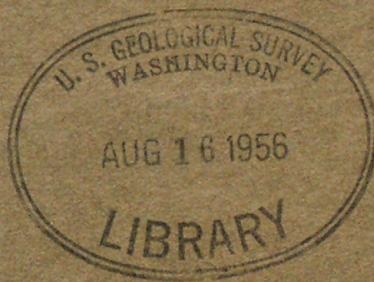


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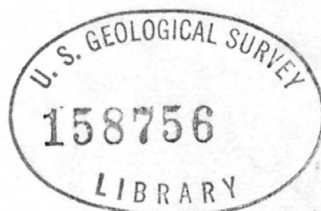
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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA
FORMATION MEASURED AND SAMPLED IN 1952

by

T. M. Cheney, R. P. Sheldon, E. R. Cressman,
R. A. Smart, and L. D. Carswell

MINERAL DEPOSITS BRANCH
Spokane, Washington April 1953

OPEN FILE

This 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

A series of reports presenting detailed stratigraphic sections and analyses of samples of the Phosphoria formation in the western phosphate field is being prepared for publication as U. S. Geological Survey Circulars. To speed the availability of these data to industry and others having immediate need for such basic information, many of the tables already typed and photographed were reproduced without text and placed on open file in advance of publication. This includes six reports of data gathered during the 1947 and 1948 field seasons. /

McKelvey, V. E., Swanson, R. W., O'Malley, F. W., and others, 1951 and 1952, Stratigraphic sections of the Phosphoria formation in Idaho (3 reports), Montana, Wyoming, and Utah: U. S. Geol. Survey open file reports.

In keeping with this objective, abstracts of the stratigraphy and P_2O_5 and acid insoluble analyses of the phosphatic parts of the sections measured and sampled during 1949, 1950, and 1951 were later released on open file in three more reports. / This is a similar report covering

Sheldon, R. P., Swanson, R. W., and Cheney, T. M., and others, 1951 and 1952, Stratigraphic sections of the Phosphoria formation measured and sampled in 1949, 1950, and 1951 (3 reports): U. S. Geol. Survey open file reports.

data gathered during the 1952 field season. The data in these reports are being prepared for publication in circulars like the six reports mentioned above. This report includes data for two sections measured in previous years but not yet released.

This report as well as the other nine referred to above, is placed on open file at the offices of the U. S. Geological Survey in Washington, D. C.; Spokane, Washington; Salt Lake City, Utah; and Montpelier, Idaho (open from May to October), and at the offices of the Idaho Bureau of Mines and Geology, Moscow, Idaho; the Montana Bureau of Mines and Geology, Butte, Montana; the Wyoming Geological Survey, Laramie, Wyoming; and the University of Utah, Salt Lake City, Utah.

MIDDLE PINEY LAKES, WYO., LOT 1377

Phosphoria formation measured and phosphatic portions sampled from hand trenches and natural exposure on north side of Middle Piney Creek, $\frac{1}{2}$ mile northeast of Middle Piney Lake, NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 8, R. 115 W., T. 30 N., Sublette County, Wyo. Beds strike N. 20° W. and dip 10° E. Section measured by R. P. Sheldon, L. D. Carswell, and E. R. Cressman and sampled by Sheldon and Carswell in May and June 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
<u>Dinwoody formation--basal beds only</u>					
Trd-1	Siltstone, calcareous	N.S.	8.0	---	---
?	Covered interval--could be either Dinwoody or E(?) member or partially both	N.S.	8.5	---	---
<u>E(?) member of Phosphoria formation</u>					
E- 1	Chert	N.S.	10.5	---	---
<u>Upper shale member of Phosphoria formation</u>					
U-12	Mudstone, cherty	N.S.	2.4	---	---
U-11	Mudstone, phosphatic	N.S.	.5	---	---
U-10	Mudstone, cherty	N.S.	3.9	---	---
U- 9	Chert	N.S.	3.0	---	---
U- 8	Chert, argillaceous and mudstone	N.S.	2.7	---	---
U- 7	Mudstone	N.S.	5.4	---	---
U- 6	Mudstone, cherty	N.S.	1.1	---	---
U- 5	Mudstone	N.S.	3.8	---	---
U- 4	Mudstone and chert	N.S.	1.2	---	---
U- 3	Dolomite, argillaceous	N.S.	1.0	---	---
U- 2	Mudstone	N.S.	8.0	---	---
U- 1	Phosphate rock	7036-RPS	1.5	29.7	12.5
Total thickness of Upper shale member			34.5		
<u>Rex chert member of Phosphoria formation</u>					
R-32	Limestone	N.S.	2.0	---	---
R-31	Limestone	7035-RPS	4.0	6.9	8.2
R-30	Limestone	N.S.	4.5	---	---
R-29	Carbonate rock and chert	N.S.	5.0	---	---
R-28	Limestone and chert	N.S.	12.0	---	---
R-27	Carbonate rock	N.S.	6.0	---	---
R-26	Carbonate rock and chert	N.S.	6.0	---	---
R-25	Limestone	N.S.	10.0	---	---
R-24	Dolomite, silty	N.S.	8.0	---	---
R-23	Covered interval	N.S.	2.0	---	---

