.87	3.18	14.7	32.3	274.80

P- 83	Phosphate rock, argillaceous	3232-WOM	0.8	23.0	4.80	1.8	4.90	31.8	33.1	293.20
P- 82	Phosphate rock and phosphatic mudstone	3231-WOM	1.0	32.5	2.0	1.0	2.92	12.5	34.1	329.70
P- 81	Phosphate rock	3300-WOM	1.2	37.3	0.40	0.40	2.36	4.2	35.3	370.46
P- 80	Phosphate rock	3299-WOM	1.0	33.6	1.7	0.93	5.08	8.5	36.3	404.06
P- 79	Phosphate rock, argillaceous	3298-WOM	0.7	19.8	4.0	1.9	6.56	37.3	37.0	417.92
P- 78	Phosphate rock and phosphatic mudstone	3297-WOM	1.1	23.6	3.6	1.4	9.04	25.8	38.1	443.88
P- 77	Phosphate rock	3296-WOM	1.4	34.7	1.0	0.54	5.38	5.3	39.5	492.46
P- 76	Phosphate rock	3295-WOM	1.5	35.6	0.86	0.52	6.90	3.0	41.0	545.86
P- 75	Phosphate rock, calcareous	3294-WOM	2.4	25.1	2.6	1.1	16.54	14.3	43.4	606.10
P- 74	Phosphate rock	3293-WOM	3.0	27.2	2.5	1.2	14.12	12.9	46.4	687.70
P- 73	Mudstone and phosphate rock	3292-WOM	0.3	26.0	2.6	1.2	14.24	16.3	46.7	695.50
P- 72	Phosphate rock	3291-WOM	2.0	23.7	3.4	1.5	15.18	18.8	48.7	742.90
P- 71	Phosphate rock, argillaceous	3290-WOM	2.8	17.5	4.7	1.8	14.56	34.6	51.5	791.90
P- 70	Mudstone	3289-WOM	1.2	6.9	--	--	--	63.0	52.7	800.18
P- 69	Mudstone	3288-WOM	1.2	1.6	--	--	--	83.0	53.9	802.10
P- 68	Phosphate rock, argillaceous	3287-WOM	2.5	17.0	--	--	--	37.7	56.4	844.60
P- 67	Phosphate rock, argillaceous	3286-WOM	2.0	19.5	--	--	--	37.8	58.4	883.60
P- 66	Mudstone, phosphatic	3285-WOM	1.5	16.6	--	--	--	45.8	59.9	908.50
P- 65	Phosphate rock, argillaceous	3284-WOM	1.1	28.2	--	--	--	22.0	61.0	939.52
P- 64	Mudstone	3283-WOM	1.1	5.7	--	--	--	77.3	62.1	945.79
P- 63	Mudstone	3192- RH	1.0	7.6	--	--	--	71.5	63.1	953.39
P- 62	Phosphate rock, argillaceous	3191- RH	1.0	21.4	--	--	--	34.3	64.1	974.79
P- 61	Mudstone, phosphatic	3282-WOM	2.0	10.4	--	--	--	64.2	66.1	995.59
P- 60	Mudstone, phosphatic	3281-WOM	0.8	8.4	--	--	--	69.2	66.9	1,002.31
P- 59	Mudstone	3280-WOM	1.3	5.7	--	--	--	73.0	68.2	1,009.72
P- 58	Mudstone, phosphatic	3279-WOM	0.7	13.9	--	--	--	51.2	68.9	1,019.45
P- 57	Phosphate rock, argillaceous	3278-WOM	0.7	20.8	--	--	--	38.2	69.6	1,034.01
P- 56	Mudstone, phosphatic	3277-WOM	0.4	13.6	--	--	--	50.8	70.0	1,039.45
P- 55	Mudstone, phosphatic	3276-WOM	1.2	11.4	--	--	--	54.5	71.2	1,053.13
P- 54	Mudstone	3275-WOM	1.0	3.7	--	--	--	74.9	72.2	1,056.83
P- 53	Mudstone, phosphatic	3274-WOM	0.6	15.6	--	--	--	46.1	72.8	1,066.19
P- 52	Phosphate rock, argillaceous	3273-WOM	0.6	21.6	--	--	--	33.0	73.4	1,079.15
P- 51	Mudstone, phosphatic	3272-WOM	0.8	12.7	--	--	--	53.6	74.2	1,089.31
P- 50	Mudstone	3271-WOM	1.0	5.2	--	--	--	69.1	75.2	1,094.51
P- 49	Mudstone	3270-WOM	2.0	5.3	--	--	--	76.4	77.2	1,105.11
P- 48	Mudstone	3269-WOM	2.5	4.8	--	--	--	70.8	79.7	1,117.11
P- 47	Mudstone	3268-WOM	0.4	1.4	--	--	--	83.7	80.1	1,117.67
P- 46	Mudstone	3267-WOM	1.3	2.4	--	--	--	80.7	81.4	1,120.79
P- 45	Mudstone	3266-WOM	1.2	1.8	--	--	--	84.2	82.6	1,122.95
P- 44	Mudstone	3265-WOM	1.5	5.6	--	--	--	70.7	84.1	1,131.35
P- 43	Mudstone, phosphatic	3264-WOM	1.0	15.7	--	--	--	41.2	85.1	1,147.05
P- 42	Mudstone	3263-WOM	1.2	3.9	--	--	--	74.0	86.3	1,151.73
P- 41	Mudstone, phosphatic	3262-WOM	0.5	14.7	--	--	--	41.3	86.8	1,159.08
P- 40	Phosphate rock	3261-WOM	0.8	26.5	--	--	--	15.9	87.6	1,180.28

