UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING

by

V. E. McKelvey, L. E. Smith,
R. A. Hoppin, and F. C. Armstrong

MINERAL DEPOSITS BRANCH

Spokane, Washington July 1951

OPEN FILE

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

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INTRODUCTION

The first of a series of reports giving detailed stratigraphic sections of the Phosphoria formation in the Western phosphate field as measured and described by the Geological Survey will be released as Circulars within the next few months. Because of the needs of industry for many of these data during the 1951 field season, and in view of the unavoidable delays attendant on publication, the tabular data to be included in these Circulars are hereby placed on open file in simple reproduction form (prepared by Ozalid from photographic negatives) and without explanatory text so that immediate use may be made of the data.

The tables include data on sections in four states: Montana, Idaho, Wyoming, and Utah; and the tables for each of these states are bound together as individual reports. The tables include name and location of section measured, brief description of geologic setting, acknowledgments for field and analytical work, abstract data on the sections (bed number, rock name, sample number, and thickness), and analytical data on the samples. The analytical data include reports on P_2O_5 and acid insoluble for all samples and additional analyses, such as Al_2O_3, Fe_2O_3, loss on ignition, F, and V_2O_5, for selected samples. Spectrographic analyses for a large number of elements are included for samples from selected localities, and special analyses have been made of a few samples.

These reports are placed on open file at the offices of the Geological Survey in Washington, D. C., Spokane, Washington, Salt Lake City, Utah, and Montpelier, Idaho, and at the offices of the Idaho Bureau of Mines and Geology, Moscow, Idaho, the Montana Bureau of Mines and Geology, Butte, Montana, and the Wyoming Geological Survey, Laramie, Wyoming, and the University of Utah, Salt Lake City, Utah.

LAYLAND CANYON, WYOMING. LOT NO. 1202.

Phosphatic shale member of Phosphoria formation sampled and upper shale member measured in hand trenches in Layland Canyon, sec. 19, and in next canyon to south, sec. 30, T. 27 N., R. 119 W., Lincoln County, Wyoming, on east limb of anticline. Beds P-1 through P-82 sampled in trench in lower shale member 300 feet above canyon bottom on north side of Layland Canyon; beds P-83 through R-1 sampled and upper shale member measured in trench 25 feet above canyon bottom on north side of canyon ¼ mile to south. Beds in north trench strike N. 20° W. and dip 34° E. at Wells contact and strike N. 15° W. and dip 76° E. in upper part of section; beds in south trench strike N. 13° W. and dip 80° E. Phosphatic shale member measured by D. M. Larrabee, R. A. Hoppin, and L. E. Smith and sampled by R. P. Sheldon, R. A. Gulbrandsen, R. S. Sears, and O. A. Payne in June and July 1947; upper shale member measured by F. C. Armstrong in September 1947. Samples analyzed for P_2O_5 and acid insoluble by U. S. Bureau of Mines Laboratory, Albany, Oregon, and for Al_2O_3, Fe_2O_3, and loss on ignition by 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		
	Dinwoody formation									
Trd - 1	Limestone, sandy	--	2.0	--	--	--	--	--	2.0	--
	Upper shale member of Phosphoria formation									
U- 12	Mudstone	--	0.7	--	--	--	--	--	0.7	--
U- 11	Mudstone, contains phosphatic limestone concretion at base	--	0.8	--	--	--	--	--	1.5	--
U- 10	Mudstone, calcareous, cherty	--	1.0	--	--	--	--	--	2.5	--
U- 9	Mudstone	--	3.2	--	--	--	--	--	5.7	--
U- 8	Mudstone	--	2.2	--	--	--	--	--	7.9	--
U- 7	Mudstone	--	1.1	--	--	--	--	--	9.0	--
U- 6	Mudstone, calcareous	--	0.75	--	--	--	--	--	9.75	--
U- 5	Mudstone	--	1.4	--	--	--	--	--	11.15	--
U- 4	Mudstone	--	0.35	--	--	--	--	--	11.50	--
U- 3	Limestone, sandy	--	0.4	--	--	--	--	--	11.90	--
U- 2	Phosphate rock, cherty	--	1.1	--	--	--	--	--	13.00	--
U- 1	Phosphate rock, cherty	--	1.5	--	--	--	--	--	14.50	--
	Rex member of Phosphoria formation—basal bed only									
R- 1	Chert, contains calcite veinlets	RAH-147-47	10.0	0.7	--	--	--	73.3	10.0	7.00
	Phosphatic shale member of Phosphoria formation									
P-105	Limestone, argillaceous	RAH-148-47	6.0	1.7	--	--	--	33.5	6.0	10.20
P-104	Phosphate rock	RAH-149-47	0.3	24.0	--	--	--	19.4	6.3	17.40
P-103	Mudstone, contains phosphatic mudstone lens 0.2 foot thick	RAH-150-47	1.0	4.9	--	--	--	67.9	7.3	22.30
P-102	Mudstone	RAH-151-47	0.6	1.2	--	--	--	75.3	7.9	23.02
P-101	Mudstone, calcareous	RAH-152-47	2.6	0.5	--	--	--	49.5	10.5	24.32
P-100	Mudstone	RAH-153-47	1.8	4.2	--	--	--	70.2	12.3	31.88

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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- 99	Phosphate rock	RAH-154-47	1.5	24.8	2.4	4.47	6.8	18.6	13.8	69.08
P- 98	Phosphate rock and mudstone	RAH-155-47	1.15	21.0	2.8	4.02	6.4	31.1	14.95	93.23
P- 97	Phosphate rock	RAH-156-47	1.4	29.8	1.5	4.48	6.6	9.5	16.35	134.95
P- 96	Phosphate rock	RAH-157-47	3.1	31.5	1.1	3.15	7.5	4.6	19.45	232.60
P- 95	Phosphate rock	RAH-158-47	2.3	29.6	1.9	0.79	8.30	9.9	21.75	300.68
P- 94	Mudstone, phosphatic	RAH-159-47	0.7	12.2	6.7	5.74	7.8	50.1	22.45	309.22
P- 93	Limestone, argillaceous	RAH-160-47	2.2	0.3	4.5	4.45	16.8	40.2	24.65	309.88
P- 92	Phosphate rock	RAH-161-47	1.1	29.6	2.1	3.82	8.0	9.0	25.75	342.44
P- 91	Phosphate rock, mudstone, and limestone	RAH-162-47	1.2	20.6	3.9	1.04	9.50	26.1	26.95	367.16
P- 90	Phosphate rock	RAH-163-47	2.3	28.4	2.5	3.76	7.0	11.7	29.25	432.48
P- 89	Phosphate rock, argillaceous	RAH-164-47	1.2	20.6	5.3	4.24	6.5	31.5	30.45	457.20
P- 88	Phosphate rock	RAH-165-47	2.1	30.1	2.4	4.86	5.1	11.5	32.55	520.41
P- 87	Mudstone, calcareous and phosphate rock	RAH-166-47	1.0	9.3	5.4	5.58	15.4	40.3	33.55	529.71
P- 86	Mudstone, calcareous	RAH-167-47	2.2	2.3	6.9	4.83	18.2	51.0	35.75	534.77
P- 85	Phosphate rock, calcareous and limestone	RAH-168-47	0.5	20.8	2.5	4.89	17.6	6.1	36.25	545.17
P- 84	Mudstone, phosphatic	RAH-169-47	1.5	13.7	9.0	6.22	13.8	36.3	37.75	565.72
P- 83	Limestone, "hanging-wall limestone"	RAH-170-47	3.2	0.7	--	--	--	10.4	40.95	567.96
P- 82	Mudstone, phosphatic	LES-258-47	0.3	8.9	--	--	--	52.3	41.25	570.63
P- 81	Mudstone	LES-257-47	0.4	0.5	--	--	--	79.4	41.65	570.83
P- 80	Mudstone	LES-256-47	0.65	0.4	--	--	--	64.1	42.30	571.09
P- 79	Mudstone	LES-255-47	0.5	0.4	--	--	--	52.3	42.80	571.29
P- 78	Mudstone	LES-254-47	0.5	0.6	--	--	--	74.1	43.30	571.59
P- 77	Mudstone	LES-253-47	0.45	4.8	--	--	--	60.4	43.75	573.75
P- 76	Mudstone, phosphatic	LES-252-47	0.4	8.4	--	--	--	53.7	44.15	577.11
P- 75	Limestone, argillaceous, "footwall limestone"	LES-251-47	1.3	1.6	--	--	--	33.0	45.45	579.19
P- 74	Mudstone	LES-250-47	0.4	3.3	--	--	--	75.0	45.85	580.51
P- 73	Mudstone, phosphatic	LES-249-47	0.6	11.1	--	--	--	50.4	46.45	587.17
P- 72	Mudstone, calcareous	RAH-139-47	1.6	0.7	--	--	--	66.6	48.05	588.29
P- 71	Mudstone, calcareous	RAH-138-47	1.0	0.5	--	--	--	66.6	49.05	588.79
P- 70	Limestone, argillaceous	RAH-137-47	2.2	0.6	--	--	--	41.5	51.25	590.11
P- 69	Mudstone, calcareous, phosphatic	RAH-136-47	2.9	12.0	--	--	--	35.6	54.15	624.91
P- 68	Limestone, argillaceous	RAH-135-47	0.5	2.5	--	--	--	36.3	54.65	626.16
P- 67	Mudstone, phosphatic	RAH-134-47	0.7	14.9	--	--	--	42.1	55.35	636.59
P- 66	Limestone, argillaceous	RAH-133-47	0.8	3.9	--	--	--	38.6	56.15	639.71
P- 65	Phosphate rock, argillaceous	RAH-132-47	2.1	15.6	--	--	--	21.9	58.25	672.47
P- 64	Limestone, argillaceous, phosphatic	RAH-131-47	0.8	9.7	--	--	--	31.4	59.05	680.23
P- 63	Phosphate rock, argillaceous	RAH-129-47	3.5	17.1	--	--	--	24.7	62.55	740.08
--	Three limestone concretions in bed P-63	RAH-130-47	(0.0-1.4)	2.0	--	--	--	1.8	--	--

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P- 62	Phosphate rock, argillaceous	RAH- 128-47	0.7	17.6	--	--	--	25.1	63.25	752.40
P- 61	Phosphate rock, argillaceous	RAH- 127-47	1.7	17.5	--	--	--	24.9	64.95	782.15
P- 60	Limestone, argillaceous	RAH- 126-47	3.0	1.7	--	--	--	32.9	67.95	787.25
P- 59	Phosphate rock, argillaceous	RAH- 125-47	0.7	19.5	--	--	--	26.0	68.65	800.90
P- 58	Mudstone, calcareous, phosphatic	RAH- 124-47	0.4	10.2	--	--	--	45.7	69.05	804.98
P- 57	Phosphate rock, argillaceous, calcareous	RAH- 123-47	0.8	19.4	--	--	--	25.0	69.85	820.50
P- 56	Phosphate rock, argillaceous	RAH- 122-47	0.7	13.4	--	--	--	33.0	70.55	829.88
P- 55	Limestone, phosphatic, argillaceous	RAH- 121-47	2.5	10.5	--	--	--	21.1	73.05	856.13
P- 54	Phosphate rock and mudstone, calcareous	RAH- 120-47	1.6	14.9	--	--	--	17.0	74.65	879.97
P- 53	Limestone, phosphatic	RAH- 119-47	0.4	15.5	--	--	--	15.2	75.05	886.17
P- 52	Mudstone	RAH- 118-47	0.7	6.6	--	--	--	66.7	75.75	890.79
P- 51	Limestone	RAH- 117-47	0.7	7.4	--	--	--	7.4	76.45	895.97
P- 50	Phosphate rock	RAH- 116-47	0.6	28.7	--	--	--	9.4	77.05	913.19
P- 49	Limestone, argillaceous	RAH- 115-47	1.7	3.4	--	--	--	26.0	78.75	918.97
P- 48	Phosphate rock	RAH- 114-47	3.8	30.1	2.2	3.30	8.9	9.0	82.55	1,033.35
P- 47	Limestone, argillaceous, phosphatic	RAH- 113-47	2.0	10.4	--	--	--	28.2	84.55	1,054.14
P- 46	Mudstone, phosphatic, calcareous	RAH- 112-47	1.3	14.3	--	--	--	41.7	85.85	1,072.74
P- 45	Mudstone	RAH- 30-47	3.9	7.2	--	--	--	51.8	89.75	1,100.82
P- 44	Mudstone, calcareous	RAH- 29-47	2.1	2.5	--	--	--	46.3	91.85	1,106.07
P- 43	Mudstone, phosphatic, calcareous	RAH- 28-47	0.6	12.0	--	--	--	46.3	92.45	1,113.27
P- 42	Limestone, argillaceous	RAH- 27-47	3.1	6.5	--	--	--	28.0	95.55	1,133.42
P- 41	Phosphate rock, argillaceous	RAH- 26-47	0.5	23.0	--	--	--	26.5	96.05	1,144.92
P- 40	Phosphate rock	RAH- 25-47	0.6	27.7	--	--	--	15.7	96.65	1,161.54
P- 39	Mudstone, phosphatic	RAH- 24-47	1.0	9.7	--	--	--	46.2	97.65	1,171.24
P- 38	Mudstone, calcareous	RAH- 23-47	1.0	3.3	--	--	--	53.2	98.65	1,174.54
P- 37	Phosphate rock, argillaceous	RAH- 22-47	0.4	17.7	--	--	--	34.4	99.05	1,181.62
P- 36	Mudstone, phosphatic	RAH- 21-47	2.0	12.3	--	--	--	50.0	101.05	1,206.22
P- 35	Mudstone	RAH- 20-47	0.3	7.1	--	--	--	61.3	101.35	1,208.35
P- 34	Limestone	RAH- 19-47	1.6	2.0	--	--	--	18.6	102.95	1,211.55
P- 33	Phosphate rock, argillaceous	RAH- 18-47	0.5	25.6	3.7	4.32	8.6	20.0	103.45	1,224.35
F- 32	Phosphate rock	RAH- 17-47	0.7	25.6	3.6	3.76	9.7	19.0	104.15	1,242.27
P- 31	Phosphate rock, argillaceous	RAH- 16-47	0.2	18.1	4.5	4.28	11.3	34.0	104.35	1,245.89
P- 30	Phosphate rock, argillaceous	RAH- 15-47	1.1	19.1	3.3	3.54	11.6	26.6	105.45	1,266.90
P- 29	Phosphate rock	RAH- 14-47	1.2	31.4	1.8	4.56	6.4	9.8	106.65	1,304.58
P- 28	Phosphate rock	RAH- 13-47	2.1	30.8	1.7	3.78	6.6	10.3	108.75	1,369.26
P- 27	Phosphate rock	RAH- 12-47	0.4	29.8	2.1	4.62	7.1	10.0	109.15	1,381.18
P- 26	Phosphate rock	RAH- 11-47	0.6	30.4	2.2	3.92	6.8	10.5	109.75	1,399.42
P- 25	Phosphate rock	RAH- 10-47	0.8	26.0	3.6	3.94	8.4	18.7	110.55	1,420.22
P- 24	Phosphate rock	RAH- 9-47	0.3	27.9	2.6	3.92	8.2	13.4	110.85	1,428.59
P- 23	Phosphate rock	RAH- 8-47	0.3	26.4	2.6	3.12	7.8	18.8	111.15	1,436.51
P- 22	Phosphate rock, argillaceous	RAH- 7-47	0.2	22.1	2.2	2.88	7.6	28.4	111.35	1,440.93
P- 21	Phosphate rock, argillaceous	RAH- 6-47	0.4	19.3	3.2	5.26	7.9	19.7	111.75	1,448.65
P- 20	Limestone, argillaceous	RAH- 5-47	1.0	6.4	4.4	4.54	23.0	33.3	112.75	1,455.05
P- 19	Mudstone, phosphatic, calcareous	RAH- 4-47	0.4	11.9	6.2	4.80	12.4	42.3	113.15	1,459.81