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
R-22	Carbonate rock	N.S.	12.0	--	--
R-21	Limestone	N.S.	7.0	--	--
R-20	Covered interval	N.S.	1.5	--	--
R-19	Sandstone	N.S.	15.5	--	--
R-18	Sandstone	N.S.	5.8	--	--
R-17	Carbonate rock and chert	N.S.	8.5	--	--
R-16	Carbonate rock and chert	N.S.	6.5	--	--
R-15	Carbonate rock	N.S.	4.8	--	--
R-14	Phosphate rock	N.S.	.3	--	--
R-13	Chert and sandy carbonate rock	N.S.	2.4	--	--
R-12	Carbonate rock, sandy	N.S.	.8	--	--
R-11	Chert	N.S.	3.5	--	--
R-10	Sandstone, cherty	N.S.	2.5	--	--
R- 9	Sandstone, carbonatic	N.S.	2.7	--	--
R- 8	Carbonate rock	N.S.	1.0	--	--
R- 7	Chert	N.S.	1.7	--	--
R- 6	Dolomite and chert	N.S.	2.7	--	--
R- 5	Carbonate rock, argillaceous	N.S.	.8	--	--
R- 4	Phosphate rock	N.S.	.1	--	--
R- 3	Dolomite	N.S.	.7	--	--
R- 2	Chert	N.S.	2.7	--	--
R- 1	Carbonate rock	N.S.	.3	--	--

Total thickness of Rex chert member

143.3

Phosphatic shale member of Phosphoria formation

P-35	Chert	7034-RPS	1.7	7.2	70.6
P-34	Carbonate rock	7033-RPS	.3	1.6	7.7
P-33	Phosphate rock and phosphatic calcareous chert	7032-RPS	1.3	29.4	15.6
P-32	Siltstone	7031-RPS	4.0	5.3	70.8
P-31	Phosphate rock	7030-RPS	.4	31.2	10.0
P-30	Mudstone	7029-RPS	1.5	3.1	72.1
P-29	Phosphate rock, argillaceous	7028-RPS	.4	18.7	31.7
P-28	Mudstone	7027-RPS	.9	.6	76.1
P-27	Limestone, argillaceous	7026-RPS	.4	.4	20.3
P-26	Mudstone	7025-RPS	3.5	2.3	76.5
P-25	Mudstone	7024-RPS	3.0	--	--
P-24	Dolomite, argillaceous	7023-RPS	2.0	.2	23.2
P-23	Mudstone, carbonatic	7022-RPS	2.5	1.2	63.8
P-22	Dolomite, argillaceous	7021-RPS	2.5	.3	35.3
P-21	Carbonate rock, argillaceous	7020-RPS	1.0	4.7	35.4
P-20	Mudstone, carbonatic	7019-RPS	2.5	4.5	42.2
P-19	Limestone and mudstone	7018-LDC	2.5	1.9	27.3
P-18	Carbonate rock, argillaceous	7017-LDC	1.8	1.3	28.8

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P-17	Carbonate rock, argillaceous	7016-LDC	2.0	.8	43.6
P-16	Mudstone	7015-LDC	4.4	2.2	77.2
P-15	Mudstone, phosphatic	7014-LDC	.5	8.7	51.8
P-14	Carbonate rock, argillaceous	7013-LDC	.9	2.6	22.9
P-13	Phosphate rock, argillaceous, carbonatic and carbonatic mudstone	7012-RPS	1.0	11.0	26.3
P-12	Carbonate rock	7011-RPS	.5	1.6	9.0
P-11	Phosphate rock, argillaceous and phosphatic mudstone	7010-RPS	1.5	22.9	17.0
P-10	Carbonate rock, argillaceous	7009-RPS	1.2	1.5	20.4
P- 9	Carbonate rock, argillaceous and calcareous, argillaceous phosphate rock	7008-RPS	3.0	11.6	21.8
P- 8	Phosphate rock and phosphatic mudstone	7007-RPS	1.4	25.1	12.6
P- 7	Dolomite, argillaceous	7006-RPS	4.6	2.0	28.7
P- 6	Mudstone, carbonatic	7005-RPS	2.7	4.3	40.0
P- 5	Phosphate rock, argillaceous	7004-RPS	5.0	15.1	28.6
P- 4	Dolomite	7003-RPS	.8	1.6	4.1
P- 3	Phosphate rock and mudstone	7002-RPS	.4	20.0	25.1
P- 2	Phosphate rock	7001-RPS	1.4	34.4	4.4
P- 1	Chert, phosphatic	7000-RPS	.5	14.5	44.6

Total thickness of phosphatic shale member

64.0

Wells formation--top part only

Cw- 1	Dolomite	N.S.	2.1	---	---
Cw- 2	Dolomite	N.S.	5.5	---	---
Cw- 3	Dolomite	N.S.	.9	---	---
Cw- 4	Sandstone	N.S.	.5	---	---
Cw- 5	Chert, calcareous	N.S.	23.0	---	---
Cw- 6	Sandstone	N.S.	19.0	---	---
Cw- 7	Limestone	N.S.	1.5	---	---
Cw- 8	Sandstone	N.S.	12.3	---	---
Cw- 9	Sandstone	N.S.	13.1	---	---
Cw-10	Covered interval	N.S.	18.0	---	---
Cw-11	Sandstone	N.S.	8.3	---	---