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 ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
P- 39	Mudstone, phosphatic	3230-WOM	0.5	16.4	--	--	--	44.9	88.1	1,188.48
P- 38	Phosphate rock, argillaceous	3229-WOM	1.5	20.3	--	--	--	36.0	89.6	1,218.93
P- 37	Mudstone	3228-WOM	2.0	1.4	--	--	--	87.1	91.6	1,221.73
P- 36	Phosphate rock	3227-WOM	2.0	28.8	--	--	--	16.7	93.6	1,279.33
P- 35	Mudstone	3226-WOM	2.0	9.9	--	--	--	62.7	95.6	1,299.13
P- 34	Phosphate rock, argillaceous	3225-WOM	1.5	20.5	--	--	--	34.9	97.1	1,329.88
P- 33	Mudstone	3224-WOM	0.6	7.4	--	--	--	68.2	97.7	1,334.32
P- 32	Mudstone, phosphatic	3223-WOM	1.5	11.1	--	--	--	56.1	99.2	1,350.97
P- 31	Mudstone	3222-WOM	1.0	1.9	--	--	--	83.7	100.2	1,352.87
P- 30	Mudstone, phosphatic	3221-WOM	2.0	8.7	--	--	--	62.5	102.2	1,370.27
P- 29	Mudstone, phosphatic, calcareous	3220- RH	2.5	11.5	--	--	--	42.1	104.7	1,399.02
P- 28	Mudstone, calcareous, phosphatic	3219- RH	3.0	9.6	--	--	--	40.5	107.7	1,427.82
P- 27	Mudstone, calcareous	3218- RH	1.5	3.7	--	--	--	62.5	109.2	1,433.37
P- 26	Mudstone, calcareous	3217- RH	0.8	1.4	--	--	--	58.0	110.0	1,434.49
P- 25	Mudstone	3216- RH	0.7	2.3	--	--	--	70.9	110.7	1,436.10
P- 24	Mudstone	3215- RH	2.5	1.1	--	--	--	80.4	113.2	1,438.85
P- 23	Chert	3214- RH	0.4	1.4	--	--	--	88.7	113.6	1,439.41
P- 22	Mudstone	3213- RH	0.7	2.4	--	--	--	83.5	114.3	1,441.09
P- 21	Mudstone	3212- RH	2.3	1.9	--	--	--	79.1	116.6	1,445.46
P- 20	Mudstone, phosphatic	3211- RH	1.5	8.2	--	--	--	60.2	118.1	1,457.76
P- 19	Mudstone	3210- RH	1.5	1.5	--	--	--	86.7	119.6	1,460.01
P- 18	Mudstone	3209- RH	1.5	4.7	--	--	--	74.2	121.1	1,467.06
P- 17	Mudstone, phosphatic	3208- RH	1.0	8.7	--	--	--	61.1	122.1	1,475.76
P- 16	Mudstone	3207- RH	0.9	0.8	--	--	--	87.5	123.0	1,476.48
P- 15	Mudstone	3206- RH	1.0	3.8	--	--	--	77.2	124.0	1,480.28
P- 14	Mudstone	3205- RH	1.3	1.8	--	--	--	81.9	125.3	1,482.62
P- 13	Covered	--	40.	--	--	--	--	--	165.3	--
P- 12	Limestone	3203- RH	1.0	2.9	--	--	--	15.1	166.3	2.90*
P- 11	Phosphate rock, argillaceous	3202- RH	1.8	21.1	--	--	--	32.4	168.1	40.88
P- 10	Phosphate rock, calcareous, argillaceous	3201- RH	0.8	17.2	--	--	--	25.7	168.9	54.64
P- 9	Limestone, phosphatic, argillaceous	3200- RH	0.7	10.7	--	--	--	20.3	169.6	62.13
P- 8	Limestone, phosphatic	3199- RH	2.4	11.4	--	--	--	8.9	172.0	89.49
P- 7	Phosphate rock	3198- RH	1.5	33.4	0.99	0.46	6.54	6.3	173.5	139.59
P- 6	Phosphate rock	3197- RH	1.0	35.2	0.72	0.59	6.54	3.3	174.5	174.79
P- 5	Phosphate rock	3196- RH	1.5	36.2	0.26	0.35	5.28	1.8	176.0	229.09
P- 4	Phosphate rock and phosphatic mudstone	3195- RH	1.5	27.1	--	--	--	21.1	177.5	269.74

P- 3	Limestone, argillaceous	3194-	RH	0.5	1.7	--	--	--	32.5	178.0	270.59
P- 2	Limestone, argillaceous	3193-	RH	1.5	0.5	--	--	--	36.5	179.5	271.34**
P- 1	Covered	--		2.0(?)	--	--	--	--	--	181.5	--

Phosphoria-Wells contact not exposed; covered interval probably not more than 3 feet thick.

Wells formation—not exposed

* Cumulative data incomplete due to missing information. Computations start from zero after interruption.

** Note incompleteness of cumulative data.

PARIS CANYON, IDAHO. LOT NO. 1266.