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- 18	Phosphate rock, argillaceous	RAH- 3-47	0.7	22.6	4.2	3.90	7.0	22.0	113.85	1,475.63
P- 17	Limestone, argillaceous, phosphatic	RAH- 2-47	1.1	10.3	5.5	5.26	18.0	32.7	114.95	1,486.96
P- 16	Phosphate rock, argillaceous	RAH- 1-47	0.4	20.8	6.5	5.80	9.4	24.5	115.35	1,495.28
P- 15	Dolomite, calcareous	DML- 24-47	1.1	3.9	--	--	--	13.7	116.45	1,499.57
P- 14	Mudstone, cherty	DML- 23-47	0.1	2.7	--	--	--	80.9	116.55	1,499.84
P- 13	Limestone, argillaceous	DML- 22-47	0.7	1.7	--	--	--	26.6	117.25	1,501.03
P- 12	Phosphate rock	DML- 21-47	1.3	23.9	--	--	--	19.4	118.55	1,532.10
P- 11	Phosphate rock, calcareous, contains fluorite	DML- 20-47	2.3	20.4	--	--	--	15.2	120.85	1,579.02
P- 10	Mudstone, phosphatic	DML- 19-47	0.2	13.8	--	--	--	42.1	121.05	1,581.78
P- 9	Limestone, argillaceous	DML- 18-47	1.4	3.2	--	--	--	23.6	122.45	1,586.26
P- 8	Phosphate rock, argillaceous	DML- 17-47	0.1	21.8	--	--	--	24.6	122.55	1,588.44
P- 7	Phosphate rock, argillaceous	DML- 16-47	0.3	25.4	--	--	--	20.1	122.85	1,596.06
P- 6	Mudstone	DML- 15-47	0.3	2.9	--	--	--	67.0	123.15	1,596.93
P- 5	Mudstone, calcareous	DML- 14-47	3.2	0.4	--	--	--	68.6	126.35	1,598.21
P- 4	Mudstone	DML- 13-47	0.5	0.2	--	--	--	76.2	126.85	1,598.31
P- 3	Mudstone	DML- 12-47	2.5	0.4	--	--	--	81.0	129.35	1,599.31
P- 2	Phosphate rock	DML- 11-47	0.3	33.4	--	--	--	5.2	129.65	1,609.33
P- 1	Phosphate rock	DML- 10-47	0.4	34.8	--	--	--	3.3	130.05	1,623.25
	Wells formation—not measured									
Cw- 1	Mudstone, calcareous and limestone	--	--	--	--	--	--	--	--	--

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SPECTROGRAPHIC ANALYSES—LAYLAND CANYON, WYOMING. LOT NO. 1202.

Semi-quantitative analyses of samples of the Phosphoria formation, Layland Canyon, Wyoming (see immediately preceding pages for location of section, thickness and description of strata, and chemical analyses of samples), made by U. S. Geological Survey Laboratory, Geochemistry and Petrology Branch, Washington, D. C. In addition to the elements listed in the table below, Sb, As, Be, Bi, Ce, Cs, Co, Cb, Ge, In, Hg, Nd, Pt, Re, Rb, Sc, Ta, Tl, Th, and W were looked for in all samples but were not detected.

Explanation of symbols

A = more than 10 percent
B' = 1-10 percent[1]
D = 0.1-1 percent
E = 0.01-0.1 percent
F = 0.001-0.01 percent
G = less than 0.001 percent
ND = not detected

Bed no.	Sample no.	Al	Ba	B	Cd	Ca	Cr	Cu	Fe	La	Pb	Mg	Mn	Mo	Ni	P	Si	Ag	Na	Sr	Sn	Ti	V	Y	Zn	Zr
	Beds P-105 through P-100 not analyzed.																									
P-99	RAH-154-47	B'	F	F	F	A	E	F	B'	E	E	D	E	F	E	A	B'	G	D	D	F	E	D	E	E	F
P-98	RAH-155-47	B'	E	F	F	A	E	E	B'	E	E	D	E	F	E	A	B'	G	D	D	E	E	D	E	E	F
P-97	RAH-156-47	B'	D	F	F	A	E	F	B'	E	E	D	E	F	E	A	B'	G	D	D	F	E	D	E	E	F
P-96	RAH-157-47	B'	F	F	F	A	E	F	B'	E	E	D	E	F	E	A	B'	G	D	D	F	E	D	E	E	F
P-95	RAH-158-47	B'	F	F	E	A	E	E	B'	F	E	D	E	F	E	A	B'	G	D	D	F	E	D	E	E	F
P-94	RAH-159-47	B'	E	F	F	B'	D	E	B'	E	E	D	E	F	E	B'	A	G	D	D	F	D	D	E	E	E
P-93	RAH-160-47	B'	F	F	F	B'	E	F	B'	ND	F	B'	E	F	E	D	A	G	E	D	F	D	E	F	E	E
P-92	RAH-161-47	B'	F	F	F	A	D	F	B'	E	F	D	E	F	F	A	B'	G	D	D	F	E	E	E	E	F
P-91	RAH-162-47	B'	F	F	F	A	D	F	B'	E	F	D	E	F	F	A	B'	G	D	D	F	E	E	E	E	F
P-90	RAH-163-47	B'	F	F	F	A	D	F	B'	E	E	D	E	F	E	A	B'	G	D	D	ND	E	E	E	E	E
P-89	RAH-164-47	B'	F	F	F	A	D	E	B'	E	E	D	E	F	E	A	B'	G	D	D	F	D	E	E	E	E
P-88	RAH-165-47	B'	F	F	ND	A	D	F	B'	E	E	D	E	F	E	A	B'	G	D	D	F	D	E	E	E	E
P-87	RAH-166-47	B'	F	F	F	B'	D	F	B'	E	E	--	E	F	E	B'	A	G	D	D	F	D	E	E	E	ND
P-86	RAH-167-47	B'	F	F	F	B'	D	F	B'	F	F	B'	E	F	E	B'	A	G	D	D	F	D	E	E	E	E
P-85	RAH-168-47	B'	F	F	F	A	D	F	B'	E	F	D	E	F	E	A	B'	G	ND	D	F	E	E	E	E	F
P-84	RAH-169-47	B'	E	F	F	B'	D	E	B'	E	E	D	E	F	E	B'	A	G	D	D	F	D	D	E	E	E
	Beds P-83 through P-49 not analyzed.																									
P-48	RAH-114-47	B'	E	F	F	A	E	E	B'	E	E	D	F	F	E	A	B'	G	D	D	F	E	D	E	E	F
	Beds P-47 through P-34 not analyzed.																									
P-33	RAH- 18-47	B'	F	F	E	A	E	E	B'	F	E	D	F	F	E	A	B'	G	D	D	F	E	D	E	E	E
P-32	RAH- 17-47	B'	F	F	E	A	E	E	B'	F	E	D	F	ND	E	A	B'	G	D	D	F	E	D	E	E	F
P-31	RAH- 16-47	B'	F	F	E	A	E	E	B'	F	E	D	E	F	E	A	B'	G	D	D	F	E	D	E	E	E
P-30	RAH- 15-47	B'	F	F	E	A	E	F	B'	F	E	B'	E	F	E	A	B'	G	D	D	F	E	D	E	E	F
P-29	RAH- 14-47	B'	E	F	E	A	E	F	B'	F	E	D	F	F	E	A	B'	G	D	D	F	E	D	E	E	F

[1] B' is equivalent to B and C of Bureau of Mines analyses.

W 5

Bed no.	Sample no.	Al	Ba	B	Cd	Ca	Cr	Cu	Fe	La	Pb	Mg	Mn	Mo	Ni	P	Si	Ag	Na	Sr	Sn	Ti	V	Y	An	Zr
P-28	RAH- 13-47	B'	F	F	E	A	E	F	B'	F	E	D	F	F	E	A	B'	G	D	D	F	E	D	E	E	F
P-27	RAH- 12-47	B'	E	F	E	A	D	E	B'	F	F	D	F	F	F	A	B'	G	D	E	F	E	D	F	E	F
P-26	RAH- 11-47	B'	E	F	E	A	D	E	B'	F	E	D	E	F	F	A	B'	G	D	E	F	E	D	F	E	F
P-25	RAH- 10-47	B'	E	F	E	A	D	E	B'	F	F	D	E	E	F	A	B'	G	D	E	F	E	D	F	E	E
P-24	RAH- 9-47	B'	E	F	E	A	D	E	B'	F	E	D	E	E	F	A	B'	G	D	E	F	E	D	F	E	F
P-23	RAH- 8-47	B'	E	F	E	A	D	E	B'	ND	F	D	E	E	F	A	B'	G	D	E	F	E	D	F	E	F
P-22	RAH- 7-47	B'	E	F	E	A	D	E	B'	F	E	B'	E	F	F	A	B'	G	D	E	F	E	D	F	E	F
P-21	RAH- 6-47	B'	E	F	E	A	D	E	B'	F	F	D	E	F	F	A	B'	G	D	E	F	E	D	F	E	F
P-20	RAH- 5-47	B'	E	F	E	A	D	E	B'	ND	F	B'	E	E	F	B'	B'	G	D	E	ND	E	D	F	D	E
P-19	RAH- 4-47	B'	E	F	E	A	D	E	B'	F	E	B'	E	F	F	A	B'	G	D	E	F	E	D	F	D	E
P-18	RAH- 3-47	B'	E	F	E	A	D	E	B'	F	E	D	E	E	E	A	B'	G	D	E	F	E	D	E	D	F
P-17	RAH- 2-47	B'	E	F	E	A	D	E	B'	F	E	B'	E	E	E	B'	B'	G	D	E	F	E	D	F	E	F
P-16	RAH- 1-47	B'	E	F	E	A	D	E	B'	F	E	B'	E	F	F	A	B'	G	D	E	F	E	E	F	E	F

Beds P-15 through P-1 not analyzed.

W6

COAL CANYON, WYOMING. LOT NO. 1201.

Phosphoria formation sampled in hand trenches, mine adit, and natural exposures in Coal Canyon, sec. 7, T. 26 N., R. 119 W., Lincoln County, Wyoming, on east limb of Sublette anticline. Upper shale member sampled in trench 200 feet above canyon bottom on south side; Rex member in natural exposures 50 feet above canyon bottom on south side; beds P-69 to P-74 from vanadiferous zone in face of adit 50 feet above canyon bottom on north side; all other beds from trench in phosphatic shale member at bottom of canyon on south side. Beds strike north and dip 75° E. Section measured by V. E. McKelvey, D. M. Larrabee, and L. E. Smith and sampled by R. A. Gulbrandsen; samples 2058-2087 collected in June 1946, all others in June 1947. Samples analyzed by Tennessee Valley Authority.

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	V_2O_5	F	Loss on ignition	Acid insoluble		
Dinwoody formation												
Trd - 1	Mudstone	VEM-97-47	1.7	0.13	11.7	3.0	0.07	0.09	9.7	74.9	1.7	1.70
Upper shale member of Phosphoria formation												
U- 27	Phosphate rock, argillaceous	VEM-96-47	1.7	24.8	4.3	3.4	0.07	2.5	4.9	23.8	1.7	42.16
U- 26	Phosphate rock and chert	VEM-95-47	0.6	15.14	9.1	4.2	--	1.3	6.7	42.10	2.3	51.24
U- 25	Chert, dolomitic	VEM-94-47	0.8	6.25	3.8	2.2	0.05	0.68	15.3	46.8	3.1	56.24
U- 24	Mudstone and chert	VEM-93-47	4.0	0.70	5.3	3.2	0.04	0.13	4.3	81.3	7.1	59.04
U- 23	Mudstone, cherty	VEM-92-47	1.6	1.65	5.4	3.8	0.04	0.18	2.5	85.9	8.7	61.68
U- 22	Mudstone	VEM-91-47	1.6	2.93	11.2	4.9	0.09	0.34	6.1	77.1	10.3	66.37
U- 21	Mudstone	VEM-90-47	3.2	4.60	10.7	4.5	0.06	0.58	7.5	70.3	13.50	81.09
U- 20	Mudstone	VEM-89-47	3.0	4.00	11.7	4.3	0.10	0.47	7.2	73.0	16.5	93.09
U- 19	Mudstone	VEM-88-47	2.6	2.00	7.3	2.5	0.10	0.31	9.5	72.1	19.1	98.29
U- 18	Mudstone, calcareous	VEM-87-47	2.6	0.30	7.8	2.6	0.06	0.21	11.7	69.2	21.7	99.07
U- 17	Limestone, argillaceous	VEM-86-47	1.6	0.5	3.6	1.5	0.04	0.11	24.3	43.5	23.3	99.87
U- 16	Mudstone	VEM-85-47	3.5	1.39	7.3	2.5	0.05	0.18	10.6	68.5	26.8	104.74
U- 15	Dolomite	VEM-84-47	3.9	1.01	4.5	2.3	0.04	0.16	11.8	68.0	30.7	108.69
U- 14	Mudstone	VEM-83-47	3.7	0.25	8.7	2.8	0.08	0.19	7.5	80.3	34.4	109.60
U- 13	Mudstone	VEM-82-47	3.6	1.21	8.1	3.2	0.05	0.24	7.1	76.8	38.0	133.96
U- 12	Mudstone	VEM-81-47	4.3	0.85	10.4	3.5	0.08	0.26	8.6	75.00	42.3	117.60
U- 11	Mudstone	VEM-80-47	1.4	0.60	10.3	4.0	0.04	0.26	8.6	73.4	43.7	118.45
U- 10	Mudstone, dolomitic	VEM-79-47	1.0	1.60	6.4	2.9	0.08	0.17	14.1	64.4	44.7	120.05
U- 9	Mudstone	VEM-78-47	0.7	0.91	9.8	4.7	0.05	0.17	5.8	79.5	45.4	120.69
U- 8	Mudstone	VEM-77-47	2.7	1.00	10.4	3.9	0.05	0.22	4.9	85.2	48.1	123.39
U- 7	Mudstone	VEM-76-47	3.1	0.75	7.5	3.2	0.05	0.22	5.2	82.5	51.2	125.71
U- 6	Phosphate rock, cherty	VEM-75-47	2.3	22.5	3.7	3.3	0.06	2.1	6.7	25.8	53.50	177.46
U- 5	Mudstone	VEM-74-47	1.4	4.1	5.1	3.5	0.04	0.51	4.4	73.2	54.9	183.20
U- 4	Chert	VEM-73-47	0.6	0.49	2.4	2.6	0.04	0.10	7.6	77.6	55.5	183.50
U- 3	Chert	VEM-72-47	1.1	4.71	1.5	3.2	0.03	0.54	6.0	69.6	56.6	188.68
U- 2	Phosphate rock, cherty	VEM-71-47	0.6	25.5	1.4	2.0	0.04	2.4	3.4	25.1	57.2	203.98
U- 1	Phosphate rock, argillaceous	VEM-70-47	0.4	16.7	4.4	2.8	0.11	2.1	4.9	30.6	57.6	210.66