Total thickness of Wells formation measured

104.2

DEADLINE RIDGE, WYO., LOT 1380

Phosphoria formation measured and phosphatic portions sampled in bulldozer trenches on west limb of anticline on Deadline Ridge, sec. 7, T. 27 N., R. 114 W., Lincoln County, Wyo. Beds strike N. 40° W. and dip 45° SW. Section measured by R. A. Smart, T. M. Cheney, and Louis D. Carswell and sampled by Smart, Carswell, and T. K. Rigby in July 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
------------	------------------	---------------	---------------------	-------------------------------	-------------------

Dinwoody formation not measured

E(?) member of Phosphoria formation

E- 1	Chert	N.S.	20.0±5.0	---	---
------	-------	------	----------	-----	-----

Upper shale member of Phosphoria formation

U-20	Mudstone, cherty, calcareous	7218-TMC	1.0	---	---
U-19	Phosphate rock, cherty	7217-TMC	.7	---	---
U-18	Chert, calcareous	7216-TMC	1.0	---	---
U-17	Phosphate rock, calcareous	7215-TMC	.5	---	---
U-16	Mudstone, phosphatic	7214-TMC	1.2	9.6	44.6
U-15	Chert	7213-RAS	2.9	4.8	60.1
U-14	Mudstone, carbonatic, cherty	7212-RAS	1.2	4.7	39.7
U-13	Chert, argillaceous	7211-RAS	2.1	7.3	57.2
U-12	Chert, phosphatic	7210-RAS	1.0	14.7	47.6
U-11	Mudstone	7209-RAS	.4	2.4	80.9
U-10	Mudstone	7208-RAS	2.1	2.7	77.1
U- 9	Mudstone	7207-RAS	2.0	2.4	75.7
U- 8	Mudstone	7206-RAS	3.8	3.0	75.6
U- 7	Mudstone	7205-RAS	6.5	2.8	69.7
U- 6	Mudstone	7204-RAS	3.1	2.4	76.9
U- 5	Mudstone, phosphatic	7203-RAS	.5	10.7	53.5
U- 4	Phosphate rock, argillaceous	7202-RAS	1.3	28.4	16.5
U- 3	Mudstone, phosphatic	7201-RAS	1.1	10.0	47.7
U- 2	Phosphate rock	7200-RAS	.9	31.7	6.7
U- 1	Phosphate rock	7199-RAS	.5	25.3	14.7

Total thickness of Upper shale member	33.8
---------------------------------------	------

Rex chert member of Phosphoria formation

R-19	Limestone, argillaceous	N.S.	1.1	---	---
R-18	Limestone, argillaceous	N.S.	1.3	---	---
R-17	Mudstone, cherty	N.S.	.4	---	---
R-16	Dolomite	N.S.	1.4	---	---
R-15	Chert, dolomitic	N.S.	2.6	---	---
R-14	Chert and cherty carbonate rock	N.S.	2.5	---	---
R-13	Dolomite	N.S.	1.0	---	---

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
R-12	Dolomite	N.S.	3.5	---	---
R-11	Dolomite	N.S.	2.5	---	---
R-10	Carbonate rock	N.S.	2.5	---	---
R- 9	Limestone	N.S.	2.0	---	---
R- 8	Dolomite	N.S.	3.0	---	---
R- 7	Covered interval---chert, carbonate rock and sandstone float	N.S.	200.0±20.0	---	---
R- 6	Carbonate rock	N.S.	2.0	---	---
R- 5	Phosphate rock	7198-TMC	1.7	32.4	4.6
R- 4	Carbonate rock	N.S.	.6	---	---
R- 3	Covered interval---limestone and chert in float	N.S.	35.0±5.0	---	---
R- 2	Carbonate rock	N.S.	2.7	---	---
R- 1	Chert	N.S.	4.7	---	---

Total thickness of Rex chert member

270.5

Phosphatic shale member of Phosphoria formation

P-39	Mudstone	7197-RAS	0.5	2.0	78.3
P-38	Chert, dolomitic	7196-RAS	.8	4.5	46.9
P-37	Phosphate rock, argillaceous	7195-RAS	1.3	26.7	20.0
P-36	Covered interval	N.S.	5.0	---	---
P-35	Mudstone	7194-LDC	.5	6.3	57.5
P-34	Mudstone, phosphatic	7193-LDC	.7	8.1	55.6
P-33	Mudstone	7192-LDC	.5	5.1	70.1
P-32	Mudstone	7191-LDC	.4	7.6	52.0
P-31	Mudstone	7190-LDC	.8	.3	78.5
P-30	Mudstone	7189-RAS	.8	4.6	66.0
P-29	Mudstone	7188-RAS	2.0	1.2	68.1
P-28	Mudstone, phosphatic	7187-RAS	.4	10.5	50.8
P-27	Mudstone	7186-RAS	7.5	.4	70.8
P-26	Mudstone, carbonatic	7185-RAS	1.1	4.6	48.5
P-25	Mudstone, carbonatic	7184-RAS	.6	1.6	63.4
P-24	Mudstone, carbonatic	7183-RAS	.8	.7	68.4
P-23	Mudstone	7182-RAS	.5	5.4	64.3
P-22	Mudstone, carbonatic	7181-RAS	1.0	3.7	56.8
P-21	Mudstone	7180-RAS	.6	4.8	69.4
P-20	Mudstone	7179-RAS	.8	1.4	74.8
P-19	Mudstone, carbonatic	7178-RAS	1.1	1.4	52.2
P-18	Mudstone	7177-RAS	4.3	.6	76.5
P-17	Mudstone, phosphatic	7176-RAS	.5	9.1	53.4
P-16	Carbonate rock, argillaceous	7175-RAS	.9	.9	38.2
P-15	Carbonate rock, argillaceous	7174-RAS	1.9	.7	29.0
P-14	Mudstone, carbonatic	7173-RAS	.6	2.0	64.7
P-13	Mudstone	7172-RAS	2.6	1.3	68.9