Phosphatic shale member of Phosphoria formation sampled in bulldozer trench on north side of Paris Canyon, sec. 8, T. 14 S., R. 43 E., Bear Lake County, Idaho, on overturned west limb of Paris syncline. Beds strike N. 2° E. and dip 35° W. Section measured by F. W. O' Malley, R. A. Harris, and D. F. Davidson and sampled by R. G. Waring and Harris in September 1948. Samples analyzed for P₂O₅ and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by laboratories of the U. S. Geological Survey, Geochemistry and Petrology Branch, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Rex member of Phosphoria formation—basal beds only										
R- 3	Chert	3180-WOM	1.0	0.8	--	--	--	94.5	1.0	0.80
R- 2	Chert	3179-WOM	1.1	2.3	--	--	--	89.0	2.1	3.33
R- 1	Chert	3178-WOM	3.0	1.3	--	--	--	93.1	5.1	7.23
Phosphatic shale member of Phosphoria formation										
P-119	Mudstone and phosphatic mudstone	3177-WOM	1.0	3.2	--	--	--	74.4	1.0	3.20
P-118	Mudstone	3176-WOM	3.0	3.5	--	--	--	73.8	4.0	13.70
P-117	Mudstone	3175-WOM	0.7	0.8	--	--	--	77.9	4.7	14.26
P-116	Mudstone; fos. col. no. 48-JES-367 ¹	3174-WOM	3.4	1.2	--	--	--	77.6	8.1	18.34
P-115	Mudstone	3173-WOM	3.0	5.8	--	--	--	68.7	11.1	35.74
P-114	Mudstone	3172-WOM	3.0	2.3	--	--	--	75.5	14.1	42.64
P-113	Phosphate rock	3171-WOM	1.7	35.6	0.92	0.74	5.54	5.6	15.8	103.16
P-112	Mudstone	3170-WOM	0.9	7.4	8.2	3.06	6.76	65.4	16.7	109.82
P-111	Phosphate rock, argillaceous	3169-WOM	1.0	21.6	2.7	1.4	6.66	33.0	17.7	131.42
P-110	Mudstone	3168-WOM	0.4	5.3	1.2	0.77	5.90	62.8	18.1	133.54
P-109	Phosphate rock	3167-WOM	0.8	34.7	3.5	1.4	10.54	6.2	18.9	161.30
P-108	Phosphate rock, argillaceous	3166-WOM	0.5	25.5	0.76	0.66	3.48	23.6	19.4	174.05
P-107	Phosphate rock	3165-WOM	0.6	33.7	9.2	3.1	6.80	6.9	20.0	194.27
P-106	Phosphate rock, argillaceous; fos. col. no. 48-JES-366	3164-WOM	0.9	21.7	4.9	2.2	6.48	30.0	20.9	213.80
P-105	Phosphate rock	3163-WOM	0.5	31.6	9.9	4.1	10.56	9.4	21.4	229.60
P-104	Phosphate rock	3162-WOM	1.0	30.5	2.1	1.1	12.56	7.4	22.4	260.10
P-103	Limestone	3161-WOM	0.4	4.8	1.4	0.69	39.82	9.3	22.8	262.02
P-102	Phosphate rock	3160-WOM	1.1	31.8	1.1	0.60	13.10	5.2	23.9	297.00
P-101	Phosphate rock, calcareous, argillaceous	3159-WOM	0.9	22.8	3.0	1.4	15.64	20.1	24.8	317.52
P-100	Phosphate rock, argillaceous, calcareous	3158-WOM	0.6	18.5	4.8	2.8	16.56	29.3	25.4	328.62
P- 99	Phosphate rock and argillaceous calcareous phosphate rock	3157-WOM	0.6	26.7	1.7	0.74	13.30	15.3	26.0	344.64
P- 98	Phosphate rock, argillaceous, calcareous	3156-WOM	0.8	20.2	4.0	1.7	17.46	25.2	26.8	360.80
P- 97	Limestone	3155-WOM	0.6	2.8	--	--	--	11.5	27.4	362.48
P- 96	Limestone, argillaceous	3154-WOM	1.3	2.9	--	--	--	35.4	28.7	366.25
P- 95	Mudstone	3153-WOM	2.3	3.3	--	--	--	65.0	31.0	373.84

P- 94	Limestone	3152-WOM	3.5	0.6	--	--	--	13.2	34.5	375.94
P- 93	Mudstone, calcareous	3151-WOM	0.4	3.8	--	--	--	53.0	34.9	377.46
P- 92	Phosphate rock, argillaceous	3150-WOM	0.6	22.5	--	--	--	28.4	35.5	390.96
P- 91	Phosphate rock, argillaceous	3149-WOM	0.5	18.8	--	--	--	32.0	36.0	400.36
P- 90	Phosphate rock	3148-WOM	0.6	32.0	--	--	--	9.3	36.6	419.56
P- 89	Phosphate rock, argillaceous	3147-WOM	0.7	16.5	--	--	--	20.7	37.3	431.11
P- 88	Mudstone, phosphatic	3146-WOM	2.2	10.9	--	--	--	27.5	39.5	455.09
P- 87	Phosphate rock, argillaceous	3145-WOM	3.7	13.1	--	--	--	25.1	43.2	503.56
P- 86	Phosphate rock, argillaceous	3144-WOM	2.7	18.5	--	--	--	29.2	45.9	553.51
P- 85	Mudstone, phosphatic	3143-WOM	2.8	14.8	--	--	--	42.7	48.7	594.95
P- 84	Mudstone	3142-WOM	0.6	6.3	--	--	--	61.7	49.3	598.73
P- 83	Mudstone	3141-WOM	1.2	2.5	--	--	--	75.4	50.5	601.73
P- 82	Phosphate rock, argillaceous	3140-WOM	0.8	21.6	--	--	--	30.2	51.3	619.01
P- 81	Mudstone; fos. col. no. 48-JES-365	3139-WOM	3.3	5.3	--	--	--	71.9	54.6	636.50
P- 80	Mudstone	3138-WOM	3.0	4.9	--	--	--	76.8	57.6	651.20
P- 79	Phosphate rock, argillaceous; fos. col. no. 48-JES-364	3137-WOM	1.3	18.1	--	--	--	33.4	58.9	674.73
P- 78	Mudstone	3136-WOM	0.8	7.0	--	--	--	65.2	59.7	680.33
P- 77	Mudstone; fos. col. no. 48-JES-363	3135-WOM	2.4	2.1	--	--	--	80.5	62.1	685.37
P- 76	Mudstone, phosphatic	3134-WOM	0.5	10.1	--	--	--	53.4	62.6	690.42
P- 75	Mudstone	3133-WOM	1.0	5.5	--	--	--	70.4	63.6	695.92
P- 74	Mudstone	3132-WOM	3.0	3.1	--	--	--	78.9	66.6	705.22
P- 73	Mudstone, phosphatic	3131-WOM	0.9	8.5	--	--	--	63.2	67.5	712.87
P- 72	Mudstone	3130-WOM	4.0	4.8	--	--	--	74.0	71.5	732.07
P- 71	Phosphate rock, argillaceous	3129-WOM	0.4	19.6	--	--	--	42.7	71.9	739.91
P- 70	Mudstone	3128-WOM	0.9	1.6	--	--	--	83.5	72.8	741.35
P- 69	Chert	3127-WOM	0.7	3.0	--	--	--	86.8	73.5	743.45
P- 68	Mudstone	3126-WOM	2.0	1.2	--	--	--	80.0	75.5	745.85
P- 67	Chert	3125-WOM	5.0	0.5	--	--	--	95.0	80.5	748.35
P- 66	Mudstone, phosphatic	3124-WOM	0.6	13.9	--	--	--	45.4	81.1	756.69
P- 65	Chert	3123-WOM	1.0	1.6	--	--	--	91.7	82.1	758.29
P- 64	Phosphate rock, argillaceous	3122-WOM	0.6	19.7	--	--	--	35.7	82.7	770.11
P- 63	Mudstone	3121-WOM	1.7	10.5	--	--	--	49.8	84.4	787.96
P- 62	Mudstone	3120-WOM	4.2	3.6	--	--	--	78.8	88.6	803.08
P- 61	Mudstone	3119-WOM	3.4	2.0	--	--	--	79.5	92.0	809.88
P- 60	Mudstone, phosphatic	3118-WOM	0.7	16.5	--	--	--	47.4	92.7	821.43
P- 59	Mudstone; fos. col. no. 48-JES-362	3117-WOM	2.2	2.8	--	--	--	80.0	94.9	827.59
P- 58	Mudstone, phosphatic; fos. col. no. 48-JES-361	3116-WOM	2.1	14.7	--	--	--	51.4	97.0	858.46
P- 57	Phosphate rock; fos. col. no. 48-JES-360	3115-WOM	0.7	26.7	--	--	--	18.5	97.7	877.15
P- 56	Mudstone, phosphatic	3114-WOM	1.4	8.4	--	--	--	63.3	99.1	888.91
P- 55	Mudstone, phosphatic; fos. col. no. 48-JES-359	3113-WOM	0.9	10.6	--	--	--	61.3	100.00	898.45