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	V_2O_5	F	Loss on ignition	Acid insoluble		
	Rex member of Phosphoria formation											
	Chert and limestone, represents top of VEM-68-47 resampled in upper shale trench	VEM-69-47	(1.4)	0.65	0.7	1.8	--	0.08	15.3	61.5	--	--
R- 7	Chert and limestone	VEM-68-47	8.5	0.11	0.2	2.5	--	0.05	9.6	73.0	8.5	0.94
R- 6	Chert and limestone	VEM-67-47	9.0	0.22	0.4	1.9	--	0.03	10.2	73.8	17.5	2.92
R- 5	Chert and limestone	VEM-66-47	10.5	0.20	0.5	2.1	--	0.04	13.1	66.7	28.0	5.02
R- 4	Chert and limestone	VEM-65-47	9.0	0.23	0.3	2.2	--	0.04	9.6	72.3	37.0	7.09
R- 3	Chert and limestone; fos. col. no. 47-HW-48[1]	VEM-64-47	10.4	0.20	0.7	2.3	--	0.04	11.6	68.5	47.4	9.17
R- 2	Chert and limestone	VEM-63-47	9.8	0.40	0.8	2.3	--	0.05	11.2	69.2	57.2	13.09
R- 1	Chert and limestone; fos. col. no. 47-HW-49	VEM-62-47	9.6	0.25	0.4	1.9	--	0.05	14.4	63.8	66.8	15.49
	Phosphatic shale member of Phosphoria formation											
--	Covered	--	13	--	--	--	--	--	--	--	13.0	--
P-107	Dolomite, calcareous, argillaceous	DML-9-47	5.7	0.76	2.5	0.9	0.04	0.13	35.7	20.0	18.7	4.33
P-106	Phosphate rock	DML-8-47	0.3	25.45	4.1	1.5	0.05	2.5	6.2	17.8	19.0	11.97
P-105	Mudstone	DML-7-47	0.4	3.25	13.3	4.0	0.07	0.37	5.9	75.6	19.4	13.27
P-104	Mudstone	DML-6-47	0.5	6.15	10.9	3.1	0.06	0.59	6.3	68.8	19.9	16.35
P-103	Mudstone	DML-5-47	0.5	4.35	12.1	3.4	0.04	0.48	6.3	73.3	20.4	18.53
P-102	Mudstone, dolomitic	DML-4-47	3.2	0.65	9.3	3.0	0.02	0.15	13.7	66.9	23.6	20.61
P-101	Mudstone	DML-3-47	1.2	4.51	10.2	3.3	0.04	0.52	7.7	69.3	24.8	26.02
P-100	Phosphate rock	DML-2-47	0.4	25.9	3.6	1.1	0.04	2.4	6.5	19.0	25.2	36.38
P- 99	Dolomite, argillaceous	DML-1-47	1.4	0.81	4.3	1.5	0.06	0.15	28.3	35.6	26.6	37.51
P- 98	Phosphate rock	2063[2]	1.1	29.8	1.4	0.8	0.07	3.1	6.2	8.2	27.7	70.29
P- 97	Phosphate rock	2062	1.9	32.9	0.9	0.6	0.10	3.8	5.4	3.2	29.6	132.80
P- 96	Phosphate rock	2061[2]	0.7	27.2	2.3	1.1	0.23	2.9	8.6	12.4	30.3	151.84
P- 95	Phosphate rock	2060	0.6	29.8	1.5	0.7	0.26	3.1	8.0	7.2	30.9	169.72
P- 94	Phosphate rock	2059	0.5	26.9	2.1	1.0	0.24	2.7	9.6	11.4	31.4	183.17
P- 93	Phosphate rock	2058	0.8	32.7	1.2	0.5	0.15	3.4	6.9	5.2	32.2	209.33
P- 92	Phosphate rock, argillaceous	VEM-61-47	1.1	21.6	4.2	1.7	0.16	2.2	9.0	22.2	33.3	233.09
P- 91	Mudstone, dolomitic	VEM-60-47	0.4	3.80	7.8	2.6	0.09	0.51	13.5	58.5	33.7	234.61
P- 90	Limestone, argillaceous, dolomitic	VEM-59-47	1.9	0.20	3.4	2.0	0.08	0.12	26.6	38.6	35.6	234.99
P- 89	Phosphate rock	VEM-58-47	0.7	29.3	2.0	2.3	0.10	3.0	9.5	10.6	36.3	255.50
P- 88	Phosphate rock, calcareous, contains limestone lens 0.0-0.3 foot thick	VEM-57-47	0.9	24.09	0.8	0.8	0.06	2.6	15.0	4.7	37.2	277.18
P- 87	Phosphate rock, argillaceous	VEM-56-47	0.6	21.03	4.4	1.6	0.11	1.9	8.3	29.2	37.8	289.80
P- 86	Phosphate rock	VEM-55-47	0.5	27.45	2.1	1.2	0.06	2.9	8.1	13.9	38.3	303.52

P- 85	Phosphate rock	VEM-54-47	0.9	27.44	1.4	1.1	0.06	3.0	8.1	11.3	39.2	328.22
P- 84	Phosphate rock and phosphatic mudstone	VEM-53-47	1.8	16.52	5.3	1.9	0.05	1.6	9.5	40.4	41.0	357.96
P- 83	Phosphate rock, limestone, and mudstone	VEM-52-47	1.0	29.41	2.3	1.7	0.05	3.2	5.4	11.80	42.0	387.37
P- 82	Limestone, argillaceous	VEM-51-47	1.7	2.11	5.8	2.1	0.06	0.24	22.1	41.2	43.7	390.96
P- 81	Mudstone, calcareous and phosphate rock	VEM-50-47	2.0	4.04	8.8	2.5	0.05	0.45	14.2	56.8	45.7	399.04
P- 80	Limestone, argillaceous, mudstone, and phosphate rock	VEM-49-47	1.0	9.90	6.7	2.3	0.09	1.1	16.8	37.0	46.7	408.94
P- 79	Mudstone, calcareous	VEM-48-47	0.8	2.16	9.7	3.0	0.05	0.31	16.5	54.7	47.5	410.67
P- 78	Phosphate rock	VEM-47-47[2]	0.4	28.67	1.9	2.1	0.11	2.8	13.1	5.62	47.9	422.14
P- 77	Limestone, argillaceous, calcareous mudstone, and phosphate rock	VEM-46-47	2.1	9.92	6.2	2.6	0.07	1.1	22.0	25.2	50.0	442.97
P- 76	Limestone, "hanging-wall limestone"	VEM-45-47	1.6	0.36	1.1	0.5	0.06	0.06	41.1	5.90	51.6	443.55
P- 75	Mudstone	VEM-44-47	0.55	2.73	8.6	3.4	0.52	0.44	16.7	59.32	52.35	445.60
P- 74	Mudstone	VEM-43-47	0.4	0.34	9.8	3.9	1.75	0.15	24.9	51.2	52.75	445.74
P- 73	Mudstone	VEM-42-47	0.65	0.20	9.6	4.0	1.45	0.23	22.6	56.38	53.40	445.87
P- 72	Mudstone	VEM-41-47	0.9	0.05	9.7	4.4	0.37	0.08	16.6	65.75	54.30	445.91
P- 71	Mudstone	VEM-40-47	1.05	6.30	7.1	3.3	0.14	0.67	17.4	46.66	55.35	452.53
P- 70	Limestone, argillaceous, "footwall limestone"	VEM-39-47	1.1	0.80	2.6	1.2	0.06	0.10	30.7	27.6	56.45	453.41
P- 69	Mudstone, phosphatic	VEM-38-47	1.5	8.31	9.2	3.6	0.08	0.80	10.3	57.9	57.95	465.87
P- 68	Mudstone	VEM-37-47	1.4	0.76	9.3	2.8	0.08	0.09	11.4	73.0	59.35	466.93
P- 67	Mudstone	VEM-36-47	0.5	6.02	10.3	3.4	0.06	0.57	10.2	65.1	59.85	469.94
P- 66	Mudstone, calcareous, dolomitic	VEM-35-47	2.3	0.66	5.7	1.9	0.05	0.08	25.9	41.4	62.15	471.46
P- 65	Mudstone, phosphatic, and calcareous phosphatic mudstone	VEM-34-47	3.0	9.97	8.0	2.6	0.03	1.1	14.3	42.4	65.15	501.37
P- 64	Dolomite, argillaceous	VEM-33-47	0.7	1.51	5.9	1.9	0.05	0.18	25.7	39.9	65.85	502.43
P- 63	Mudstone, phosphatic	VEM-32-47	2.0	12.38	8.5	2.6	0.08	1.3	15.9	35.23	67.85	527.19
P- 62	Phosphate rock, argillaceous	VEM-31-47	2.0	13.73	5.1	2.1	0.17	1.4	18.7	25.1	69.85	554.65
P- 61	Limestone, dolomitic, argillaceous	VEM-30-47	3.5	0.69	4.3	1.4	0.05	0.09	33.1	15.00	73.35	557.07
P- 60	Dolomite, argillaceous	VEM-29-47	1.1	2.22	3.6	1.3	0.05	0.22	33.7	23.4	74.45	559.51
P- 59	Phosphate rock, dolomitic, argillaceous, dolomite lens included in sample	VEM-28-47	3.0	14.29	7.1	2.3	0.08	1.3	18.2	26.53	77.45	602.38
P- 58	Dolomite	VEM-27-47	1.6	2.10	2.2	0.7	0.07	0.22	40.7	10.47	79.05	605.74
P- 57	Mudstone, phosphatic	VEM-26-47	1.6	13.63	10.5	3.1	0.05	1.5	15.2	38.27	80.65	627.55
P- 56	Dolomite	VEM-25-47	1.2	2.24	2.2	0.7	0.05	0.27	40.0	25.48	81.85	630.24

[1] Fossil collection made by H. Wedow, Paleontology and Stratigraphy Branch, U. S. Geological Survey.
[2] See additional analyses of selected samples at end of chemical analyses tables.

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	V_2O_5	F	Loss on ignition	Acid insoluble		
P- 55	Phosphate rock, dolomitic	VEM-24-47	1.6	14.85	4.3	1.4	0.21	1.5	22.4	15.28	83.45	654.00
P- 54	Dolomite	VEM-23-47	1.3	5.38	1.3	0.9	0.04	0.56	35.9	10.8	84.75	660.99
P- 53	Phosphate rock and phosphatic mudstone	VEM-22-47	2.5	21.00	4.5	1.7	0.09	2.1	18.9	11.68	87.25	713.49
P- 52	Dolomite, phosphatic	VEM-21-47	0.7	8.11	0.1	0.5	0.07	0.78	35.8	4.93	87.95	719.17
P- 51	Phosphate rock	VEM-20-47	0.3	24.35	2.8	1.7	0.08	2.6	11.9	16.55	88.25	726.47
P- 50	Dolomite, calcareous	VEM-19-47	1.3	4.42	3.0	1.1	0.06	0.47	34.8	18.02	89.55	732.22
	Fault (strikes N. 10° W. dips 60° E.) truncates beds P-50 and P-51.											
P- 49	Phosphate rock	VEM-18-47	0.6	26.01	3.1	1.4	0.06	2.9	11.2	10.08	90.15	747.83
P- 48	Dolomite	VEM-17-47	1.1	4.04	1.7	1.0	0.07	0.44	37.0	13.63	91.25	752.27
P- 47	Dolomite	VEM-16-47	1.1	3.05	1.7	0.9	0.09	0.35	38.7	12.92	92.35	755.63
P- 46	Dolomite, argillaceous	VEM-15-47	1.1	4.85	3.7	1.7	0.08	0.56	30.5	23.8	93.45	760.97
P- 45	Phosphate rock	VEM-14-47	0.8	28.85	1.3	0.9	0.08	3.3	11.0	3.46	94.25	784.05
P- 44	Phosphate rock	LES-10-47	1.3	26.24	2.3	1.2	0.25	2.9	13.6	10.0	95.55	818.11
P- 43	Phosphate rock	LES- 9-47	0.7	29.26	1.2	1.0	0.13	3.2	8.7	8.9	96.25	838.59
P- 42	Dolomite	LES- 8-47	2.0	4.41	2.0	0.8	0.05	0.44	33.7	17.8	98.25	847.41
P- 41	Mudstone, phosphatic	LES- 7-47	3.8	10.75	7.9	2.5	0.05	1.1	11.7	48.2	102.05	888.26
P- 40	Mudstone, dolomitic	LES- 6-47	3.0	1.55	4.6	2.1	0.05	0.19	22.5	47.4	105.05	892.91
P- 39	Mudstone, phosphatic	LES- 5-47	0.6	12.33	8.5	2.5	0.07	1.1	10.2	47.2	105.65	900.31
P- 38	Dolomite, argillaceous	LES- 4-47	1.8	1.90	2.2	0.9	0.04	0.21	31.5	28.7	107.45	903.73
P- 37	Dolomite, argillaceous	LES- 3-47	0.6	4.75	2.3	0.8	0.05	0.50	27.6	29.2	108.05	906.58
P- 36	Dolomite, argillaceous	LES- 2-47	0.9	7.08	2.4	0.8	0.05	0.75	24.7	28.8	108.95	912.95
P- 35	Phosphate rock, argillaceous	LES- 1-47	0.4	23.34	3.7	1.3	0.06	2.3	8.2	25.2	109.35	922.29
P- 34	Phosphate rock	VEM-13-47	0.6	30.00	1.8	0.7	0.09	3.2	7.6	9.4	109.95	940.29
P- 33	Mudstone and phosphate rock, contains gypsum	2086	0.8	8.1	3.0	2.6	0.35	0.83	19.6	48.9	110.75	946.77
P- 32	Mudstone, dolomitic	2085	1.8	7.2	2.2	2.0	--	0.71	19.1	41.1	112.55	959.73
P- 31	Phosphate rock, argillaceous	2084	1.0	18.1	2.0	1.8	0.42	1.8	11.6	33.3	113.55	977.83
P- 30	Mudstone, phosphatic	2083	0.9	8.0	2.5	2.2	--	0.84	13.4	49.5	114.45	985.03
P- 29	Mudstone, dolomitic	2082	0.8	6.0	2.4	1.9	0.23	0.88	16.6	40.2	115.25	989.83
P- 28	Dolomite, argillaceous	2081	1.7	6.4	1.3	1.2	0.18	0.71	25.7	25.5	116.95	1,000.71
P- 27	Phosphate rock	2080[2]	1.2	26.3	2.1	1.1	0.30	2.4	9.4	14.6	118.15	1,032.27
P- 26	Phosphate rock	2079[2]	2.1	26.1	1.6	0.9	0.17	2.4	9.3	13.6	120.25	1,087.08
P- 25	Phosphate rock	2078	0.3	29.5	1.1	0.7	0.08	3.0	7.1	10.9	120.55	1,095.93
P- 24	Phosphate rock	2077	1.7	28.6	1.4	0.7	0.09	2.6	7.8	10.5	122.25	1,144.55
P- 23	Phosphate rock	2076	1.7	26.7	1.9	0.8	0.14	2.7	9.1	12.3	123.95	1,189.94
P- 22	Phosphate rock	2075	0.8	21.1	2.0	1.0	0.10	2.1	12.2	18.5	124.75	1,206.82
P- 21	Phosphate rock, argillaceous, dolomitic	2074	0.9	16.4	2.2	1.3	0.09	1.8	14.7	24.4	125.65	1,221.58