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P-12	Carbonate rock, argillaceous	7171-RAS	1.2	4.8	34.9
P-11	Mudstone, phosphatic, carbonatic	7170-RAS	1.2	8.8	38.1
P-10	Phosphate rock, argillaceous, carbonatic	7169-RAS	.8	12.6	24.9
P- 9	Phosphate rock, argillaceous	7168-RAS	1.4	24.2	14.5
P- 8	Carbonate rock, argillaceous	7167-RAS	.5	3.6	20.2
P- 7	Carbonate rock, argillaceous	7166-RAS	2.5	1.1	25.4
P- 6	Mudstone, carbonatic	7165-RAS	5.1	5.5	45.3
P- 5	Carbonate rock	7164-RAS	.4	1.0	6.8
P- 4	Phosphate rock, argillaceous	7163-RAS	3.5	17.9	27.7
P- 3	Carbonate rock	7162-RAS	3.4	2.1	5.4
P- 2	Phosphate rock, argillaceous	7161-RAS	1.0	18.8	27.0
P- 1	Carbonate rock, phosphatic	7160-RAS	1.2	14.4	6.9

Total thickness of phosphatic shale member

60.7

Wells formation not measured

Cw- 1 Chert and limestone

N.S.

FONTENELLE CREEK, WYO., LOT 1379

Phosphoria formation measured and phosphatic portions sampled from two bulldozer trenches, a hand trench, and natural outcrop on south side of Fontenelle Creek in Bridger National Forest, sec. 35, T. 27 N., R. 116 W., Lincoln County, Wyo. Beds strike N. 15° W. and dip 55° SW. Section measured by R. P. Sheldon, L. D. Carswell, R. A. Smart, and E. R. Cressman and sampled by T. K. Rigby in June 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
<u>Dinwoody formation not measured</u>					
Trd- 1	Siltstone, calcareous	N.S.	---	---	---
<u>E(?) member of Phosphoria formation</u>					
E- 4	Carbonate rock	7132-RAS	2.2	7.4	15.5
E- 3	Chert with mudstone partings	N.S.	30.0	---	---
E- 2	Chert	N.S.	1.8	---	---
E- 1	Chert with mudstone partings and mudstone	N.S.	4.1	---	---
Total thickness of E(?) member			<u>38.1</u>		
<u>Upper shale member of Phosphoria formation</u>					
U-18	Chert and mudstone	N.S.	1.3	---	---
U-17	Mudstone, cherty	N.S.	1.4	---	---
U-16	Mudstone, carbonatic	N.S.	1.7	---	---
U-15	Chert	N.S.	.5	---	---
U-14	Mudstone, carbonatic	N.S.	2.1	---	---
U-13	Carbonate rock, cherty	N.S.	.4	---	---
U-12	Mudstone, carbonatic	N.S.	1.2	---	---
U-11	Mudstone, dolomitic	N.S.	.7	---	---
U-10	Mudstone, calcareous	N.S.	2.7	---	---
U- 9	Chert	N.S.	2.4	---	---
U- 8	Mudstone	N.S.	1.6	---	---
U- 7	Dolomite, argillaceous	N.S.	1.7	---	---
U- 6	Mudstone	N.S.	2.3	---	---
U- 5	Chert	N.S.	.3	---	---
U- 4	Mudstone, phosphatic and carbonatic mudstone	N.S.	.6	---	---
U- 3	Phosphate rock	7131-ERC	.9	29.2	13.5
U- 2	Carbonate rock	N.S.	.7	---	---
U- 1	Phosphate rock	7130-LDC	.9	26.7	10.4
Total thickness of Upper shale member			<u>23.4</u>		

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
<u>Rex chert member of Phosphoria formation</u>					
R-29	Carbonate rock, silty	N.S.	9.0	---	---
R-28	Carbonate rock and chert	N.S.	10.6	---	---
R-27	Limestone	N.S.	43.0	---	---
R-26	Limestone	N.S.	6.0	---	---
R-25	Limestone	N.S.	6.5	---	---
R-24	Mudstone	N.S.	.8	---	---
R-23	Siltstone, calcareous	N.S.	2.8	---	---
R-22	Limestone	N.S.	3.8	---	---
R-21	Limestone, argillaceous	N.S.	3.6	---	---
R-20	Sandstone, calcareous	N.S.	1.3	---	---
R-19	Chert, sandy	N.S.	1.5	---	---
R-18	Sandstone, calcareous	N.S.	3.3	---	---
R-17	Limestone	N.S.	4.0	---	---
R-16	Sandstone, calcareous	N.S.	6.5	---	---
R-15	Carbonate rock	N.S.	7.5	---	---
R-14	Chert	N.S.	7.0	---	---
R-13	Phosphate rock, cherty	7129-RPS	.4	20.2	30.9
R-12	Dolomite	N.S.	5.0	---	---
R-11	Dolomite, phosphatic and chert	N.S.	1.5	---	---
R-10	Dolomite	N.S.	.7	---	---
R- 9	Chert, phosphatic, carbonatic	7128-RPS	.4	7.8	40.6
R- 8	Dolomite	N.S.	.5	---	---
R- 7	Chert	N.S.	.2	---	---
R- 6	Phosphate rock, cherty	7127-RPS	.3	18.4	39.7
R- 5	Carbonate rock	N.S.	2.3	---	---
R- 4	Mudstone	N.S.	.6	---	---
R- 3	Carbonate rock	N.S.	4.0	---	---
R- 2	Limestone	N.S.	1.8	---	---
R- 1	Chert and silty carbonate rock	N.S.	3.2	---	---