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 ₂ O ₅ (cumulative) ⁵
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
P- 54	Mudstone	3112-WOM	1.1	1.9	--	--	--	78.2	101.1	900.54
P- 53	Phosphate rock, argillaceous	3111-WOM	0.5	18.3	--	--	--	33.9	101.6	909.69
P- 52	Mudstone	3110-WOM	0.7	4.5	--	--	--	72.9	102.3	912.84
P- 51	Mudstone	3109-WOM	1.5	3.2	--	--	--	61.6	103.8	917.64
P- 50	Limestone, argillaceous, phosphatic; fos. col. no. 48-JES-358	3108-WOM	0.9	12.4	--	--	--	32.5	104.7	928.80
P- 49	Mudstone, phosphatic; fos. col. no. 48-JES-357	3107-WOM	2.9	9.3	--	--	--	43.6	107.6	955.77
P- 48	Limestone, argillaceous; fos. col. no. 48-JES-356	3106-WOM	1.5	3.9	--	--	--	35.3	109.1	961.62
P- 47	Mudstone, calcareous	3105-WOM	4.0	2.3	--	--	--	60.0	113.1	970.82
P- 46	Mudstone, calcareous	3104-WOM	2.8	4.4	--	--	--	62.9	115.9	983.14
P- 45	Mudstone, calcareous	3103-WOM	2.2	1.0	--	--	--	73.2	118.1	985.34
P- 44	Mudstone, calcareous	3102-WOM	1.1	7.3	--	--	--	52.3	119.2	993.37
P- 43	Mudstone, calcareous, phosphatic; fos. col. no. 48-JES-355	3101-WOM	3.0	7.8	--	--	--	51.5	122.2	1,016.77
P- 42	Mudstone, calcareous	3100-WOM	3.3	7.2	--	--	--	41.5	125.5	1,040.53
P- 41	Limestone, argillaceous, phosphatic; fos. col. no. 48-JES-354	3099-WOM	3.3	7.8	--	--	--	38.7	128.8	1,066.27
P- 40	Mudstone	3098-WOM	1.7	6.0	--	--	--	60.1	130.5	1,076.47
P- 39	Limestone, argillaceous	3097-WOM	1.6	0.6	--	--	--	38.6	132.1	1,077.43
P- 38	Mudstone, calcareous, phosphatic	3096-WOM	0.8	8.5	--	--	--	56.5	132.9	1,084.23
P- 37	Mudstone and chert	3095-WOM	0.9	5.8	--	--	--	67.8	133.8	1,089.45
P- 36	Mudstone and chert; fos. col. no. 48-JES-353	3094-WOM	0.6	5.2	--	--	--	65.5	134.4	1,092.57
P- 35	Mudstone	3093-WOM	2.3	5.0	--	--	--	50.4	136.7	1,104.07
P- 34	Mudstone	3092-WOM	2.0	7.2	--	--	--	57.4	138.7	1,118.47
P- 33	Mudstone, calcareous, phosphatic; fos. col. no. 48-JES-352	3091-WOM	1.7	9.9	--	--	--	42.7	140.4	1,135.30
P- 32	Limestone, argillaceous	3090-WOM	1.0	7.3	--	--	--	25.8	141.4	1,142.60
P- 31	Limestone	3089-WOM	0.8	1.5	--	--	--	16.6	142.2	1,143.80
P- 30	Limestone, argillaceous, phosphatic; fos. col. no. 48-JES-351	3088-WOM	0.9	10.7	--	--	--	35.9	143.1	1,153.43
P- 29	Phosphate rock, calcareous, argillaceous; fos. col. no. 48-JES-350	3087-WOM	0.7	19.2	--	--	--	23.6	143.8	1,166.87
P- 28	Phosphate rock, calcareous, argillaceous; fos. col. no. 48-JES-349	3086-WOM	1.5	20.8	--	--	--	20.0	145.3	1,198.07
P- 27	Phosphate rock, argillaceous, calcareous	2860- DFD	0.6	17.5	--	--	--	28.7	145.9	1,208.57
P- 26	Phosphate rock, calcareous; fos. col. no. 48-JES-348	1850- DFD	1.8	22.9	--	--	--	18.3	147.7	1,249.79
P- 25	Phosphate rock, argillaceous, calcareous	1849- DFD	0.5	17.4	--	--	--	33.5	148.2	1,258.49
P- 24	Phosphate rock, argillaceous, calcareous	1848- DFD	0.9	16.6	--	--	--	32.8	149.1	1,273.43