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P- 20	Phosphate rock, argillaceous, dolomitic	2073	1.2	12.8	2.8	1.4	0.08	1.4	17.1	28.0	126.85	1,236.94
P- 19	Phosphate rock, argillaceous, dolomitic	2072	1.1	15.5	2.7	1.3	0.06	1.7	14.0	27.3	127.95	1,253.99
P- 18	Dolomite, argillaceous	2071	0.7	6.9	2.0	1.2	0.06	0.82	26.5	23.8	128.65	1,258.82
P- 17	Dolomite, phosphatic, argillaceous	2070	0.4	13.3	1.7	1.1	0.05	1.6	19.0	22.7	129.05	1,264.14
P- 16	Dolomite	2069	2.3	5.2	1.2	0.5	0.05	0.55	32.6	16.1	131.35	1,276.10
P- 15	Phosphate rock	VEM-12-47[2]	1.3	21.55	3.1	1.3	0.05	2.5	11.9	18.5	132.65	1,304.11
P- 14	Dolomite	VEM-11-47[2]	0.5	6.4	0.5	0.8	0.05	0.74	31.7	16.5	133.15	1,307.31
P- 13	Phosphate rock, dolomitic	VEM-10-47[2]	0.9	15.69	1.2	1.5	0.05	1.6	20.2	16.2	134.05	1,321.43
P- 12	Dolomite, phosphatic	VEM- 9-47[2]	0.5	11.5	0.9	0.7	0.05	1.3	27.3	12.2	134.55	1,327.18
P- 11	Phosphate rock	VEM- 8-47[2]	0.7	28.9	1.1	0.7	0.11	3.4	9.1	7.9	135.25	1,347.41
P- 10	Mudstone	VEM- 7-47[2]	0.4	7.5	5.6	2.7	0.09	0.91	18.3	44.0	135.65	1,350.41
P- 9	Dolomite, phosphatic, argillaceous	2066	1.4	9.7	2.4	1.4	0.09	0.93	25.6	20.0	137.05	1,363.99
P- 8	Phosphate rock, argillaceous	2065	0.4	20.6	3.2	1.6	0.17	2.2	9.0	26.4	137.45	1,372.23
P- 7	Mudstone	2064	0.5	5.0	4.2	3.4	0.36	0.77	11.5	62.7	137.95	1,374.73
P- 6	Mudstone, dolomitic	VEM- 6-47	2.6	0.26	7.5	2.5	0.09	0.12	14.9	64.7	140.55	1,375.41
P- 5	Mudstone	VEM- 5-47	0.5	0.3	9.7	3.1	0.04	0.19	10.7	73.5	141.05	1,375.56
P- 4	Mudstone	VEM- 4-47	0.6	0.44	9.8	4.6	0.19	0.29	12.8	74.7	141.65	1,375.82
P- 3	Mudstone	VEM- 3-47	0.5	0.16	8.8	3.7	0.11	0.23	6.6	81.5	142.15	1,375.90
P- 2	Mudstone	VEM- 2-47	1.4	0.67	10.1	3.1	0.08	0.25	6.5	80.3	143.55	1,376.84
P- 1	Phosphate rock	VEM- 1-47	0.2	29.05	2.5	0.7	0.10	2.9	7.4	8.3	143.75	1,382.65

Wells formation

Cw - 5	Limestone, sandy	--	4.3	--	--	--	--	--	--	--	4.3	--
Cw - 4	Limestone	--	2.8	--	--	--	--	--	--	--	7.1	--
Cw - 3	Siltstone, calcareous	--	3.0	--	--	--	--	--	--	--	10.0	--
Cw - 2	Limestone, sandy	--	3.8	--	--	--	--	--	--	--	13.9	--
Cw - 1	Limestone	--	9.0	--	--	--	--	--	--	--	22.9	--

[2] See additional analyses of selected samples at end of chemical analyses tables.

Additional analyses of Coal Canyon samples

Bed no.	Sample no.	SiO_2	CaO	MgO	Na_2O	K_2O	TiO_2	H_2O-	CO_2	S as SO_3
D- 1	VEM-97-47	61.04	8.16	2.1	0.95	3.40	0.65	0.75	6.9	nil
U- 27	VEM-96-47	23.48	37.18	0.45	1.00	1.05	0.25	0.54	1.6	1.2
U- 26	VEM-95-47	37.30	22.60	1.4	--	--	--	0.88	2.3	0.75
U- 25	VEM-94-47	43.60	19.80	5.4	0.72	1.22	0.27	0.30	13.5	0.43
U- 24	VEM-93-47	74.62	4.70	0.84	0.97	1.20	0.34	0.30	2.9	<0.1
U- 23	VEM-92-47	78.46	3.60	0.51	0.62	1.50	0.34	0.30	0.7	0.22
U- 22	VEM-91-47	65.22	4.00	0.88	--	--	0.52	1.23	0.2	0.32
U- 21	VEM-90-47	59.54	7.32	1.1	3.10	0.69	0.49	1.89	0.5	0.39
U- 20	VEM-89-47	63.04	5.80	1.2	0.50	3.50	0.53	1.31	0.4	0.26
U- 19	VEM-88-47	65.32	8.36	2.6	2.20	0.57	0.35	0.57	5.9	0.11
U- 18	VEM-87-47	61.52	8.20	3.7	0.40	2.40	0.52	0.50	8.4	nil
U- 17	VEM-86-47	23.50	18.20	8.8	0.30	1.50	0.24	0.36	22.7	<0.1
U- 16	VEM-85-47	62.30	8.20	3.1	0.50	2.13	0.43	0.46	7.1	0.17
U- 15	VEM-84-47	62.36	10.20	3.0	0.44	1.85	0.37	0.41	8.8	0.21
U- 14	VEM-83-47	70.84	4.90	1.3	2.40	0.49	0.46	0.77	3.1	0.20
U- 13	VEM-82-47	66.84	4.20	1.9	0.60	2.77	0.44	0.64	3.1	0.20
U- 12	VEM-81-47	65.02	5.30	2.2	3.10	0.30	0.44	0.82	4.2	0.13
U- 11	VEM-80-47	61.70	5.40	2.0	0.25	3.20	0.44	0.86	3.9	0.20
U- 10	VEM-79-47	57.51	10.80	4.4	0.28	1.79	0.37	0.55	10.8	0.28
U- 9	VEM-78-47	70.14	2.00	0.86	0.40	3.10	0.55	0.92	0.3	0.31
U- 8	VEM-77-47	72.94	1.42	0.79	3.20	0.50	0.52	0.78	0.2	0.17
U- 7	VEM-76-47	71.02	4.40	0.73	0.52	2.60	0.34	0.54	2.0	0.21
U- 6	VEM-75-47	24.86	35.60	0.62	0.85	1.30	0.14	0.48	4.5	1.0
U- 5	VEM-74-47	67.60	8.40	0.55	0.40	1.83	0.33	0.38	1.8	0.24
U- 4	VEM-74-47	74.34	9.00	0.40	0.60	0.60	0.09	0.16	6.6	0.10
U- 3	VEM-72-47	69.00	13.20	0.39	0.32	0.42	0.10	0.13	5.3	0.21
U- 2	VEM-71-47	27.60	37.10	0.27	0.53	0.75	0.13	0.27	1.7	1.0
U- 1	VEM-70-47	34.00	30.40	0.59	0.57	1.70	0.20	0.68	1.6	0.95
--	VEM-69-47	61.05	19.00	1.00	--	--	--	0.09	14.7	<0.1
R- 7	VEM-68-47	73.49	11.80	0.78	--	--	--	0.12	9.6	nil
R- 6	VEM-67-47	72.48	12.00	0.64	--	--	--	0.05	9.3	<0.1
R- 5	VEM-66-47	66.49	16.40	0.41	--	--	--	0.06	12.7	nil
R- 4	VEM-65-47	73.72	11.50	0.41	0.89	2.72	--	0.15	9.5	<0.1
R- 3	VEM-64-47	66.91	14.00	0.48	--	--	--	0.08	11.2	<0.1
R- 2	VEM-63-47	87.43	14.00	0.63	--	--	--	0.14	10.9	<0.1
R- 1	VEM-62-47	63.28	18.00	0.62	--	--	--	0.07	14.1	nil
P-107	DML- 9-47	17.58	29.80	11.1	0.54	0.63	0.14	0.26	33.8	0.51
P-106	DML- 8-47	17.80	39.40	0.47	1.50	1.20	0.20	0.67	2.6	2.3

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P-105	DML- 7-47	61.52	5.60	0.82	0.35	3.90	0.01	0.79	0.9	0.60
P-104	DML- 6-47	57.58	9.00	0.67	0.59	3.30	0.47	1.02	0.8	0.91
P-103	DML- 5-47	61.14	6.60	0.63	0.40	3.57	0.45	1.04	0.6	0.76
P-102	DML- 4-47	55.26	9.00	4.2	0.84	2.53	0.54	0.43	10.4	0.31
P-101	DML- 3-47	57.11	10.40	0.90	1.02	1.67	0.43	0.93	3.2	0.77
P-100	DML- 2-47	17.70	40.80	0.39	1.09	0.80	0.17	0.62	3.8	2.0
P- 99	DML- 1-47	30.02	22.20	10.0	1.00	1.22	0.31	0.31	26.6	0.48
P- 98	2063[2]	9.91	46.2	0.24	0.83	0.60	0.09	0.50	4.4	2.3
P- 97	2062	4.73	49.1	0.20	1.01	0.39	0.07	0.46	2.0	2.9
P- 96	2061[2]	13.87	39.8	0.37	0.76	1.10	0.16	1.47	1.7	2.9
P- 95	2060	8.85	44.1	0.34	1.03	0.67	0.07	1.26	2.3	3.2
P- 94	2059	13.28	39.7	0.36	0.91	0.92	0.12	1.73	1.9	4.0
P- 93	2058	6.49	45.7	0.24	1.16	0.54	0.05	1.02	2.2	3.5
P- 92	VEM-61-47	27.10	32.40	0.39	1.20	1.80	0.26	1.12	1.3	2.8
P- 91	VEM-60-47	47.36	12.80	3.8	0.96	2.30	0.42	0.83	8.8	1.1
P- 90	VEM-59-47	32.32	25.60	4.9	0.90	1.47	0.01	0.32	24.8	0.85
P- 89	VEM-58-47	12.90	42.24	0.33	1.00	0.77	0.14	0.89	1.6	3.2
P- 88	VEM-57-47	6.70	48.42	0.41	1.14	0.45	0.08	0.56	11.8	2.3
P- 87	VEM-56-47	27.70	31.46	0.42	1.09	1.24	0.32	0.87	1.8	2.5
P- 86	VEM-55-47	15.50	41.60	0.31	1.25	0.70	0.16	0.89	2.1	2.9
P- 85	VEM-54-47	14.10	44.18	0.29	1.20	0.40	0.16	0.58	4.7	2.3
P- 84	VEM-53-47	34.24	25.41	0.43	1.09	1.60	0.40	1.08	2.0	2.4
P- 83	VEM-52-47	13.20	44.00	0.26	0.94	0.62	0.15	0.47	2.3	1.6
P- 82	VEM-51-47	35.27	26.80	2.1	0.74	1.45	0.19	0.34	20.8	0.90
P- 81	VEM-50-47	47.21	13.40	4.2	0.84	2.43	0.42	0.62	10.0	0.90
P- 80	VEM-49-47	31.21	26.4	0.90	0.45	1.89	0.32	1.35	9.6	2.1
P- 79	VEM-48-47	47.41	15.40	2.21	0.62	2.45	0.10	0.86	10.5	1.0
P- 78	VEM-47-47[2]	7.70	42.10	0.43	0.90	0.67	0.14	1.55	1.9	3.5
P- 77	VEM-46-47	21.10	30.80	1.70	1.00	1.49	0.26	1.37	14.0	2.2
P- 76	VEM-45-47	4.82	50.22	1.8	0.60	0.72	0.03	0.13	40.2	0.44
P- 75	VEM-44-47	47.18	8.40	1.9	1.25	2.12	0.52	0.51	5.0	8.6
P- 74	VEM-43-47	41.64	6.05	2.3	0.78	2.55	0.18	0.83	5.9	12.5
P- 73	VEM-42-47	45.64	4.20	2.7	0.99	2.78	0.23	0.52	5.1	10.6
P- 72	VEM-41-47	52.58	4.20	2.9	1.30	2.85	0.36	0.32	5.6	8.4
P- 71	VEM-40-47	37.36	15.60	1.4	1.27	2.11	0.28	0.37	6.4	9.4
P- 70	VEM-39-47	22.98	36.40	1.8	1.10	0.70	0.06	0.29	29.3	0.60
P- 69	VEM-38-47	48.07	13.20	0.53	1.30	2.38	0.48	1.33	0.52	1.6
P- 68	VEM-37-47	59.80	5.40	2.4	1.50	2.30	0.42	0.99	5.1	0.90
P- 67	VEM-36-47	53.23	9.48	0.48	1.20	2.62	0.61	1.41	0.59	1.6
P- 66	VEM-35-47	33.46	23.20	5.4	1.20	1.30	0.24	0.46	23.0	0.62
P- 65	VEM-34-47	35.28	22.2	1.2	1.20	2.14	0.38	1.32	6.1	2.0
P- 64	VEM-33-47	32.75	20.20	8.6	1.44	1.25	0.27	0.39	23.3	0.55
P- 63	VEM-32-47	29.90	24.40	0.80	1.02	1.95	0.38	1.62	5.1	2.2

[2] See additional analyses of selected samples at end of chemical analyses tables.