Total thickness of Rex chert member

138.1

Phosphatic shale member of Phosphoria formation

P-45	Carbonate rock	7126-RAS	0.8	0.5	15.8
P-44	Mudstone, carbonatic	7125-RAS	.9	1.3	62.1
P-43	Mudstone, carbonatic	7124-RAS	5.9	1.1	63.6
P-42	Mudstone, carbonatic	7123-RAS	.4	.7	63.2
P-41	Mudstone, carbonatic	7122-RAS	1.0	1.2	59.4
P-40	Carbonate rock, argillaceous	7121-RAS	.8	1.9	22.2
P-39	Mudstone	7120-RAS	3.2	1.5	67.1
P-38	Carbonate rock, argillaceous	7119-RAS	1.1	.6	22.9
P-37	Mudstone, carbonatic	7118-RAS	.8	2.2	64.0
P-36	Carbonate rock	7117-RAS	1.5	1.0	1.3

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBI
P-35	Mudstone and chert	7116-RAS	.5	5.3	64.3
P-34	Phosphate rock	7115-RAS	2.6	34.3	1.3
P-33	Mudstone, carbonatic	7114-RAS	2.7	.5	64.3
P-32	Phosphate rock	7113-RAS	1.0	31.8	3.9
P-31	Mudstone	7112-RAS	1.1	5.3	70.8
P-30	Phosphate rock	7111-RAS	1.2	30.6	7.1
P-29	Phosphate rock, argillaceous	7110-RAS	1.5	23.9	23.6
P-28	Phosphate rock	7109-ERC	.9	26.6	17.7
P-27	Phosphate rock	7108-ERC	1.8	22.7	9.7
P-26	Mudstone and calcareous phosphate rock	7107-ERC	.7	12.0	24.4
P-25	Phosphate rock, argillaceous and carbonate rock	7106-ERC	1.8	18.6	35.0
P-24	Dolomite, argillaceous	7105-ERC	1.7	1.5	24.1
P-23	Mudstone, carbonatic	7104-ERC	1.2	.2	57.7
P-22	Mudstone	7103-ERC	.9	.4	70.4
P-21	Mudstone, carbonatic	7102-ERC	.7	3.2	62.4
P-20	Mudstone	7101-ERC	2.7	3.9	71.9
P-19	Mudstone, carbonatic	7100-ERC	3.9	.7	53.8
P-18	Mudstone, carbonatic	7099-ERC	3.1	.5	45.8
P-17	Mudstone, carbonatic	7098-RAS	2.2	5.9	44.7
P-16	Limestone, argillaceous	7097-RAS	1.3	.6	22.6
P-15	Mudstone, phosphatic, carbonatic	7096-RAS	.6	11.4	37.2
P-14	Limestone	7095-RAS	1.4	2.5	15.6
P-13	Phosphate rock, argillaceous carbonatic	7094-RAS	3.9	14.4	18.1
P-12	Limestone, argillaceous	7093-RAS	2.8	1.7	20.1
P-11	Limestone, argillaceous	7092-RAS	.8	4.7	29.3
P-10	Mudstone	N.S.	2.9	—	—
P- 9	Carbonate rock, argillaceous	7091-RAS	.8	3.9	22.6
P- 8	Mudstone, carbonatic	7090-RAS	1.5	7.5	42.8
P- 7	Carbonate rock	7089-RAS	3.3	6.8	14.6
P- 6	Phosphate rock	7088-RAS	.9	24.1	11.4
P- 5	Phosphate rock, argillaceous, carbonatic	7087-RAS	1.9	15.5	17.3
P- 4	Phosphate rock, carbonatic	7086-RAS	1.4	13.4	7.8
P- 3	Phosphate rock	7085-RAS	.4	25.0	4.6
P- 2	Carbonate rock, argillaceous	7084-RAS	.5	1.4	35.9
P- 1	Phosphate rock, argillaceous	7083-RAS	.7	25.2	23.1

Total thickness of Phosphatic shale member

73.7

Wells formation--top part only

Cw- 1	Carbonate rock	N.S.	1.3±.4
Cw- 2	Chert, dolomitic	N.S.	4.4±.3
Cw- 3	Chert	N.S.	2.5

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
Cw- 4	Dolomite and cherty silty dolomite	N.S.	3.5	---	---
Cw- 5	Chert	N.S.	3.0	---	---
Cw- 6	Chert, dolomitic and chert	N.S.	10.3	---	---
Cw- 7	Chert and dolomitic chert	N.S.	.8	---	---
Cw- 8	Mudstone	N.S.	.4	---	---
Cw- 9	Chert and dolomitic chert	N.S.	5.0	---	---
Cw-10	Chert, dolomitic	N.S.	4.8	---	---
Cw-11	Chert and dolomitic chert	N.S.	5.0	---	---
Cw-12	Dolomite, argillaceous	N.S.	4.2	---	---
Cw-13	Carbonate rock, silty	N.S.	1.9	---	---
Cw-14	Mudstone	N.S.	.7	---	---
Cw-15	Sandstone, calcareous	N.S.	.5	---	---
Cw-16	Sandstone, calcareous	N.S.	3.4	---	---

Note: Covered below.