P- 23	Phosphate rock, argillaceous	1847- DFD	0.7	20.4	--	--	--	29.5	149.8	1,287.71
P- 22	Phosphate rock, calcareous	1846- DFD	1.1	25.8	--	--	--	11.7	150.9	1,316.09
P- 21	Phosphate rock, calcareous	1845- DFD	0.6	21.9	--	--	--	16.8	151.5	1,329.23
P- 20	Phosphate rock, calcareous	1844- DFD	1.1	23.9	--	--	--	16.8	152.6	1,355.52
P- 19	Mudstone and calcareous phosphate rock	1843- DFD	1.4	14.8	--	--	--	40.8	154.0	1,376.24
P- 18	Phosphate rock, argillaceous	1842- DFD	0.5	17.5	--	--	--	36.2	154.5	1,384.99
P- 17	Phosphate rock, argillaceous	3085-WOM	0.5	17.5	--	--	--	36.9	155.0	1,393.74
P- 16	Mudstone, phosphatic	3084-WOM	1.0	10.4	--	--	--	54.4	156.0	1,404.14
P- 15	Mudstone, phosphatic	3083-WOM	3.5	8.4	--	--	--	63.6	159.5	1,433.54
P- 14	Mudstone	3082-WOM	1.1	2.1	--	--	--	77.0	160.6	1,435.85
P- 13	Phosphate rock	3081-WOM	0.7	29.0	--	--	--	17.0	161.3	1,456.15
P- 12	Phosphate rock, argillaceous	3070-WOM	1.5	20.8	--	--	--	36.4	162.8	1,487.35
P- 11	Mudstone, phosphatic	3069-WOM	1.5	9.4	--	--	--	59.7	164.3	1,501.45
P- 10	Mudstone, phosphatic	3068-WOM	1.0	13.5	--	--	--	52.3	165.3	1,514.95
P- 9	Phosphate rock, argillaceous; fos. col. no. 48-JES-347	3067-WOM	2.3	17.1	--	--	--	44.8	167.6	1,554.28
P- 8	Phosphate rock, argillaceous; fos. col. no. 48-JES-346	3080- RH	0.8	19.8	--	--	--	32.2	168.4	1,570.12
P- 7	Phosphate rock, argillaceous	3079- RH	0.6	23.5	--	--	--	23.9	169.0	1,584.22
P- 6	Phosphate rock	3078- RH	2.2	32.7	1.4	0.59	5.60	6.3	171.2	1,656.16
P- 5	Phosphate rock	3077- RH	2.6	33.8	1.1	0.51	4.92	5.1	173.8	1,744.04
P- 4	Mudstone, phosphatic	3076- RH	0.6	13.8	--	--	--	49.7	174.4	1,752.32
P- 3	Mudstone	3075- RH	2.5	2.4	--	--	--	57.7	176.9	1,758.32
P- 2	Mudstone, calcareous	3074- RH	1.1	0.7	--	--	--	58.0	178.0	1,759.09
P- 1	Phosphate rock	3073- RH	0.3	28.7	--	--	--	7.5	178.3	1,767.70

Wells formation—top beds only

Cw- 1	Dolomite, argillaceous, calcareous	3072- RH	4.0	5.4	--	--	--	29.5	4.0	21.60
Cw- 2	Dolomite, calcareous, argillaceous	3071- RH	2.7	1.0	--	--	--	22.8	6.7	24.30

BLOOMINGTON CANYON, IDAHO. LOT NO. 1272.

Phosphatic shale member of Phosphoria formation cored in diamond drill hole no. 1 on north slope of Bloomington Canyon, sec. 21, T. 14 S., R. 43 E., Bear Lake County, Idaho, on west limb of Paris syncline. Beds strike NW; dip varies from 0° to 20° E. Hole drilled in June and July 1948 by U. S. Bureau of Mines, A. E. Long in charge. Core measured by R. H. Thurston, R. M. Campbell, R. A. Hoppin, R. L. Parker, D. F. Davidson, R. A. Gulbrandsen, D. A. Bostwick, and J. E. Smedley and sampled by Davidson. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for other constituents by Trace Elements Section Laboratory, U. S. Geological Survey, Washington, D. C.

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
Phosphatic shale member of Phosphoria formation—top not cored										
P-187	Mudstone	801-RMC	2.3	3.7	--	--	--	72.5	2.3	8.51
P-186	Mudstone	802-RMC	2.0	5.4	--	--	--	68.0	4.3	19.31
P-185	Mudstone	803-RMC	3.5	1.5	--	--	--	79.5	7.8	24.56
P-184	Mudstone and phosphate rock	804-RMC	0.4	16.4	--	--	--	38.3	8.2	31.12
P-183	Phosphate rock	805-RMC	0.3	33.2	--	--	--	8.9	8.5	41.08
P-182	Mudstone, phosphatic	806-RMC	0.7	32.5	--	--	--	12.4	9.2	63.83
P-181	Phosphate rock	807-RMC	0.6						9.8	83.33
	The P ₂ O ₅ and acid insoluble analyses represent a composite of samples 806-RMC and 807-RMC.									
P-180	Mudstone, phosphatic	808-RMC	0.6	16.4	--	--	--	48.1	10.4	93.17
P-179	Phosphate rock, argillaceous	809-RMC	0.7	23.1	--	--	--	33.0	11.1	109.34
P-178	Mudstone, phosphatic	810-RMC	0.7	11.5	--	--	--	57.6	11.8	117.39
P-177	Phosphate rock	811-RMC	1.0	35.9	0.83	0.33	3.34	5.5	12.8	153.29
P-176	Phosphate rock, argillaceous	812-RMC	0.4	26.5	4.2	1.2	5.38	22.0	13.2	<u>163.89</u>
P-175	Core missing	--	0.4	--	--	--	--	--	13.6	--
P-174	Phosphate rock	813-RMC	0.4	23.9	4.8	0.94	6.64	28.1	14.0	9.56*
P-173	Phosphate rock	814-RMC	0.4		5.4	1.07	6.54		14.4	19.12
	The P ₂ O ₅ and acid insoluble analyses represent a composite of samples 813-RMC and 814-RMC.									
P-172	Phosphate rock, argillaceous	815-RMC	0.8	26.5	2.4	0.71	7.12	22.7	15.2	<u>40.32</u>
P-171	Core missing	--	0.1	--	--	--	--	--	15.3	--
P-170	Phosphate rock	816-RMC	0.9	34.2	1.3	0.32	5.00	7.7	16.2	--
P-169	Core missing	--	0.1	--	--	--	--	--	16.3	--
P-168	Phosphate rock	817-RMC	0.9	27.4	2.9	0.68	7.72	19.1	17.2	24.66*
P-167	Phosphate rock, argillaceous	818-RMC	0.5	23.9	5.3	0.46	8.44	28.2	17.7	36.61
P-166	Phosphate rock and phosphatic mudstone	819-RMC	0.9	31.6	2.1	0.37	8.40	8.7	18.6	<u>68.21</u>
P-165	Core missing	--	0.1	--	--	--	--	--	18.7	--
P-164	Phosphate rock	820-RMC	1.0	34.8	1.1	0.39	8.60	1.5	19.7	--

* Cumulative data incomplete due to missing information. Computations start from zero after interruption.