Bed no.	Sample no.	SiO_2	CaO	MgO	Na_2O	K_2O	TiO_2	H_2O-	CO_2	S as SO_3
P- 62	VEM-31-47	20.82	28.40	1.0	0.94	1.35	0.26	1.85	7.3	3.0
P- 61	VEM-30-47	19.60	32.40	5.3	0.95	0.95	0.13	0.45	30.1	0.56
P- 60	VEM-29-47	18.63	25.8	12.3	1.26	0.97	0.10	0.54	30.3	0.80
P- 59	VEM-28-47	22.60	26.40	3.4	0.89	1.70	0.29	1.76	7.9	2.5
P- 58	VEM-27-47	8.27	29.60	15.1	0.80	0.50	0.06	0.77	36.2	1.0
P- 57	VEM-26-47	32.60	20.07	0.63	0.75	2.60	0.38	1.86	0.86	2.5
P- 56	VEM-25-47	7.82	29.72	15.0	0.60	0.71	0.10	0.43	36.7	0.60
P- 55	VEM-24-47	13.10	32.05	6.1	0.79	1.22	0.18	1.23	14.4	2.5
P- 54	VEM-23-47	8.69	31.80	10.9	0.50	0.66	0.11	0.58	32.3	1.1
P- 53	VEM-22-47[3]	10.60	32.82	1.0	0.75	1.20	0.13	1.00	2.4	3.9
P- 52	VEM-21-47	5.20	36.00	13.0	0.60	0.40	0.13	0.41	33.00	1.0
P- 51	VEM-20-47	15.53	36.45	0.77	1.15	1.12	0.25	1.24	2.2	3.1
P- 50	VEM-19-47	14.50	27.20	8.0	0.78	1.12	0.04	1.07	28.6	1.7
P- 49	VEM-18-47	11.50	40.37	0.98	1.56	0.95	0.16	0.53	3.4	3.0
P- 48	VEM-17-47	11.19	26.60	13.2	0.58	0.82	0.07	1.00	31.2	1.7
P- 47	VEM-16-47	10.47	27.36	13.9	0.84	0.69	0.06	1.10	32.8	1.6
P- 46	VEM-15-47	19.38	24.96	9.9	0.89	1.59	0.22	1.15	24.4	1.6
P- 45	VEM-14-47	5.17	45.45	0.39	1.00	0.49	0.07	1.01	4.3	2.7
P- 44	LES- 10-47	12.80	38.80	0.58	1.35	0.79	0.15	1.46	2.0	3.8
P- 43	LES- 9-47	9.50	43.73	0.57	0.97	0.54	0.11	0.79	2.8	3.0
P- 42	LES- 8-47	14.42	28.40	12.8	0.70	0.85	0.11	0.44	30.6	0.96
P- 41	LES- 7-47	36.80	18.40	1.9	1.44	2.62	0.28	1.06	4.3	1.8
P- 40	LES- 6-47	38.32	16.2	8.4	1.19	2.17	0.06	0.59	19.5	0.63
P- 39	LES- 5-47	36.80	20.00	1.5	0.87	3.27	0.34	0.20	3.5	1.8
P- 38	LES- 4-47	25.56	23.2	12.4	0.45	0.85	0.06	0.41	28.6	0.71
P- 37	LES- 3-47	26.12	24.20	10.3	0.80	1.05	0.26	0.54	24.4	1.0
P- 36	LES- 2-47	25.76	24.53	9.1	1.00	0.97	0.13	0.60	22.6	1.2
P- 35	LES- 1-47	23.70	34.40	0.41	1.00	1.40	0.22	0.77	1.6	2.9
P- 34	VEM-13-47	10.75	43.65	0.19	1.08	0.51	0.08	0.72	1.6	3.4
P- 33	2086	44.45	12.7	0.64	0.30	2.73	0.40	3.88	1.1	4.5
P- 32	2085	--	--	5.4	--	--	--	--	13.1	2.0
P- 31	2084	30.01	27.2	0.39	0.86	1.81	0.33	2.10	1.3	3.7
P- 30	2083	--	--	3.0	--	--	--	--	7.2	2.1
P- 29	2082	36.28	21.5	4.8	1.10	2.03	0.36	1.19	11.6	3.1
P- 28	2081	22.93	26.7	9.5	1.02	1.30	0.23	0.75	22.9	1.3
P- 27	2080[2]	15.75	37.5	0.46	0.95	1.35	0.16	1.52	2.0	3.5
P- 26	2079[2]	14.06	39.7	1.5	0.77	1.36	0.13	1.09	4.9	2.8
P- 25	2078	12.04	42.9	0.59	0.72	0.99	0.10	0.99	2.5	2.4
P- 24	2077	11.63	42.3	0.60	0.90	0.88	0.10	0.87	3.3	2.8
P- 23	2076	13.36	41.2	0.80	0.95	1.07	0.12	1.22	3.6	3.1
P- 22	2075	18.16	35.4	2.2	0.83	1.51	0.16	1.48	6.4	3.1
P- 21	2074	22.77	30.4	3.7	0.70	1.88	0.21	1.39	9.8	2.7

P- 20	2073	25.87	27.8	5.0	0.60	1.53	0.21	1.30	12.5	2.1
P- 19	2072	25.91	29.4	3.3	0.63	2.26	0.21	1.38	8.6	2.3
P- 18	2071	21.20	26.7	9.0	0.30	2.29	0.11	0.70	23.5	1.1
P- 17	2070	21.25	30.9	5.9	0.42	1.65	0.31	0.71	16.0	1.5
P- 16	2069	16.21	28.2	12.2	0.33	0.79	0.09	0.59	33.2	1.0
P- 15	VEM-12-47[2]	16.64	36.40	2.4	0.83	1.52	0.15	0.71	7.1	2.6
P- 14	VEM-11-47[2]	15.20	30.60	12.3	0.40	0.78	0.08	0.57	29.8	1.1
P- 13	VEM 10-47[2]	16.02	35.00	6.7	0.77	0.83	0.17	0.55	17.7	1.2
P- 12	VEM- 9-47[2]	13.00	32.15	10.1	0.62	0.69	0.12	1.46	25.3	2.3
P- 11	VEM- 8-47[2]	10.09	43.82	0.6	1.09	0.45	0.16	0.70	3.7	3.5
P- 10	VEM- 7-47[2]	39.08	16.32	3.7	0.45	2.25	0.24	1.53	8.0	2.8
P- 9	2066	17.98	26.8	9.5	0.42	1.31	0.14	1.35	21.9	2.1
P- 8	2065	26.27	31.1	0.57	0.79	1.58	0.19	1.82	1.9	3.7
P- 7	2064	55.29	9.1	0.80	0.59	3.96	0.45	2.36	0.8	3.1
P- 6	VEM- 6-47	53.36	10.00	5.8	0.40	4.10	0.18	0.33	13.3	0.39
P- 5	VEM- 5-47	61.56	4.96	3.0	0.17	4.63	0.16	0.78	6.1	1.5
P- 4	VEM- 4-47	61.56	0.64	0.87	0.24	5.03	0.11	1.58	0.3	3.7
P- 3	VEM- 3-47	71.04	7.28	0.72	0.30	5.07	0.10	0.95	0.3	1.6
P- 2	VEM- 2-47	69.28	2.60	1.4	0.35	4.50	0.18	0.75	2.3	1.1
P- 1	VEM- 1-47	10.20	42.24	1.9	0.95	0.40	0.07	0.42	5.1	2.2

[2] See additional analyses of selected samples on next page.
[3] The SiO_2 analysis for this sample is probably in error.

Additional analyses of selected samples[4]

Bed no.	Sample no.	P_2O_5	V_2O_5	F	SiO_2	TiO_2	CaO	MgO	Na_2O	K_2O	MnO	Ni
P-97	2063	--	--	--	--	--	--	--	--	--	--	--
P-95	2061	28.77	0.31	3.03	10.06	0.06	41.73	0.20	0.73	0.96	0.003	0.002
P-77	VEM-47-47	29.89	0.05	3.18	2.43	0.04	42.10	2.36	0.80	0.55	0.009	0.023
P-25	2080	26.33	0.28	2.61	12.63	0.08	38.96	0.22	0.91	1.16	0.005	0.002
P-24	2079	--	--	--	--	--	--	--	--	--	--	--
P-12 to 15	2068[5]	--	--	--	--	--	--	--	--	--	--	--
P-10 to 11	2067[6]	18.48	0.10	2.01	16.13	0.08	31.48	4.21	0.65	1.16	0.035	0.039

Cr_2O_3	Co	Zn	Cu	Pb	Ag	MoO_3	W	Cl	Organic matter
--	--	--	--	--	0.0001	--	--	--	--
0.14	0.004	0.008	0.003	0.001	0.0001	0.002	--	0.004	5.28[7]
0.28	0.006	0.001	0.013	0.005	0.0002	0.002	<0.005	--	7.18[7]
0.08	0.004	0.010	0.0006	0.001	0.0002	0.012	--	0.004	5.82[7]
--	--	--	--	--	0.0003	--	--	--	--
--	--	--	--	--	0.0003	--	--	--	--
0.12	0.004	0.002	0.020	0.005	0.0004	0.002	<0.005	--	4.64[8]

[4] Analyses made by U. S. Geological Survey, Geochemistry and Petrology Branch.
[5] Sample no. 2068 is a composite of samples VEM-9-47 through VEM-12-47.
[6] Sample no. 2067 is a composite of samples VEM-7-47 and VEM-8-47.
[7] CO_2 and S reported present.
[8] CO_2 reported present, strong, and S reported present.

SPECTROGRAPHIC ANALYSES—COAL CANYON, WYOMING. LOT NO. 1201.

Semi-quantitave analyses of samples of the phosphatic shale member of Phosphoria formation, Coal Canyon, Wyoming (see immediately preceding pages for location of section, thickness and description of strata, and chemical analyses of samples), made by U. S. Bureau of Mines Laboratory, Albany, Oregon. In addition to the elements listed in the table below, Sb, As, Bi, Cd, Co, Ga, Au, Li, Hg, Pt, Ta, Sn, and W were looked for in all samples but were not detected.

Explanation of symbols

A = more than 10 percent
B = 5-10 percent
C = 1-5 percent
D = 0.1-1 percent
E = 0.01-0.1 percent
F = 0.001-0.01 percent
G = less than 0.001 percent
ND = not detected

Bed no.	Sample no.	Al	Ba	Be	B	Ca	Cr	Cb	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Si	Ag	Na	Sr	Ti	V	Zn	Zr
P-107	DML- 9-47	C	ND	ND	F	A	F	ND	G	D	E	C	E	F	F	B	ND	E	ND	E	F	ND	F
P-106	DML- 8-47	C	ND	ND	F	A	E	ND	G	D	ND	D	F	F	E	B	ND	D	ND	E	E	ND	E
P-105	DML- 7-47	C	ND	ND	F	C	E	ND	G	D	ND	D	F	F	E	A	ND	E	ND	D	E	ND	E
P-104	DML- 6-47	C	ND	ND	E	C	E	ND	G	D	ND	D	F	F	E	A	ND	D	ND	E	E	ND	E
P-103	DML- 5-47	C	ND	ND	E	C	E	ND	G	D	ND	D	F	F	E	A	ND	E	ND	E	E	ND	E
P-102	DML- 4-47	C	ND	ND	E	C	F	ND	G	D	ND	D	E	F	E	A	ND	D	ND	E	F	ND	E
P-101	DML- 3-47	C	ND	ND	E	C	E	ND	G	D	ND	D	E	F	E	A	ND	D	ND	E	E	ND	E
P-100	DML- 2-47	C	ND	ND	F	A	E	ND	G	D	ND	D	F	F	F	B	ND	D	ND	E	F	ND	E
P- 99	DML- 1-47	C	ND	ND	F	B	F	ND	G	D	ND	C	E	F	F	A	ND	E	ND	E	F	ND	E
P- 98	2063	C	ND	ND	F	A	E	ND	G	D	ND	D	F	F	F	C	E	D	ND	E	E	ND	E
P- 97	2062	D	E	G	E	A	D	ND	F	D	E	D	E	F	E	B	G	D	E	E	E	F	F
P- 96	2061	D	E	G	E	A	D	ND	F	C	E	D	E	E	E	A	G	D	E	E	D	E	E
P- 95	2060	C	ND	ND	F	A	E	E	G	D	ND	D	F	F	E	C	G	D	ND	E	D	E	F
P- 94	2059	C	ND	ND	F	A	E	E	G	D	ND	D	ND	F	E	C	G	D	ND	E	D	E	F
P- 93	2058	C	ND	ND	F	A	E	ND	G	E	ND	D	ND	F	F	C	G	D	ND	E	D	E	F
P- 92	VEM-61-47	C	E	G	E	A	D	ND	F	C	E	D	E	E	E	A	G	D	E	E	E	E	E
P- 91	VEM-60-47	C	E	ND	F	C	E	E	G	D	ND	C	E	F	E	A	G	D	ND	E	E	E	E
P- 90	VEM-59-47	D	ND	ND	F	C	E	ND	G	D	ND	C	F	ND	F	B	ND	D	ND	E	E	ND	F
P- 89	VEM-58-47	D	ND	ND	F	B	E	ND	G	D	ND	D	F	F	F	C	G	D	E	E	D	ND	F
P- 88	VEM-57-47	D	ND	ND	F	C	E	ND	G	D	ND	D	F	ND	ND	C	ND	E	E	E	E	ND	F
P- 87	VEM-56-47	C	E	ND	F	A	E	E	G	C	ND	D	F	F	E	B	G	D	D	E	D	E	E
P- 86	VEM-55-47	D	E	ND	F	A	E	ND	G	D	ND	D	F	ND	F	C	G	D	E	E	E	ND	F
P- 85	VEM-54-47	D	ND	ND	F	A	E	ND	G	D	ND	D	F	ND	F	C	G	D	E	E	E	ND	F
P- 84	VEM-53-47	C	E	ND	F	B	E	E	G	D	ND	D	F	F	E	A	G	D	E	E	E	ND	E
P- 83	VEM-52-47	D	ND	ND	F	A	E	ND	G	D	ND	E	F	F	F	C	G	D	D	E	E	ND	F
P- 82	VEM-51-47	C	E	ND	F	A	E	E	G	D	ND	D	E	F	F	A	ND	E	ND	E	E	ND	E
P- 81	VEM-50-47	C	E	ND	F	B	E	E	G	D	ND	C	E	F	E	A	ND	D	ND	E	E	ND	E
P- 80	VEM-49-47	C	E	ND	F	B	E	E	G	D	ND	D	E	F	E	A	G	D	E	E	D	E	E
P- 79	VEM-48-47	C	E	ND	F	B	E	E	G	D	ND	D	E	F	E	A	ND	E	ND	E	E	ND	E
P- 78	VEM-47-47	D	E	ND	F	A	E	E	G	D	ND	D	F	F	E	C	G	D	E	E	E	ND	F