Total thickness of Wells formation measured

51.7

BASIN CREEK, WYO., LOT 1381

Phosphoria formation measured and sampled from bulldozer trenches and natural exposure on the north side of Basin Creek on the west limb of a doubly plunging anticline, secs. 12 and 13, T. 26 N., R. 117½ W., Lincoln County, Wyo. Beds strike N. 30° W. and dip 45° W. Section measured by R. A. Smart, T. M. Cheney, and L. D. Carswell and sampled by Smart and T. K. Rigby in July 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
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Dinwoody formation not measured

Upper shale member of Phosphoria formation

U-17	Phosphate rock, argillaceous	7276-RAS	1.2	18.2	39.8
U-16	Phosphate rock, argillaceous	7275-RAS	.9	26.4	18.6
U-15	Phosphate rock, argillaceous	7274-RAS	1.1	25.5	23.8
U-14	Phosphate rock, argillaceous	7273-RAS	1.7	24.6	27.1
U-13	Phosphate rock, argillaceous	7272-RAS	1.3	21.5	33.2
U-12	Phosphate rock, argillaceous	7271-RAS	1.2	22.0	33.5
U-11	Phosphate rock, argillaceous	7270-RAS	.9	22.1	31.7
U-10	Phosphate rock, argillaceous	7269-RAS	2.3	19.1	40.0
U- 9	Mudstone, phosphatic	7268-TMC	.5	13.9	51.3
U- 8	Mudstone, phosphatic	7267-TMC	.2	12.6	59.9
U- 7	Mudstone	7266-TMC	.4	4.6	62.9
U- 6	Phosphate rock, argillaceous	7265-TMC	1.0	24.5	30.0
U- 5	Chert and argillaceous dolomite	N.S.	13.0	---	---
U- 4	Mudstone	N.S.	5.0	---	---

Note: Beds U-4, U-3, and U-2 are fractured and cut by faults.

U- 3	Chert and argillaceous dolomite	N.S.	2.0	---	---
U- 2	Mudstone	N.S.	1.0	---	---
U- 1	Phosphate rock, cherty and phosphatic chert	7264-LDC	2.1	21.6	39.4

Total thickness of Upper shale member 35.8

Rex chert member of Phosphoria formation

R-21	Limestone and cherty limestone	N.S.	25.0±5.0	---	---
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Note: Bed R-21 probably cut by fault.

R-20	Siltstone	N.S.	5.0	---	---
R-19	Mudstone	N.S.	2.0	---	---
R-18	Chert	N.S.	5.0	---	---
R-17	Chert and siltstone	N.S.	20.0	---	---
R-16	Chert and siltstone	N.S.	5.0	---	---
R-15	Covered interval	N.S.	4.0±1.0	---	---

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
R-14	Limestone, cherty	N.S.	30.0	---	---
R-13	Chert and mudstone	N.S.	4.5	---	---
R-12	Phosphate rock	N.S.	.3	---	---
R-11	Covered interval	N.S.	2.6	---	---
R-10	Sandstone, calcareous	N.S.	3.3	---	---
R- 9	Limestone	N.S.	6.0	---	---
R- 8	Covered interval	N.S.	7.5±2.5	---	---
R- 7	Limestone, cherty	N.S.	12.0	---	---
R- 6	Limestone	N.S.	2.0	---	---
R- 5	Limestone, cherty	N.S.	1.9	---	---
R- 4	Mudstone and chert	N.S.	1.2	---	---
R- 3	Chert	N.S.	1.4	---	---
R- 2	Mudstone	N.S.	.8	---	---
R- 1	Limestone	N.S.	2.3	---	---

Total thickness of Rex chert member

141.8

Phosphatic shale member of Phosphoria formation

P-51	Mudstone	N.S.	1.0	---	---
P-50	Mudstone, phosphatic, carbonatic	7260-RAS	.5	12.4	32.9
P-49	Carbonate rock, argillaceous	7259-RAS	2.6	35.6	3.4
P-48	Mudstone, phosphatic	7258-RAS	2.7	10.7	63.6
P-47	Phosphate rock	7257-RAS	.5	31.1	14.0
P-46	Mudstone	7256-RAS	.3	3.5	79.8
P-45	Phosphate rock	7255-RAS	1.7	32.4	11.5
P-44	Phosphate rock, argillaceous	7254-RAS	1.8	26.8	22.5
P-43	Phosphate rock	7253-RAS	.8	32.7	13.0
P-42	Mudstone	7252-RAS	.7	1.5	85.6
P-41	Phosphate rock, argillaceous	7251-RAS	.3	23.8	28.5
P-40	Mudstone	7250-RAS	2.0	2.4	83.5
P-39	Phosphate rock and mudstone	7249-RAS	.6	22.5	30.1
P-38	Mudstone	7248-RAS	.6	1.4	82.1
P-37	Phosphate rock, argillaceous	7247-RAS	.3	27.4	19.3
P-36	Mudstone	N.S.	.9	---	---
P-35	Mudstone	N.S.	.7	---	---
P-34	Mudstone	N.S.	2.2	---	---
P-33	Mudstone	N.S.	1.2	---	---
P-32	Mudstone	N.S.	3.4	---	---
P-31	Mudstone	N.S.	1.4	---	---
P-30	Mudstone	N.S.	1.6	---	---
P-29	Mudstone	N.S.	1.3	---	---
P-28	Mudstone, calcareous	N.S.	2.7	---	---
P-27	Mudstone, phosphatic	7246-RAS	3.5	14.1	35.7
P-26	Phosphate rock, argillaceous	7245-RAS	.7	27.9	18.2
P-25	Phosphate rock	7244-RAS	.7	32.5	7.1