P-163	Core missing	--	0.4	--	--	--	--	--	20.1	--
P-162	Phosphate rock	821-RMC	1.0	25.3	3.3	0.64	12.40	19.1	21.1	25.30*
P-161	Phosphate rock and phosphatic mudstone	822-RMC	0.6	31.4	2.2	0.57	8.08	9.6	21.7	44.14
P-160	Phosphate rock, argillaceous	823-RMC	1.0	23.9	3.7	1.1	13.84	20.5	22.7	68.04
P-159	Mudstone, phosphatic	824-RMC	1.0	15.9	--	--	--	41.5	23.7	83.94
P-158	Phosphate rock	825-RMC	0.4	21.7	--	--	--	7.8	24.1	92.62
P-157	Mudstone	826-RMC	0.4	6.4	--	--	--	55.8	24.5	95.18
P-156	Mudstone	827-RMC	0.6	4.5	--	--	--	54.7	25.1	97.88
P-155	Mudstone	828-RMC	0.3	7.2	--	--	--	45.6	25.4	100.04
P-154	Mudstone	829-RMC	0.4	2.2	--	--	--	58.9	25.8	100.92
P-153	Mudstone	830-RMC	0.4	1.6	--	--	--	60.8	26.2	101.56
P-152	Mudstone	831-RLP	0.9	0.8	--	--	--	62.3	27.1	102.28
P-151	Mudstone	832-RLP	0.6	2.5	--	--	--	55.3	27.7	103.78
P-150	Mudstone	833-RLP	0.4	6.1	--	--	--	50.6	28.1	106.22
P-149	Mudstone	834-RLP	1.1	2.0	--	--	--	57.0	29.2	108.42
P-148	Phosphate rock, calcareous	835-RLP	0.5	16.6	--	--	--	19.5	29.7	116.72
P-147	Phosphate rock, calcareous	836-JES	0.7	22.1	--	--	--	19.1	30.4	132.19
P-146	Phosphate rock	837-DAB	0.9	26.7	--	--	--	15.8	31.3	156.22
P-145	Phosphate rock	838-DAB	0.5	34.8	--	--	--	5.6	31.8	173.62
P-144	Phosphate rock	839-DAB	0.5	29.6	--	--	--	5.6	32.3	188.42
P-143	Phosphate rock, argillaceous	840-DAB	1.5	14.9	--	--	--	17.5	33.8	210.77
P-142	Phosphate rock, argillaceous	841-DAB	0.8	13.8	--	--	--	17.4	34.6	221.81
P-141	Phosphate rock, argillaceous	842-DAB	0.6	17.1	--	--	--	23.1	35.2	232.07
P-140	Phosphate rock, argillaceous	843-DAB	0.9	16.9	--	--	--	17.9	36.1	247.28
P-139	Core missing	--	1.9	--	--	--	--	--	38.0	--
P-138	Phosphate rock, argillaceous	844-DAB	1.8	16.6	--	--	--	32.6	39.8	29.88*
P-137	Phosphate rock, argillaceous	845-RMC	1.0	17.1	--	--	--	27.0	40.8	46.98
P-136	Phosphate rock and mudstone	846-RMC	1.0	16.7	--	--	--	31.1	41.8	63.68
P-135	Phosphate rock, argillaceous	847-RMC	1.0	16.4	--	--	--	33.8	42.8	80.08
P-134	Mudstone, phosphatic	848-RAH	2.4	7.8	--	--	--	61.1	45.2	98.80
P-133	Mudstone, phosphatic	849-RAH	0.4	14.9	--	--	--	39.9	45.6	104.76
P-132	Phosphate rock, argillaceous	850-RAH	0.4	16.5	--	--	--	35.8	46.0	111.36
P-131	Mudstone, phosphatic	851-RAH	0.9	12.7	--	--	--	49.0	46.9	122.79
P-130	Mudstone	852-RAH	1.1	6.6	--	--	--	63.8	48.0	130.05
P-129	Mudstone	853-RAH	1.8	5.5	--	--	--	66.9	49.8	139.95
P-128	Mudstone, phosphatic	854-RAH	1.0	11.6	--	--	--	52.6	50.8	151.55
P-127	Mudstone, phosphatic	855-RAH	0.9	8.6	--	--	--	68.0	51.7	159.29
P-126	Mudstone, phosphatic	856-RAH	1.1	9.7	--	--	--	67.6	52.8	169.96
P-125	Mudstone, phosphatic	857-RAH	1.1	9.7	--	--	--	60.9	53.9	180.63

* Cumulative data incomplete due to missing information. Computations start from zero after interruption.

* Cumulative data in

Bed no.	Rock description	Sample no.	Thickness (feet)	Chemical analyses (percent)					Cumulative thickness (feet)	Thickness x percent P ₂ O ₅ (cumulative)
				P ₂ O ₅	Al ₂ O ₃	Fe ₂ O ₃	Loss on ignition	Acid insoluble		
P-124	Core missing	--	1.0	--	--	--	--	--	54.9	--
P-123	Mudstone	858-RAH	1.3	5.9	--	--	--	70.8	56.2	7.67*
P-122	Mudstone	859-RAH	1.0	6.2	--	--	--	66.5	57.2	13.87
P-121	Mudstone	860-RAH	1.1	2.9	--	--	--	81.6	58.3	17.06
P-120	Core missing	--	1.1	--	--	--	--	--	59.4	--
P-119	Mudstone	861-RLP	0.5	0.7	--	--	--	86.7	59.9	--
P-118	Core missing	--	0.2	--	--	--	--	--	60.1	--
P-117	Mudstone	862-RLP	1.5	6.4	--	--	--	66.2	61.6	--
P-116	Phosphate rock, argillaceous	863-RLP	1.0	21.1	--	--	--	30.7	62.6	--
P-115	Core missing	--	0.2	--	--	--	--	--	62.8	--
P-114	Mudstone	864-RLP	1.5	5.4	--	--	--	67.6	64.3	8.10*
P-113	Mudstone	865-RLP	1.0	2.5	--	--	--	76.1	65.3	10.60
P-112	Mudstone, phosphatic	866-RLP	0.5	13.6	--	--	--	42.0	65.8	17.40
P-111	Mudstone	867-RLP	1.2	3.7	--	--	--	70.0	67.0	21.84
P-110	Core missing	--	0.2	--	--	--	--	--	67.2	--
P-109	Mudstone, phosphatic	868- JES	1.1	2.5	--	--	--	75.5	68.3	2.75*
P-108	Mudstone and cherty phosphate rock	869- JES	0.8	18.6	--	--	--	77.6	69.1	17.63
P-107	Mudstone	870- JES	1.2	2.0	--	--	--	86.6	70.3	20.03
P-106	Chert	871- JES	1.6	0.6	--	--	--	97.4	71.9	20.99
P-105	Chert	872- JES	0.8	0.2	--	--	--	97.2	72.7	21.15
P-104	Chert	873-RLP	0.2)	--	--	--	--	--	72.9	--
P-103	Core missing	--	0.8	--	--	--	--	--	73.7	--
P-102	Chert	874-RLP	0.6)	0.5	--	--	--	96.5	74.3	--
P-101	Core missing	--	2.4	--	--	--	--	--	76.7	--
P-100	Chert	875-RLP	0.1)	--	--	--	--	--	76.8	--
The P ₂ O ₅ and acid insoluble analyses represent a composite of samples 873-RLP, 874-RLP, and 875-RLP.										
P- 99	Core missing	--	0.9	--	--	--	--	--	77.7	--
P- 98	Chert	876-RLP	0.5	0.6	--	--	--	96.3	78.2	--
P- 97	Core missing	--	0.1	--	--	--	--	--	78.3	--
P- 96	Chert	877-RLP	0.4	0.6	--	--	--	96.9	78.7	--
P- 95	Core missing	--	0.7	--	--	--	--	--	79.4	--
P- 94	Chert	878-RLP	0.5	0.6	--	--	--	96.5	79.9	--
P- 93	Core missing	--	3.0	--	--	--	--	--	82.9	--
P- 92	Mudstone and argillaceous phosphate rock	879-RAG	0.8	8.7	--	--	--	59.0	83.7	--
P- 91	Core missing	--	0.2	--	--	--	--	--	83.9	--
P- 90	Phosphate rock	880-RAG	0.8	33.8	--	--	--	8.3	84.7	27.04*
P- 89	Phosphate rock and mudstone	881-RAG	0.6	10.3	--	--	--	58.7	85.3	33.22