Bed no.	Sample no.	Al	Ba	Be	B	Ca	Cr	Cb	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Si	Ag	Na	Sr	Ti	V	Zn	Zr
P- 77	VEM-46-47	C	E	ND	E	A	E	E	G	D	ND	D	E	ND	E	B	G	D	E	E	E	ND	F
P- 76	VEM-45-47	D	ND	ND	F	A	E	E	G	E	ND	D	E	ND	ND	C	ND	ND	E	E	E	ND	F
P- 75	VEM-44-47	C	E	G	E	B	E	ND	F	C	E	C	E	E	E	A	G	D	F	D	D	E	E
P- 74	VEM-43-47	C	E	G	D	C	D	ND	F	C	E	C	E	D	D	A	G	D	F	D	D	D	E
P- 73	VEM-42-47	C	E	G	D	C	D	ND	F	B	E	C	E	D	D	A	G	D	F	D	D	E	E
P- 72	VEM-41-47	C	E	ND	E	C	E	E	G	C	ND	D	E	E	E	A	G	D	ND	D	D	E	E
P- 71	VEM-40-47	C	E	G	E	A	D	ND	F	C	E	C	E	E	E	A	G	D	F	D	E	E	E
P- 70	VEM-39-47	C	E	ND	F	A	E	E	G	D	ND	D	E	ND	F	B	ND	D	ND	E	E	ND	E
P- 69	VEM-38-47	C	E	G	E	A	D	ND	F	C	E	D	E	F	E	A	G	D	E	E	E	F	E
P- 68	VEM-37-47	C	E	ND	E	C	E	E	G	D	ND	D	E	ND	E	A	ND	D	ND	E	E	ND	E
P- 67	VEM-36-47	C	E	ND	E	C	E	E	G	C	ND	D	E	F	E	A	ND	D	ND	D	E	ND	E
P- 66	VEM-35-47	C	E	ND	F	A	E	E	G	D	ND	C	E	ND	F	A	ND	D	ND	E	E	ND	E
P- 65	VEM-34-47	C	E	ND	E	B	D	D	G	C	ND	D	E	F	E	A	G	D	E	E	E	E	E
P- 64	VEM-33-47	C	E	ND	F	B	E	ND	G	D	ND	C	E	ND	F	A	ND	D	ND	E	E	ND	E
P- 63	VEM-32-47	C	E	ND	E	A	D	E	G	C	ND	D	E	F	E	A	G	D	E	E	E	E	E
P- 62	VEM-31-47	C	E	G	E	A	D	ND	F	C	E	C	E	E	E	A	G	D	E	E	D	E	E
P- 61	VEM-30-47	C	E	ND	F	A	E	D	G	D	ND	C	E	F	F	B	ND	D	ND	E	E	ND	E
P- 60	VEM-29-47	C	E	ND	F	A	E	ND	G	D	ND	C	E	F	E	B	G	D	ND	E	E	ND	E
P- 59	VEM-28-47	C	E	G	E	A	C	ND	F	C	E	B	E	E	D	A	G	D	E	D	E	F	E
P- 58	VEM-27-47	C	E	ND	F	B	.E	ND	G	E	ND	C	F	F	E	C	ND	E	ND	E	E	ND	F
P- 57	VEM-26-47	C	E	ND	E	B	E	ND	G	D	ND	D	F	F	E	B	G	E	E	E	E	E	F
P- 56	VEM-25-47	C	E	ND	F	A	E	ND	G	E	ND	C	F	ND	F	C	ND	E	E	E	E	ND	F
P- 55	VEM-24-47	C	E	ND	F	A	E	ND	G	D	ND	C	F	F	E	C	G	D	E	E	E	E	F
P- 54	VEM-23-47	C	E	ND	F	A	E	ND	G	E	ND	C	F	ND	F	C	G	E	E	E	E	ND	F
P- 53	VEM-22-47	C	E	ND	F	A	E	E	G	D	ND	D	F	F	E	B	ND	D	E	E	E	E	E
P- 52	VEM-21-47	D	E	ND	F	A	E	ND	G	E	ND	C	F	ND	F	C	G	E	E	E	E	ND	F
P- 51	VEM-20-47	C	E	ND	F	A	E	E	G	D	ND	D	F	F	E	C	G	D	E	E	E	E	E
P- 50	VEM-19-47	C	E	ND	F	A	E	ND	G	D	ND	C	F	F	E	C	G	E	E	E	E	ND	F
P- 49	VEM-18-47	C	E	G	E	A	D	ND	F	C	E	C	E	F	E	B	G	D	E	E	E	F	E
P- 48	VEM-17-47	C	E	ND	F	A	E	ND	G	E	ND	C	F	F	E	C	G	E	E	E	E	ND	F
P- 47	VEM-16-47	D	E	ND	F	B	E	ND	G	E	ND	C	F	F	E	C	G	E	E	E	E	ND	F
P- 46	VEM-15-47	C	E	G	E	A	E	ND	F	C	E	B	E	F	E	A	G	D	E	E	E	E	E
P- 45	VEM-14-47	D	E	ND	F	A	E	ND	G	E	ND	D	F	F	E	C	G	E	E	E	E	ND	F
P- 44	LES- 10-47	C	ND	ND	F	A	E	E	G	D	ND	D	ND	E	E	C	G	D	ND	E	D	E	F
P- 43	LES- 9-47	C	ND	ND	F	A	E	ND	G	D	ND	D	ND	F	E	C	G	D	ND	E	E	E	F
P- 42	LES- 8-47	C	ND	ND	F	A	E	ND	G	D	ND	C	F	F	E	A	G	E	ND	E	E	E	F
P- 41	LES- 7-47	C	ND	ND	F	B	E	ND	G	C	ND	D	F	F	E	A	G	D	ND	E	E	E	E
P- 40	LES- 6-47	C	ND	ND	F	B	E	ND	G	D	ND	C	F	F	E	A	G	D	ND	E	E	ND	E
P- 39	LES- 5-47	C	ND	ND	F	B	E	ND	G	D	ND	D	F	F	E	A	G	D	ND	E	E	E	F
P- 38	LES- 4-47	C	ND	ND	F	A	E	ND	G	D	ND	C	F	F	F	A	G	E	ND	E	E	ND	F
P- 37	LES- 3-47	C	ND	ND	F	A	E	ND	G	D	ND	C	F	F	F	A	G	E	ND	E	E	ND	F
P- 36	LES- 2-47	C	ND	ND	F	A	E	ND	G	D	ND	C	F	F	F	A	G	E	ND	E	E	ND	F

P- 35	LES- 1-47	C	ND	ND	F	A	E	ND	G	D	ND	D	F	F	E	A	G	E	ND	E	E	E
P- 34	VEM-13-47	D	E	G	F	A	E	ND	G	C	E	D	F	F	E	A	G	E	E	E	E	E
P- 33	2086	C	E	G	F	A	E	ND	G	C	E	D	F	F	E	A	G	E	E	E	E	E
P- 32	2085	C	E	ND	F	B	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	E
P- 31	2084	C	E	ND	F	B	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	E
P- 30	2083	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 29	2082	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 28	2081	C	ND	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 27	2080	C	ND	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 26	2079	C	E	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 25	2078	D	ND	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 24	2077	C	ND	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 23	2076	C	ND	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 22	2075	C	ND	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 21	2074	C	ND	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 20	2073	C	ND	ND	F	B	E	ND	G	D	E	C	F	F	E	A	G	E	E	E	E	F
P- 19	2072	C	ND	ND	F	A	E	ND	G	D	E	C	F	F	E	A	G	E	E	E	E	F
P- 18	2071	C	ND	ND	F	B	E	ND	G	D	E	C	F	F	E	A	G	E	E	E	E	F
P- 17	2070	C	ND	ND	F	B	E	ND	G	D	E	C	F	F	E	A	G	E	E	E	E	F
P- 16	2069	D	ND	ND	F	A	E	ND	G	D	E	C	F	F	E	A	G	E	E	E	E	F
P- 15	VEM-12-47	D	E	ND	F	B	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 14	VEM-11-47	D	E	ND	F	B	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 13	VEM 10-47	D	E	ND	F	A	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 12	VEM- 9-47	D	E	ND	F	B	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 11	VEM- 8-47	D	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 10	VEM- 7-47	C	E	ND	F	B	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 9	2066	C	ND	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 8	2065	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 7	2064	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 6	VEM- 6-47	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 5	VEM- 5-47	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 4	VEM- 4-47	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 3	VEM- 3-47	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 2	VEM- 2-47	C	E	ND	F	C	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F
P- 1	VEM- 1-47	C	E	ND	F	D	E	ND	G	D	E	D	F	F	E	A	G	E	E	E	E	F

NORTH FORK OF PINE CREEK, WYOMING. LOT NO. 1204.

Phosphatic shale member of Phosphoria formation sampled in bulldozer trench on North Fork of Pine Creek, sec. 13, T. 25 N., R. 118 W., Lincoln County, Wyoming, 10 miles northeast of Cokeville on east limb of syncline. Beds strike N. 10-25° E. and dip 37-45° W. Section measured by R. A. Hoppin, V. E. McKelvey, and L. E. Smith and sampled by R. P. Sheldon, O. A. Payne, and R. S. Sears in June and July 1947. Samples analyzed 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_2O_5 (cumulative)
				P_2O_5	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
	Phosphatic shale member of Phosphoria formation									
P-83	Mudstone, calcareous	RAH-63-47	2.2	0.3	--	--	--	67.8	2.2	0.66
P-82	Mudstone, calcareous	RAH-62-47	2.4	7.4	--	--	--	50.7	4.6	18.42
P-81	Limestone, argillaceous; fos. col. no. 47-HW-54[1]	RAH-61-47	2.5	6.3	--	--	--	27.3	7.1	34.17
P-80	Limestone, argillaceous; fos. col. no. 47-HW-53	RAH-60-47	1.5	0.6	--	--	--	44.0	8.6	35.07
P-79	Limestone, argillaceous; fos. col. no. 47-HW-52	RAH-59-47	1.9	0.7	--	--	--	41.9	10.5	36.40
P-78	Mudstone, calcareous; fos. col. no. 47-HW-51	RAH-58-47	2.7	1.2	--	--	--	60.9	13.2	39.64
P-77	Mudstone, calcareous; fos. col. no. 47-HW-50	RAH-57-47	1.6	0.7	--	--	--	59.0	14.8	40.76
P-76	Mudstone, calcareous	RAH-56-47	1.0	0.7	--	--	--	60.0	15.8	41.46
P-75	Limestone, argillaceous	RAH-55-47	3.2	0.6	--	--	--	49.7	19.0	43.38
P-74	Mudstone	RAH-54-47	3.8	1.0	--	--	--	82.7	22.8	47.18
P-73	Mudstone, phosphatic; fos. col. no. 47-HW-21	RAH-53-47	0.9	13.3	--	--	--	61.1	23.7	59.15
P-72	Mudstone; fos. col. no. 47-HW-20	RAH-52-47	4.4	4.7	--	--	--	83.6	28.1	79.83
P-71	Mudstone	RAH-51-47	2.6	4.3	--	--	--	74.6	30.7	91.01
P-70	Mudstone, calcareous	RAH-50-47	1.4	2.3	--	--	--	65.7	32.1	94.23
P-69	Mudstone	RAH-49-47	1.3	3.3	--	--	--	79.6	33.4	98.52
P-68	Phosphate rock	RAH-48-47	3.5	34.7	1.2	0.45	3.40	5.3	36.9	219.97
P-67	Mudstone, calcareous	RAH-47-47	1.4	2.8	9.72	1.7	6.44	72.2	38.3	223.89
P-66	Phosphate rock, argillaceous	RAH-46-47	4.4	25.9	3.5	0.89	3.92	23.4	42.7	337.85
P-65	Phosphate rock; fos. col. no. 47-HW-19	RAH-45-47	1.0	30.1	2.9	1.3	2.78	17.7	43.7	367.95
P-64	Mudstone	RAH-44-47	1.3	1.4	--	--	--	84.8	45.0	369.77
P-63	Mudstone	LES-116-47	1.8	3.3	--	--	--	77.0	46.8	375.71
P-62	Mudstone	LES-115-47	0.9	1.0	--	--	--	84.3	47.7	376.61
P-61	Phosphate rock, argillaceous	LES-114-47	0.4	24.1	--	--	--	24.9	48.1	386.25
P-60	Mudstone, phosphatic	LES-113-47	0.6	13.6	--	--	--	47.2	48.7	394.41
P-59	Mudstone	LES-112-47	1.0	1.1	--	--	--	78.6	49.7	395.51
P-58	Phosphate rock, calcareous, argillaceous	LES-111-47	0.4	20.8	--	--	--	22.7	50.1	403.83
P-57	Mudstone, phosphatic	LES-110-47	0.55	14.4	--	--	--	39.4	50.65	411.74
P-56	Limestone, argillaceous, phosphatic	LES-109-47	0.5	9.2	--	--	--	35.0	51.15	416.34

P-55	Limestone, argillaceous; fos. col. no. 47-HW-18	LES-108-47	1.4	3.8	--	--	--	22.6	52.55	421.66
P-54	Mudstone	LES-107-47	0.5	0.5	--	--	--	67.3	53.05	421.91
P-53	Mudstone	LES-106-47	0.45	0.2	--	--	--	71.6	53.50	422.00
P-52	Mudstone	LES-105-47	0.95	0.2	--	--	--	80.1	54.45	422.19
--	Mudstone	LES-354-47	(0.5)	0.3	--	--	--	78.0	--	--
	LES-354-47 represents the upper half of LES-105, bed P-52.									
P-51	Mudstone	LES-104-47	1.0	6.3	--	--	--	55.9	55.45	428.49
P-50	Mudstone, calcareous; fos. col. no. 47-HW-17	LES-103-47	0.7	2.1	--	--	--	51.7	56.15	429.96
P-49	Mudstone	LES-102-47	0.7	1.3	--	--	--	84.6	56.85	430.87
P-48	Mudstone, phosphatic	LES-101-47	0.7	12.5	--	--	--	51.1	57.55	439.62
P-47	Mudstone, calcareous and limestone	LES-100-47	3.0	0.4	--	--	--	46.7	60.55	440.82
P-46	Mudstone, calcareous	LES- 99-47	2.0	0.9	--	--	--	63.0	62.55	442.62
P-45	Mudstone, phosphatic	LES- 98-47	2.0	10.0	--	--	--	49.8	64.55	462.62
P-44	Mudstone, calcareous	LES- 97-47	3.6	6.7	--	--	--	56.0	68.15	486.74
P-43	Phosphate rock, argillaceous, contains calcareous concretions; fos. col. no. 47-HW-41	LES- 96-47	3.9	15.2	--	--	--	30.1	72.05	546.02
P-42	Limestone, argillaceous; fos. col. no. 47-HW-16	LES- 95-47	2.8	1.0	--	--	--	28.3	74.85	548.82
P-41	Phosphate rock, argillaceous, calcareous	LES- 94-47	1.9	16.4	--	--	--	35.9	76.75	579.98
P-40	Limestone, argillaceous, phosphatic	LES- 93-47	1.0	8.4	--	--	--	34.7	77.75	588.38
P-39	Phosphate rock, argillaceous, calcareous	LES- 92-47	2.1	17.6	--	--	--	33.8	79.85	625.34
P-38	Phosphate rock, argillaceous, calcareous	LES- 91-47	0.5	16.3	--	--	--	35.7	80.35	633.49
P-37	Phosphate rock, argillaceous, calcareous, contains chert lenses	LES- 90-47	0.75	19.0	--	--	--	26.7	81.10	647.74
P-36	Limestone, argillaceous	LES- 89-47	3.0	4.7	--	--	--	22.2	84.10	661.84
P-35	Chert, contains quartz vugs; fos. col. no. 47-HW-15	LES- 88-47	0.7	5.5	--	--	--	77.8	84.80	665.69
P-34	Mudstone, phosphatic	LES- 87-47	0.8	13.7	--	--	--	51.4	85.60	676.65
P-33	Phosphate rock, silty and mudstone	LES- 86-47	0.5	26.1	--	--	--	20.4	86.10	689.70
P-32	Phosphate rock	LES- 85-47	2.15	33.0	--	--	--	8.6	88.25	760.65
P-31	Phosphate rock, argillaceous	LES- 84-47	0.5	18.0	--	--	--	39.1	88.75	769.65
P-30	Mudstone, phosphatic, calcareous	LES- 83-47	2.3	13.1	--	--	--	41.8	91.05	799.78
P-29	Limestone, argillaceous	LES- 82-47	2.2	0.6	--	--	--	35.1	93.25	801.10
P-28	Mudstone, calcareous, phosphatic	LES- 81-47	0.8	7.8	--	--	--	51.0	94.05	807.35
P-27	Limestone, argillaceous, contains chert lenses	LES- 80-47	0.8	5.7	--	--	--	30.0	94.85	811.90
P-26	Phosphate rock	LES- 79-47	0.85	30.2	--	--	--	12.9	95.70	837.57
P-25	Mudstone, calcareous	LES- 78-47	0.3	4.8	--	--	--	62.1	96.00	839.01
P-24	Mudstone, calcareous	LES- 77-47	1.2	0.4	--	--	--	70.5	97.20	839.49
P-23	Mudstone	LES- 76-47	0.35	3.8	--	--	--	71.2	97.55	840.82
P-22	Mudstone	LES- 75-47	1.6	5.4	--	--	--	73.7	99.15	849.46

[1] Fossil collection made by H. Wedow, 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-21	Mudstone	LES- 74-47	0.75	1.7	--	--	--	83.9	99.90	850.74
P-20	Phosphate rock	LES- 73-47	0.9	31.7	--	--	--	15.6	100.80	879.26
P-19	Mudstone, contains chert lenses	LES- 72-47	4.0	1.0	--	--	--	92.7	104.80	883.26
P-18	Mudstone and chert	LES- 71-47	1.8	1.0	--	--	--	85.8	106.60	885.06
P-17	Mudstone, calcareous and chert	LES- 58-47	2.0	0.6	--	--	--	43.9	108.60	886.26
P-16	Mudstone, calcareous and chert	LES- 57-47	1.9	1.1	--	--	--	60.6	110.50	888.36
P-15	Mudstone, calcareous and chert	LES- 56-47	1.5	1.1	--	--	--	66.6	112.00	890.00
P-14	Mudstone, calcareous and chert	LES- 55-47	1.2	1.2	--	--	--	48.7	113.20	891.44
P-13	Limestone, argillaceous and phosphate rock	LES- 54-47	0.7	6.3	--	--	--	26.0	113.90	895.86
P-12	Limestone, argillaceous	LES- 53-47	0.85	1.9	--	--	--	25.4	114.75	897.47
P-11	Mudstone, calcareous	LES- 52-47	1.8	6.8	--	--	--	52.7	116.55	909.71
P-10	Limestone, argillaceous	LES- 51-47	0.65	2.2	--	--	--	19.0	117.20	911.14
P- 9	Mudstone, phosphatic	LES- 50-47	0.85	13.2	--	--	--	46.3	118.05	922.36
P- 8	Mudstone, calcareous	LES- 49-47	0.45	3.9	--	--	--	57.4	118.50	924.12
P- 7	Limestone, argillaceous	LES- 48-47	1.9	0.6	--	--	--	34.9	120.40	925.26
P- 6	Mudstone, calcareous	LES- 47-47	0.5	1.3	--	--	--	74.0	120.90	925.90
P- 5	Limestone, argillaceous	VEM-104-47	1.9	0.4	--	--	--	33.0	122.80	926.66
P- 4	Mudstone	VEM-103-47	0.5	1.1	--	--	--	75.6	123.30	927.22
P- 3	Mudstone, calcareous	VEM-102-47	1.9	0.4	--	--	--	57.9	125.20	927.98
P- 2	Limestone, argillaceous	VEM-101-47	1.1	0.4	--	--	--	45.4	126.30	928.42
P- 1	Phosphate rock, mudstone, and chert	VEM-100-47	0.4	26.4	--	--	--	17.4	126.70	938.98
	Wells formation									
Cw-2	Sandstone, phosphatic	VEM- 99-47	1.4	12.0	--	--	--	56.1	1.4	--
Cw-1	Mudstone, calcareous	VEM- 98-47	1.9	1.0	--	--	--	53.6	3.3	--

SPECTROGRAPHIC ANALYSES—NORTH FORK OF PINE CREEK, WYOMING. LOT NO. 1204.