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P-24	Mudstone, carbonatic	7243-RAS	1.2	3.2	60.7
P-23	Carbonate rock, argillaceous	7242-RAS	1.0	.5	35.7
P-22	Mudstone	7241-RAS	.6	2.6	80.2
P-21	Phosphate rock, argillaceous	7240-LDC	3.5	17.3	40.6
P-20	Phosphate rock, argillaceous	7239-LDC	1.8	22.7	28.6
P-19	Mudstone, phosphatic and mudstone	7238-LDC	.7	21.3	34.7
P-18	Dolomite, argillaceous	7237-LDC	2.5	3.6	23.9
P-17	Mudstone and phosphatic rock	7236-LDC	.6	15.2	50.3
P-16	Phosphate rock	7235-LDC	.7	33.5	8.2
P-15	Phosphate rock	7234-LDC	.7	32.3	5.1
P-14	Phosphate rock, argillaceous	7233-LDC	.6	26.8	18.6
P-13	Phosphate rock	7232-LDC	1.0	28.7	9.6
P-12	Mudstone and phosphatic mudstone	7231-LDC	1.5	14.7	41.6
P-11	Mudstone	7230-LDC	.8	6.3	55.7
P-10	Carbonate rock, argillaceous	7229-LDC	2.7	2.3	39.8
P- 9	Phosphate rock	7228-LDC	1.7	29.9	17.7
P- 8	Mudstone	7227-LDC	.6	4.2	68.7
P- 7	Mudstone	7226-LDC	1.3	.5	77.3
P- 6	Mudstone	7225-LDC	.3	4.1	73.6
P- 5	Mudstone	7224-LDC	1.0	3.0	78.3
P- 4	Mudstone, carbonatic	7223-LDC	1.7	4.7	55.7
P- 3	Phosphate rock	7221-LDC	.7	31.0	10.3
P- 2	Phosphate rock	7220-LDC	.8	30.5	18.1
P- 1	Phosphate rock, argillaceous	7219-LDC	1.1	16.7	34.4
--	Phosphate rock, argillaceous	7263-LDC	(1.9)	26.2	28.7

Note: Sample 7263 represents beds P-1 and P-2, but taken in road cut below measured section.

Total thickness of Phosphatic shale member 65.8

Wells formation--top part only

Cw- 1	Dolomite	N.S.	0.7	--	--
Cw- 2	Chert and carbonate rock	N.S.	8.0	--	--
Cw- 3	Carbonate rock	N.S.	.9	--	--
Cw- 4	Phosphate rock, argillaceous	7262-LDC	.3	22.2	20.5
Cw- 5	Carbonate rock	N.S.	3.0	--	--
Cw- 6	Mudstone	N.S.	1.0	--	--
Cw- 7	Carbonate rock	N.S.	5.0	--	--
Cw- 8	Mudstone	N.S.	3.0	--	--
Cw- 9	Phosphate rock, argillaceous	7261-LDC	.3	21.3	42.3
Cw-10	Covered interval	N.S.	7.0	--	--
Cw-11	Carbonate rock	N.S.	.2	--	--
Cw-12	Sandstone	N.S.	1.7	--	--
Cw-13	Mudstone	N.S.	1.7	--	--
Cw-14	Sandstone	N.S.	1.0	--	--

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
Cw-15	Sandstone	N.S.	1.5	--	--
Total thickness of Wells formation measured			<u>35.3</u>		

WEST BRANCH OF HAMS FORK CREEK, WYO., LOT 1383

Partial section of the Upper shale member of the Phosphoria formation measured and sampled in a hand trench on the West Branch of Hams Fork Creek, at the mouth of Rock Creek, sec. 24, T. 26 N., R. 117 W., Lincoln County, Wyo. Beds strike N. 35° E. and dip 25° S. Section measured by T. M. Cheney and sampled by T. K. Rigby in August 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
<u>Dinwoody formation - basal bed only</u>					
Trd- 1	Siltstone	N.S.	3.0+	--	--
<u>Upper shale member of Phosphoria formation - partial section</u>					
U- 8	Mudstone, phosphatic	7283-TMC	1.2	16.0	43.1
U- 7	Mudstone	7282-TMC	.5	5.7	62.9
U- 6	Mudstone, phosphatic	7281-TMC	.8	13.7	55.4
U- 5	Siltstone, cherty	7280-TMC	1.3	2.9	85.9
U- 4	Siltstone, cherty	7279-TMC	2.1	1.7	87.4
U- 3	Siltstone, cherty and mudstone	7278-TMC	1.6	1.4	89.1
U- 2	Chert	7277-TMC	2.6	1.6	85.5
U- 1	Mudstone	N.S.	1.0+	--	--

Note: Beds below not measured.