P- 88	Mudstone	882- RAG	0.6	2.7	--	--	--	79.5	85.9	34.84
P- 87	Mudstone	883- RAG	1.7	0.7	--	--	--	80.6	87.6	<u>36.03</u>
P- 86	Core missing	--	0.2	--	--	--	--	--	87.8	--
P- 85	Mudstone	884- RAG	2.8	2.4	--	--	--	78.6	90.6	6.72*
P- 84	Phosphate rock	885- RAG	0.2	30.6	--	--	--	11.3	90.8	12.84
P- 83	Mudstone	886- RAG	0.5	8.6	--	--	--	59.6	91.3	17.14
P- 82	Phosphate rock, argillaceous	887- RAG	0.1		--	--	--		91.4	<u>18.00</u>

The P₂O₅ and acid insoluble analyses represent a composite of samples 886-RAG and 887-RAG.

P- 81	Core missing	--	0.2	--	--	--	--	--	91.6	--
P- 80	Mudstone	888- RAH	1.7	1.0	--	--	--	80.2	93.3	--
P- 79	Mudstone	889- RAH	1.6	2.3	--	--	--	77.0	94.9	--
P- 78	Core missing	--	0.2	--	--	--	--	--	95.1	--
P- 77	Mudstone and phosphate rock	890- RAH	1.0	26.3	--	--	--	21.0	96.1	--
P- 76	Mudstone	891- RAH	0.7	2.8	--	--	--	73.9	96.8	--
P- 75	Core missing	--	1.0	--	--	--	--	--	97.8	--
P- 74	Mudstone	892- RAH	0.5	1.1	--	--	--	79.4	98.3	--
P- 73	Core missing	--	0.2	--	--	--	--	--	98.5	--
P- 72	Mudstone, phosphatic	893- RAH	0.65	9.9	--	--	--	56.9	99.15	--
P- 71	Core missing	--	0.15	--	--	--	--	--	99.30	--
P- 70	Mudstone	894- RAH	1.2	4.9	--	--	--	70.9	100.50	5.88*
P- 69	Mudstone	895- RAH	1.3	1.3	--	--	--	81.0	101.80	7.57
P- 68	Phosphate rock	896- RLP	0.2	31.5	--	--	--	11.0	102.00	13.87
P- 67	Mudstone, phosphatic	897- RAH	1.2	9.0	--	--	--	73.5	103.20	24.67
P- 66	Phosphate rock	898- RAH	0.7	32.0	--	--	--	9.4	103.90	47.07
P- 65	Mudstone, phosphatic	899- RAH	0.2	12.5	--	--	--	52.1	104.10	49.57
P- 64	Phosphate rock, argillaceous	900- RAH	0.3	25.9	--	--	--	22.6	104.40	<u>57.34</u>
P- 63	Core missing	--	0.6	--	--	--	--	--	105.00	--
P- 62	Phosphate rock, argillaceous	901- RAH	0.7	20.0	--	--	--	33.9	105.70	14.00*
P- 61	Mudstone and phosphate rock	902- RAH	1.7	8.3	--	--	--	67.3	107.40	28.11
P- 60	Mudstone	903- RAH	1.5	3.3	--	--	--	72.1	108.90	33.06
P- 59	Mudstone	904- RAH	1.4	6.2	--	--	--	69.9	110.30	41.74
P- 58	Mudstone and phosphate rock	905- RHT	0.9	14.8	--	--	--	40.3	111.20	55.06
P- 57	Mudstone, phosphatic	906- RHT	3.4	8.9	--	--	--	49.9	114.60	85.32
P- 56	Mudstone	907- RHT	0.2	2.6	--	--	--	69.9	114.80	85.84
P- 55	Mudstone, phosphatic	908- RHT	0.6	14.3	--	--	--	37.4	115.40	94.42
P- 54	Mudstone	909- RHT	0.1		--	--	--		115.50	95.85

The P₂O₅ and acid insoluble analyses represent a composite of samples 908-RHT and 909-RHT.

* Cumulative data incomplete due to missing information. Computations start from zero after interruption.