Semi-quantitative analyses of a few samples of the Phosphoria formation, North Fork of Pine Creek, Wyoming (see immediately preceding pages for location of section, thickness and description of strata, and chemical analyses of samples), made by the U. S. Geological Survey Laboratory, Geochemistry and Petrology Branch. In addition to the elements listed in the table below, Sb, As, Be, Bi, Cd, Ce, Cs, Co, Cb, Ge, In, Hg, Mo, Nd, Pt, Re, Rb, Sc, Ta, Tl, Th, and W were looked for in all samples but were not detected.

Explanation of symbols

A = more than 10 percent
B' = 1-10 percent[1]
D = 0.01-0.1 percent
E = 0.01-0.1 percent
F = 0.001-0.01 percent
G = less than 0.001 percent
ND = not detected

Bed no.	Sample no.	Al	Ba	B	Ca	Cr	Cu	Fe	La	Pb	Mg	Mn	Ni	P	Si	Ag	Na	Sr	Sn	Ti	V	Y	Zn	Zr
P-68	RAH-48-47	D	F	F	A	D	F	D	E	E	D	F	F	--	B'	G	D	D	F	E	E	E	F	E
P-67	RAH-47-47	--	F	F	B'	E	F	D	ND	E	D	E	F	B'	A	G	D	D	F	D	E	ND	F	E
P-66	RAH-46-47	D	F	F	A	D	F	D	E	E	D	F	F	A	B'	G	D	D	F	E	E	E	F	E
P-65	RAH-45-47	D	F	F	A	E	F	D	E	F	D	E	F	A	B'	G	D	D	F	E	E	E	F	E

[1] B' is equivalent to B and C of Bureau of Mines analyses.

MIDDLE FORK OF PINE CREEK, WYOMING. LOT NO. 1205.

Phosphoria formation sampled on north wall of Middle Fork of Pine Creek, sec. 35, T. 25 N., R. 118 W., Lincoln County, Wyoming, on west-dipping Tump Range monocline. Beds R-26 to U-30 sampled in trench 150 feet above creek, all other beds in trench 50-200 feet above creek. Beds R-1 to R-25 measured in natural exposures 150-400 feet above creek. Beds strike N. 10° E. and dip 26° W. Section measured by R. A. Hoppin, F. C. Armstrong, and L. E. Smith and sampled by R. S. Sears and O. A. Payne in June, July, and August 1947. Samples analyzed 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_2O_5 (cumulative)
				P_2O_5	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
	Dinwoody formation									
Trd-1	Mudstone, calcareous, fos. col. nos. 47-HW-31 and 47-HW-31A[1]	--	1.1	--	--	--	--	--	1.1	--
	Upper shale member of Phosphoria formation									
U-30	Phosphate rock, argillaceous, calcareous; fos. col. nos. 47-HW-30 and 47-HW-30A	RAH-43-47	2.2	18.0	--	--	--	29.1	2.2	39.60
U-29	Chert, calcareous, phosphatic	RAH-42-47	1.9	8.2	--	--	--	47.0	4.1	55.18
U-28	Chert, calcareous	RAH-41-47	1.1	1.6	--	--	--	51.3	5.2	56.94
U-27	Chert, clacareous	RAH-40-47	2.8	0.9	--	--	--	64.6	8.0	59.46
U-26	Chert, calcareous	RAH-39-47	1.0	1.1	--	--	--	62.4	9.0	60.56
U-25	Mudstone, calcareous	RAH-38-47	1.1	1.7	--	--	--	60.7	10.1	62.43
U-24	Mudstone, calcareous	RAH-37-47	1.4	4.4	--	--	--	56.1	11.5	68.59
U-23	Mudstone, phosphatic, calcareous	RAH-36-47	0.6	13.1	--	--	--	41.0	12.1	76.45
U-22	Chert, calcareous	RAH-35-47	1.6	1.7	--	--	--	60.6	13.7	79.17
U-21	Chert, calcareous	RAH-34-47	0.7	2.3	--	--	--	62.3	14.4	80.78
U-20	Chert, calcareous	RAH-33-47	0.7	2.0	--	--	--	65.2	15.1	82.18
U-19	Mudstone and limestone	RAH-32-47	1.0	1.6	--	--	--	65.2	16.1	83.78
U-18	Mudstone, calcareous	RAH-31-47	2.5	1.6	--	--	--	66.6	18.6	78.78
U-17	Mudstone, calcareous	LES-46-47	2.6	2.8	--	--	--	67.7	21.2	95.06
U-16	Mudstone, calcareous	LES-34-47	1.0	3.4	--	--	--	52.4	22.2	98.46
U-15	Mudstone, calcareous	LES-33-47	2.4	2.3	--	--	--	61.7	24.6	103.98
U-14	Mudstone, calcareous	LES-32-47	1.0	3.3	--	--	--	65.2	25.6	107.28
U-13	Mudstone, calcareous	LES-31-47	1.5	2.9	--	--	--	65.8	27.1	111.63
U-12	Phosphate rock and calcareous mudstone containing chert	LES-30-47	1.5	6.7	--	--	--	61.1	28.6	121.68
U-11	Mudstone, contains chert	LES-29-47	1.05	3.3	--	--	--	72.1	29.65	125.14
U-10	Mudstone, calcareous	LES-28-47	1.4	3.2	--	--	--	70.2	31.05	129.62
U-9	Mudstone, calcareous	LES-27-47	2.4	3.8	--	--	--	66.6	33.45	138.74
U-8	Mudstone	LES-26-47	2.5	3.4	--	--	--	73.9	35.95	147.24
U-7	Limestone, argillaceous, phosphatic	LES-25-47	0.65	8.7	--	--	--	34.7	36.60	152.90
U-6	Mudstone, calcareous	LES-24-47	3.4	5.7	--	--	--	62.6	40.00	172.28

U- 5	Phosphate rock, argillaceous	LES-23-47	0.55	23.1	--	--	--	24.8	40.55	184.98
U- 4	Limestone, argillaceous	LES-22-47	1.45	5.9	--	--	--	41.8	42.00	193.54
U- 3	Mudstone, calcareous	LES-21-47	5.0	1.8	--	--	--	56.8	47.00	202.54
U- 2	Mudstone, calcareous	LES-20-47	1.9	2.2	--	--	--	65.0	48.90	206.72
U- 1	Phosphate rock, argillaceous; fos. col. no. 47-HW-29	LES-19-47	0.6	25.1	--	--	--	22.3	49.50	221.78
	Rex member of Phosphoria formation									
R-26	Limestone, phosphatic; fos. col. no. 47-HW-2B	LES-18-47	0.3	11.4	--	--	--	10.0	0.3	3.42
R-25	Limestone; fos. col. no. 47-HW-33	--	3.5	--	--	--	--	--	3.8	--
R-24	Limestone, phosphatic	--	0.3	--	--	--	--	--	4.1	--
R-23	Limestone, contains chert; fos. col. no. 47-HW-36	--	5.0	--	--	--	--	--	9.1	--
R-22	Limestone, phosphatic	--	2.3	--	--	--	--	--	11.4	--
R-21	Limestone, cherty; fos. col. no. 47-HW-37	--	5.1	--	--	--	--	--	16.5	--
R-20	Limestone and chert; fos. col. no. 47-HW-38	--	9.0	--	--	--	--	--	25.5	--
R-19	Limestone	--	2.0	--	--	--	--	--	27.5	--
R-18	Limestone and chert; fos. col. nos. 47-HW-39 and 47-HW-40	--	8.0	--	--	--	--	--	35.5	--
R-17	Limestone; fos. col. no. 47-HW-27	--	5.4	--	--	--	--	--	40.9	--
R-16	Limestone; fos. col. no. 47-HW-26	--	5.4	--	--	--	--	--	46.3	--
R-15	Limestone; fos. col. no. 47-HW-25	--	2.5	--	--	--	--	--	48.8	--
R-14	Covered interval, probably fossiliferous limestone and chert	--	23.0	--	--	--	--	--	71.8	--
R-13	Limestone; fos. col. nos. 47-HW-23 and 47-HW-24	--	11.0	--	--	--	--	--	82.8	--
R-12	Limestone and chert	--	15.0	--	--	--	--	--	97.8	--
R-11	Limestone	--	4.5	--	--	--	--	--	102.3	--
R-10	Limestone and chert	--	7.5	--	--	--	--	--	109.8	--
R- 9	Limestone and chert	--	6.2	--	--	--	--	--	116.0	--
R- 8	Mudstone, calcareous	--	2.5	--	--	--	--	--	118.5	--
R- 7	Mudstone, calcareous	--	5.0	--	--	--	--	--	123.5	--
R- 6	Mudstone, calcareous	--	5.0	--	--	--	--	--	128.5	--
R- 5	Mudstone, calcareous	--	5.0	--	--	--	--	--	133.5	--
R- 4	Mudstone, calcareous	--	4.0	--	--	--	--	--	137.5	--
R- 3	Chert and mudstone	--	2.6	--	--	--	--	--	140.1	--
R- 2	Quartzite, phosphatic	--	1.2	--	--	--	--	--	141.3	--
R- 1	Mudstone, dolomitic	--	5.0	--	--	--	--	--	146.3	--

[1] Fossil collection made by H. Wedow, 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		
	Phosphatic shale member of Phosphoria formation									
P-73	Mudstone, calcareous	LES-11-47	4.0	0.98	--	--	--	63.19	4.0	3.92
P-72	Mudstone, phosphatic, calcareous	LES-12-47	2.0	10.63	--	--	--	48.2	6.0	25.18
P-71	Mudstone, calcareous	LES-13-47	4.2	1.0	--	--	--	49.6	10.2	29.38
P-70	Phosphate rock, cherty	LES-14-47	0.7	23.8	--	--	--	26.0	10.9	46.04
P-69	Limestone, argillaceous	LES-15-47	2.8	1.8	--	--	--	42.5	13.7	51.08
P-68	Mudstone, calcareous	LES-16-47	1.7	1.2	--	--	--	73.6	15.4	53.12
P-67	Mudstone and argillaceous limestone	LES-17-47	1.5	5.3	--	--	--	29.3	16.9	61.07
P-66	Phosphate rock	LES-35-47	1.3	33.5	0.7	0.55	5.00	3.1	18.2	104.62
P-65	Phosphate rock	LES-36-47	0.7	34.9	0.8	0.65	2.98	4.1	18.9	129.05
P-64	Phosphate rock	LES-37-47	1.0	32.6	1.2	0.85	3.88	6.4	19.9	161.65
P-63	Mudstone and phosphate rock	LES-38-47	0.4	8.2	--	--	--	60.0	20.3	164.93
P-62	Limestone, argillaceous	LES-39-47	1.2	0.6	--	--	--	47.5	21.5	165.65
P-61	Phosphate rock	LES-40-47	0.9	32.0	--	--	--	6.6	22.4	194.45
P-60	Phosphate rock, argillaceous	LES-41-47	2.0	26.2	--	--	--	24.2	24.4	246.85
P-59	Phosphate rock; fos. col. no. 47-HW-22	LES-42-47	1.5	25.8	--	--	--	15.5	25.9	285.55
P-58	Mudstone, calcareous	LES-43-47	2.3	1.4	--	--	--	57.6	28.2	288.77
P-57	Phosphate rock, argillaceous	LES-44-47	0.4	25.8	--	--	--	21.7	28.6	299.09
P-56	Mudstone, calcareous	LES-45-47	2.8	0.6	--	--	--	74.9	31.4	300.77
P-55	Phosphate rock	LES-59-47	0.4	28.8	--	--	--	10.2	31.8	312.29
P-54	Limestone, argillaceous	LES-60-47	0.5	1.3	--	--	--	42.4	32.3	312.94
P-53	Phosphate rock, argillaceous	LES-61-47	0.35	22.6	--	--	--	27.6	32.65	320.85
P-52	Limestone, argillaceous	LES-62-47	1.4	0.6	--	--	--	47.1	34.05	321.69
P-51	Phosphate rock	LES-63-47	0.6	23.5	--	--	--	19.1	34.65	335.79
P-50	Phosphate rock, argillaceous	LES-64-47	0.6	16.8	--	--	--	34.6	35.25	345.87
P-49	Phosphate rock, argillaceous	LES-65-47	0.6	14.6	--	--	--	36.3	35.85	354.63
P-48	Limestone, argillaceous	LES-66-47	3.5	0.8	--	--	--	42.7	39.35	357.43
P-47	Mudstone	FCA-15-47	0.45	4.4	--	--	--	55.3	39.80	359.41
P-46	Phosphate rock, argillaceous	FCA-16-47	0.4	21.7	--	--	--	22.8	40.20	368.09
P-45	Mudstone	LES-68-47	0.45	0.2	--	--	--	61.5	40.65	368.18
P-44	Mudstone	FCA-17-47	0.5	0.1	--	--	--	66.7	41.15	368.23
P-43	Mudstone	FCA-18-47	0.65	0.4	--	--	--	73.6	41.80	368.49
P-42	Mudstone	FCA-19-47	0.5	3.2	--	--	--	67.6	42.30	370.09
P-41	Mudstone	FCA-20-47	0.35	6.4	--	--	--	55.3	42.65	372.33
P-40	Dolomite	FCA- 1-47	0.8	0.5	--	--	--	7.6	43.45	372.73
P-39	Mudstone, calcareous	FCA- 2-47	1.05	2.7	--	--	--	49.5	44.50	375.56
P-38	Mudstone	FCA- 3-47	0.6	2.2	--	--	--	80.8	45.10	376.88
P-37	Mudstone, phosphatic	FCA- 4-47	0.6	13.0	--	--	--	43.4	45.70	384.68
P-36	Limestone, argillaceous	FCA- 5-47	2.3	0.4	--	--	--	42.4	48.00	385.60
P-35	Mudstone, calcareous	FCA- 6-47	1.8	0.9	--	--	--	53.6	49.80	387.22
P-34	Mudstone, phosphatic	FCA- 7-47	2.05	10.4	--	--	--	49.5	51.85	408.54