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- 53	Mudstone, phosphatic	910- RHT	1.4	12.4	--	--	--	37.3	116.90	113.21
P- 52	Mudstone, phosphatic	911- RHT	0.2	8.5	--	--	--	46.3	117.10	114.91
P- 51	Core missing	--	0.5	--	--	--	--	--	117.60	--
P- 50	Mudstone, phosphatic	912- RHT	0.5	9.4	--	--	--	52.6	118.10	4.70*
P- 49	Mudstone	913- RHT	0.8	7.4	--	--	--	50.2	118.90	10.62
P- 48	Mudstone, phosphatic	914- RHT	0.8	9.3	--	--	--	48.8	119.70	18.06
P- 47	Mudstone, phosphatic	915- RHT	0.6	8.6	--	--	--	49.9	120.30	23.22
P- 46	Mudstone, phosphatic	916- RHT	0.8	8.6	--	--	--	57.7	121.10	30.10
P- 45	Mudstone	917- RHT	1.4	4.3	--	--	--	62.6	122.50	36.12
P- 44	Mudstone	918- RHT	0.5	0.9	--	--	--	71.5	123.00	36.57
P- 43	Mudstone	919- RHT	0.2	1.4	--	--	--	71.2	123.20	36.85
P- 42	Mudstone	920- RHT	1.6	5.4	--	--	--	60.8	124.80	45.49
P- 41	Mudstone	921- RHT	1.2	3.3	--	--	--	65.6	126.00	49.45
P- 40	Mudstone	922- RHT	0.2	3.9	--	--	--	68.8	126.20	50.23
P- 39	Mudstone	923- RHT	0.4	6.6	--	--	--	57.7	126.60	52.87
P- 38	Mudstone	924- RHT	0.2	6.8	--	--	--	65.2	126.80	54.23
P- 37	Mudstone	925- RHT	2.0	3.0	--	--	--	68.6	128.80	60.23
P- 36	Mudstone, phosphatic, calcareous	926- DFD	2.5	9.8	--	--	--	49.3	131.30	84.73
P- 35	Mudstone, phosphatic	927- DFD	2.0	9.6	--	--	--	49.7	133.30	103.93
P- 34	Mudstone, phosphatic	928- DFD	1.2	12.3	--	--	--	44.3	134.50	118.69
P- 33	Core missing	--	0.4	--	--	--	--	--	134.90	--
P- 32	Mudstone, phosphatic, and calcareous mudstone	929- DFD	3.3	10.6	--	--	--	47.6	138.20	34.98*
P- 31	Mudstone, phosphatic, calcareous	930- DFD	1.2	10.9	--	--	--	51.7	139.40	48.06
P- 30	Mudstone	931- DFD	2.8	7.2	--	--	--	58.0	142.20	68.22
P- 29	Mudstone	932- DFD	1.5	7.5	--	--	--	51.0	143.70	79.47
P- 28	Mudstone, calcareous, phosphatic	933- DFD	0.9	9.8	--	--	--	46.0	144.60	88.29
P- 27	Core missing	--	1.5	--	--	--	--	--	146.10	--
P- 26	Mudstone, phosphatic	934- DFD	0.7	8.1	--	--	--	61.8	146.80	5.67*
P- 25	Mudstone, phosphatic	935- DFD	2.2	13.4	--	--	--	39.7	149.00	35.15
P- 24	Mudstone	936- RHT	0.6	5.6	--	--	--	69.7	149.60	38.51
P- 23	Mudstone, phosphatic, calcareous	937- RHT	0.8	11.7	--	--	--	47.0	150.40	47.87
P- 22	Mudstone, phosphatic	938- RHT	1.0	10.6	--	--	--	46.5	151.40	58.47
P- 21	Mudstone, phosphatic	939- RHT	0.4	12.0	--	--	--	51.3	151.80	63.27
P- 20	Phosphate rock, argillaceous	940- RHT	3.5	17.9	--	--	--	30.4	155.30	125.92
P- 19	Mudstone, phosphatic	941- RHT	0.3	14.7	--	--	--	43.7	155.60	130.33
P- 18	Phosphate rock, argillaceous	942- RHT	2.0	18.3	--	--	--	26.7	157.60	166.93
P- 17	Phosphate rock and mudstone	943- RHT	2.6	19.4	--	--	--	37.8	160.20	217.37
P- 16	Mudstone, phosphatic	944- RHT	0.6	16.6	--	--	--	46.1	160.80	227.33
P- 15	Mudstone, phosphatic	945- RHT	1.9	10.6	--	--	--	59.4	162.70	247.47
P- 14	Mudstone, phosphatic	946- RHT	6.0	9.1	--	--	--	63.2	168.70	302.07

P- 13	Phosphate rock, argillaceous	947- RHT	1.2	27.4	2.2	0.55	3.98	24.8	169.90	334.95
P- 12	Phosphate rock and mudstone	948- RHT	2.0	23.3	4.9	1.4	4.20	30.7	171.90	381.55
P- 11	Mudstone	949- RHT	0.7	6.2	9.3	3.2	4.62	69.0	172.60	385.89
P- 10	Phosphate rock, argillaceous	950- RHT	1.2	17.9	6.6	1.5	4.44	43.3	173.80	407.39
P- 9	Mudstone, phosphatic	951- RHT	0.9	8.6	9.8	2.6	3.84	33.4	174.70	415.13
P- 8	Mudstone and phosphate rock	952- RHT	5.4	21.1	4.6	1.3	3.90	37.3	180.10	529.07
P- 7	Core missing	--	1.4	--	--	--	--	--	181.50	--
P- 6	Mudstone, phosphatic	953- RHT	0.7	12.3	9.8	3.2	4.58	52.9	182.20	--
P- 5	Phosphate rock, argillaceous	954- RHT	0.5	20.5	5.6	1.3	4.60	34.9	182.70	--
P- 4	Core missing	--	5.0	--	--	--	--	--	187.79	--
P- 3	Mudstone	955- RHT	7.0	5.8	--	--	--	68.4	194.70	40.60*
P- 2	Limestone breccia, argillaceous	956- RHT	0.5	1.3	--	--	--	41.5	195.20	41.25
P- 1	Phosphate rock and chert	957- RHT	5.9	24.9	--	--	--	27.3	201.10	188.16**

Wells formation—top beds only

Cw- 1	Limestone, argillaceous	958- RHT	1.0	0.4	--	--	--	37.3	1.0	0.40
Cw- 2	Limestone and sandstone	959- RHT	6.7	1.4	--	--	--	53.9	7.7	9.78
Cw- 3	Limestone breccia, cherty	960- RHT	1.6	0.8	--	--	--	68.3	9.3	11.06

* Cumulative data incomplete due to missing information. Computations start from zero after interruption.

** Note incompleteness of cumulative data.