P-33	Limestone, argillaceous	FCA- 8-47	1.3	1.6	--	--	--	33.3	53.15	410.62
P-32	Limestone, argillaceous	FCA- 9-47	1.15	0.4	--	--	--	33.3	54.30	411.08
P-31	Mudstone, phosphatic	FCA-10-47	0.6	13.4	--	--	--	41.3	54.90	419.12
P-30	Limestone, argillaceous	FCA-11-47	0.9	1.3	--	--	--	22.3	55.80	420.30
P-29	Phosphate rock, argillaceous, calcareous	FCA-12-47	1.2	12.4	--	--	--	32.3	57.00	435.18
P-28	Limestone, phosphatic	FCA-13-47	0.65	9.4	--	--	--	19.2	57.65	441.28
P-27	Mudstone	FCA-14-47	0.6	7.2	--	--	--	36.3	58.25	445.60
P-26	Phosphate rock, argillaceous, calcareous, contains concretions	FCA-21-47	1.6	19.5	--	--	--	17.4	59.85	476.80
P-25	Phosphate rock, argillaceous, calcareous	FCA-22-47	0.7	14.8	--	--	--	30.4	60.55	487.16
P-24	Limestone, argillaceous	FCA-23-47	1.9	1.0	--	--	--	30.8	62.45	489.06
P-23	Limestone, argillaceous	FCA-24-47	1.1	0.6	--	--	--	24.3	63.55	489.72
P-22	Phosphate rock, argillaceous	FCA-25-47	0.9	14.1	--	--	--	31.2	64.45	502.41
P-21	Phosphate rock, argillaceous	FCA-26-47	1.1	17.5	--	--	--	29.9	65.55	521.66
P-20	Phosphate rock, argillaceous	FCA-27-47	2.7	14.2	--	--	--	32.4	68.25	560.00
P-19	Limestone	FCA-28-47	1.4	3.7	--	--	--	14.6	69.65	565.18
P-18	Limestone, argillaceous	FCA-30-47	1.0	7.6	--	--	--	21.2	70.65	572.78
P-17	Phosphate rock, calcareous, argillaceous	FCA-31-47	1.5	15.3	--	--	--	26.4	72.15	595.73
P-16	Phosphate rock, calcareous, argillaceous	FCA-32-47	1.6	17.0	--	--	--	23.7	73.75	622.94
P-15	Limestone; fos. col. no. 47-HW-14	FCA-33-47	3.6	3.4	--	--	--	11.6	77.35	635.18
P-14	Mudstone, phosphatic	FCA-34-47	0.75	9.2	--	--	--	51.8	78.10	642.08
P-13	Phosphate rock	FCA-35-47	1.35	31.1	--	--	--	5.0	79.45	684.46
P-12	Mudstone, calcareous, phosphatic	FCA-36-47	2.0	11.7	--	--	--	36.8	81.45	707.46
P-11	Mudstone, calcareous, phosphatic	FCA-37-47	0.9	10.6	--	--	--	45.3	82.35	717.00
P-10	Limestone, argillaceous	FCA-38-47	3.4	1.7	--	--	--	36.1	85.75	722.78
P- 9	Limestone, argillaceous	FCA-39-47	1.3	0.3	--	--	--	35.0	87.05	723.17
P- 8	Limestone, argillaceous, phosphatic	FCA-40-47	2.1	11.0	--	--	--	30.6	89.15	746.27
P- 7	Mudstone, phosphatic	FCA-41-47	0.8	12.8	--	--	--	45.3	89.95	756.51
P- 6	Limestone, argillaceous	FCA-42-47	0.75	1.5	--	--	--	47.2	90.70	757.64
P- 5	Mudstone	FCA-43-47	1.1	4.0	--	--	--	66.6	91.80	762.04
P- 4	Phosphate rock, calcareous	FCA-44-47	1.4	30.7	--	--	--	7.1	93.20	805.02
P- 3	Limestone, argillaceous	FCA-45-47	2.35	0.4	--	--	--	38.4	95.55	805.96
P- 2	Mudstone, phosphatic, calcareous	FCA-46-47	0.55	12.3	--	--	--	45.0	96.10	812.72
P- 1	Limestone, argillaceous, phosphatic; fos. col. no. 47-HW-13	FCA-47-47	0.35	11.5	--	--	--	30.2	96.45	816.74
	Wells formation									
Cw-6	Limestone, cherty	FCA-48-47	0.8	0.4	--	--	--	11.0	0.8	--
Cw-5	Chert, calcareous, argillaceous	FCA-232-47	0.7	0.6	--	--	--	72.1	1.5	--
Cw-4	Chert, calcareous	FCA-231-47	1.6	0.7	--	--	--	54.4	3.1	--
Cw-3	Chert, calcareous	FCA-230-47	3.6	0.7	--	--	--	51.0	6.7	--
Cw-2	Limestone, cherty	FCA-229-47	1.5	0.8	--	--	--	43.0	8.2	--
Cw-1	Chert, calcareous	--	0.2	--	--	--	--	--	8.4	--

SPECTROGRAPHIC ANALYSES—MIDDLE FORK OF PINE CREEK, WYOMING. LOT NO. 1205.

Semi-quantitative analyses of a few samples of the Phosphoria formation, Middle Fork of Pine Creek, Wyoming (see immediately preceding pages for location of section, thickness and description of strata, and chemical analyses of samples), made by U. S. Geological Survey Laboratory, Geochemistry and Petrology Branch, Washington, D. C. In addition to the elements listed in the table below, Sb, As, Be, Bi, Ce, Cs, Co, Cb, Ge, In, Hg, Mo, Nd, Pt, Re, Rb, Sc, Ta, Tl, Th, and W were looked for in all samples but were not detected.

Explanation of symbols

A = more than 10 percent
B' = 1-10 percent[1]
D = 0.1-1 percent
E = 0.01-0.1 percent
F = 0.001-0.01 percent
G = less than 0.001 percent
ND = not detected

Bed no.	Sample no.	Al	Ba	B	Cd	Ca	Cr	Cu	Fe	La	Pb	Mg	Mn	Ni	P-	Si	Ag	Na	Sr	Sn	Ti	V	Y	Zn	Zr
P-66	LES-35-47	D	F	F	F	A	D	F	D	E	E	D	F	F	A	B'	G	D	D	F	E	E	E	F	E
P-65	LES-36-47	D	F	F	ND	A	D	F	D	E	E	D	F	F	A	B'	G	D	D	F	E	E	E	F	E
P-64	LES-37-47	D	F	ND	ND	A	D	F	D	E	E	D	F	F	A	B'	G	D	D	F	E	ND	E	F	E

[1] B' is equivalent to B and C of Bureau of Mines analyses.

LEEFE, WYOMING. LOT NO. 1213.

Part of phosphatic shale member of Phosphoria formation sampled at two places in Leefe open pit mine of San Francisco Chemical Company 4 miles west of Sage, secs. 10 and 15, T. 21 N., R. 120 W., Uinta County, Wyoming. Beds are flat lying. Section of beds P-1 to P-11 from locality A measured and sampled by R. M. Campbell in December 1947; section of beds P-1 to P-23 from locality B measured by F. W. O'Malley and R. A. Harris and sampled by Harris and R. A. Smart in October 1948. Samples analyzed 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_2O_5 (cumulative)
				P_2O_5	Al_2O_3	Fe_2O_3	Loss on ignition	Acid insoluble		
	Locality A[1]									
	Phosphatic shale member of Phosphoria formation—partial section									
P-11	Phosphate rock, argillaceous	RMC-145-47	2.5	17.4	2.1	1.67	9.14	31.6	2.5	43.50
P-10	Limestone, argillaceous	RMC-144-47	0.7	1.7	3.6	1.65	28.26	29.2	3.2	44.69
P- 9	Phosphate rock	RMC-143-47	2.7	35.5	0.66	0.53	3.50	3.1	5.9	140.54
P- 8	Phosphate rock, argillaceous	RMC-142-47	0.4	26.9	3.4	0.80	3.94	20.7	6.3	151.30
P- 7	Phosphate rock	RMC-141-47	1.0	34.6	0.99	0.61	3.12	4.2	7.3	185.90
P- 6	Phosphate rock	RMC-140-47	0.9	32.6	1.2	2.10	4.00	5.4	8.2	215.24
P- 5	Phosphate rock, argillaceous	RMC-139-47	0.6	20.8	5.5	1.00	4.22	33.5	8.8	227.72
P- 4	Phosphate rock, argillaceous	RMC-138-47	1.4	28.8	2.6	0.82	3.74	14.5	10.2	268.04
P- 3	Phosphate rock, argillaceous	RMC-137-47	1.2	28.8	2.9	0.69	3.82	18.3	11.4	302.60
P- 2	Phosphate rock, argillaceous	RMC-136-47	0.8	24.8	3.6	1.46	3.80	26.3	12.2	322.44
P- 1	Phosphate rock, argillaceous	RMC-135-47	0.3	23.0	4.8	0.79	2.84	32.7	12.5	329.34
	Locality B									
	Phosphatic shale member of Phosphoria formation—upper part only									
P-24	Chert	--	0.03	--	--	--	--	--	--	--
	Bed P-24 may represent base of Rex member.									
P-23	Mudstone, cherty	RH-3326	2.0	3.5	--	--	--	83.9	2.0	7.00
P-22	Phosphate rock, argillaceous	RH-3325	0.8	23.9	--	--	--	30.9	2.8	26.12
P-21	Mudstone	RH-3324	1.3	2.9	--	--	--	79.9	4.1	29.89
P-20	Phosphate rock, argillaceous	RH-3323	0.4	28.5	--	--	--	20.8	4.5	41.29
P-19	Mudstone	WOM - 3322	1.7	3.6	--	--	--	72.4	6.2	47.41
P-18	Mudstone, phosphatic and cherty phosphate rock	WOM - 3321	1.0	18.3	--	--	--	44.2	7.2	65.71
P-17	Mudstone, phosphatic	WOM - 3320	0.4	9.5	--	--	--	63.6	7.6	69.51
P-16	Phosphate rock and mudstone	WOM - 3319	0.8	21.4	--	--	--	34.0	8.4	86.63
P-15	Phosphate rock	WOM - 3318	4.5	35.0	--	--	--	4.7	12.9	244.13
P-14	Phosphate rock, calcareous	RH-3317	1.4	26.7	--	--	--	2.0	14.3	281.51

[1] Beds P-1 to P-11 of locality A are probably equivalent to beds P-9 through P-18 of locality B.

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-13	Phosphate rock	RH-3316	0.8	34.1	--	--	--	6.2	15.1	308.79
P-12	Phosphate rock	RH-3315	0.3	35.5	--	--	--	4.6	15.4	319.44
P-11	Phosphate rock	WOM - 3314	0.8	27.0	--	--	--	19.3	16.2	341.04
P-10	Phosphate rock	WOM - 3313	1.4	28.5	--	--	--	17.6	17.6	380.94
P- 9	Phosphate rock, argillaceous	WOM - 3312	0.6	17.7	--	--	--	43.2	18.2	391.56
P- 8	Mudstone	WOM - 3311	2.0	3.9	--	--	--	76.7	20.2	399.36
P- 7	Phosphate rock	WOM - 3310	0.7	29.9	--	--	--	13.9	20.9	420.29
P- 6	Phosphate rock	WOM - 3309	0.7	34.5	--	--	--	7.3	21.6	444.44
P- 5	Phosphate rock, argillaceous	WOM - 3308	1.5	19.5	--	--	--	37.3	23.1	473.69
P- 4	Phosphate rock, argillaceous	WOM - 3307	1.0	23.7	--	--	--	28.0	24.1	497.39
P- 3	Phosphate rock	WOM - 3306	1.2	28.8	--	--	--	17.6	25.3	531.95
P- 2	Mudstone and argillaceous phosphate rock	WOM - 3305	1.1	15.6	--	--	--	47.7	26.4	549.11
P- 1	Phosphate rock, argillaceous	WOM - 3335	1.1	23.9	--	--	--	28.1	27.5	575.40

SPECTROGRAPHIC ANALYSES—LEEFE, WYOMING. LOT NO. 1213.

Locality A

Semi-quantitative analyses of samples of the Phosphoria formation, Leefe, Wyoming (see immediately preceding pages for location of section, thickness and description of strata, and chemical analyses of samples), made by the U. S. Geological Survey Laboratory, Geochemistry and Petrology Branch. In addition to the elements listed in the table below, Sb, As, Be, Bi, B, Ce, Cs, Cb, Ge, Hg, Mo, Nd, Pt, Re, Rb, Sc, Ta, Tl, Th, Sn, and W, were looked for in all samples but were not detected.

Explanation of symbols

A = more than 10 percent
B' = 1-10 percent[1]
D = 0.1-1 percent
E = 0.01-0.1 percent
F = 0.001-0.01 percent
G = less than 0.001 percent
ND = not detected

Bed no.	Sample no.	Al	Ba	Cd	Ca	Cr	Co	Cu	Ga	In	Fe	La	Pb	Mg	Mn	Ni	P	Si	Ag	Na	Sr	Ti	V	Yb	Y	Zn	Zr
P-11	RMC-145-47	B'	E	ND	B'	F	ND	F	F	G	D	E	ND	E	D	E	B'	A	G	D	D	E	E	G	E	F	F
P-10	RMC-144-47	B'	E	F	A	F	ND	F	F	G	D	ND	ND	E	D	E	D	A	G	D	E	E	E	G	F	F	E
P- 9	RMC-143-47	D	E	ND	A	E	ND	F	F	ND	E	E	F	E	E	E	A	B'	G	D	D	E	D	G	E	F	F
P- 8	RMC-142-47	B'	E	ND	A	E	ND	F	F	G	D	E	F	E	E	E	A	B'	G	D	D	E	D	G	E	E	E
P- 7	RMC-141-47	D	E	ND	A	E	ND	F	F	G	D	E	E	E	D	E	A	B'	G	D	D	E	D	G	E	E	F
P- 6	RMC-140-47	D	E	F	A	E	F	F	F	G	D	E	E	E	D	E	A	B'	G	D	D	E	D	G	E	E	F
P- 5	RMC-139-47	B'	E	ND	B'	E	F	F	F	G	D	F	E	E	D	E	B'	A	G	D	D	E	D	G	E	E	E
P- 4	RMC-138-47	B'	E	F	A	E	F	F	F	G	D	E	E	E	D	E	A	B'	G	D	D	E	D	G	E	E	E
P- 3	RMC-137-47	B'	E	F	A	E	F	F	F	G	D	E	E	E	D	E	A	B'	G	D	D	E	D	G	E	E	E
P- 2	RMC-136-47	B'	E	F	A	E	F	F	F	ND	D	E	E	E	E	E	A	A	G	D	D	E	D	G	E	E	E
P- 1	RMC-135-47	B'	E	ND	A	E	ND	F	F	ND	D	F	E	E	D	E	A	A	G	D	D	E	D	G	E	E	E

[1] B' is equivalent to B and C of Bureau of Mines analyses.