Total thickness of Upper shale member measured 11.1+

WHEAT CREEK, WYO., LOT 1378

Phosphoria formation measured and phosphatic portions sampled in bulldozer trench on west limb of anticline near the head of Wheat Creek, sec. 4, R. 116 W., T. 23 N., Lincoln County, Wyo. Beds strike north and dip 60° W. Section measured and sampled by E. R. Cressman, L. D. Carswell, R. A. Smart, and R. P. Sheldon in June 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
<u>E(?) member of Phosphoria formation</u>					
E- 6	Chert	N.S.	18.0	---	---
E- 5	Mudstone, phosphatic	N.S.	.3	---	---
E- 4	Chert	N.S.	8.5	---	---
E- 3	Mudstone, phosphatic	N.S.	.5	---	---
E- 2	Chert	N.S.	4.6	---	---
E- 1	Chert	N.S.	2.9	---	---
Total thickness of E(?) member			<u>34.8</u>		
<u>Upper shale member of Phosphoria formation</u>					
U- 8	Mudstone	N.S.	1.2	---	---
U- 7	Phosphate rock, argillaceous	7082-RAS	1.7	22.7	25.1
U- 6	Mudstone	N.S.	3.6	---	---
U- 5	Mudstone	N.S.	9.6	---	---
U- 4	Mudstone	N.S.	3.2	---	---
U- 3	Mudstone	N.S.	1.1	---	---
U- 2	Mudstone	N.S.	.7	---	---
U- 1	Phosphate rock, argillaceous	7081-RAS	1.1	25.1	15.6
Total thickness of Upper shale member			<u>22.2</u>		
<u>Rex chert member of Phosphoria formation</u>					
R-22	Limestone, argillaceous	N.S.	8.4	---	---
R-21	Covered interval	N.S.	112.5	---	---
R-20	Carbonate rock, sandy	N.S.	10.0	---	---
R-19	Chert	N.S.	9.0	---	---
R-18	Dolomite	N.S.	1.3	---	---
R-17	Chert and phosphate rock	N.S.	.6	---	---
R-16	Dolomite	N.S.	4.0	---	---
R-15	Phosphate rock	7080-RPS	.5	32.5	2.7
R-14	Dolomite	N.S.	2.5	---	---
R-13	Phosphate rock	7079-RPS	.3	31.0	4.7
R-12	Dolomite	N.S.	2.6	---	---
R-11	Phosphate rock	7078-RPS	1.5	29.3	3.7
R-10	Dolomite	N.S.	1.5	---	---
R- 9	Phosphate rock	7077-RPS	.5	26.9	12.5
R- 8	Dolomite	N.S.	1.0	---	---

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
R- 7	Phosphate rock	7076-RPS	1.0	27.7	15.2
R- 6	Carbonate rock, argillaceous	7075-RPS	2.0	1.9	28.6
R- 5	Sandstone, carbonatic and sandy carbonate rock	N.S.	13.5	---	---
R- 4	Chert	N.S.	1.5	---	---
R- 3	Carbonate rock, sandy	N.S.	9.0	---	---
R- 2	Chert	N.S.	8.0	---	---
R- 1	Chert	N.S.	13.0	---	---

Total thickness of Rex chert member 204.2

Phosphatic shale member of Phosphoria formation

P-34	Phosphate rock, cherty	7074-ERC	0.7	17.4	36.8
P-33	Siltstone	7073-ERC	1.3	1.5	80.9
P-32	Carbonate rock, silty	7072-ERC	1.2	.4	36.3
P-31	Mudstone and phosphate rock	7071-ERC	2.9	10.9	51.4
P-30	Mudstone, carbonatic and phosphate rock	7070-ERC	1.1	11.4	37.6
P-29	Dolomite	7069-ERC	2.3	1.3	10.9
P-28	Mudstone	7068-ERC	2.5	2.2	72.8
P-27	Carbonate rock, argillaceous	7067-ERC	2.1	.5	35.9
P-26	Mudstone	7066-ERC	1.9	5.8	67.5
P-25	Carbonate rock, argillaceous	7065-ERC	4.1	.3	37.2
P-24	Mudstone	7064-ERC	2.3	.6	85.4
P-23	Mudstone, carbonatic	7063-ERC	3.8	5.8	39.6
P-22	Carbonate rock, cherty and argillaceous carbonate rock	7062-ERC	1.9	2.8	24.6
P-21	Mudstone, phosphatic	7061-ERC	1.0	12.2	41.1
P-20	Dolomite, argillaceous	7060-ERC	.5	1.4	26.4
P-19	Carbonate rock, argillaceous phosphatic	7059-ERC	3.4	9.1	27.6
P-18	Phosphate rock and argillaceous carbonate rock	7058-ERC	2.2	16.9	15.9
P-17	Carbonate rock, argillaceous	7057-ERC	2.5	1.0	38.4
P-16	Mudstone	7056-ERC	2.5	7.6	51.5
P-15	Mudstone, phosphatic, carbonatic	7055-ERC	1.4	11.5	24.1
P-14	Mudstone, phosphatic, carbonatic	7054-ERC	1.5	8.2	42.4
P-13	Phosphate rock, argillaceous	7053-ERC	2.5	15.3	28.7
P-12	Phosphate rock, argillaceous	7052-ERC	1.7	26.3	15.6
P-11	Phosphate rock, argillaceous	7051-ERC	1.8	16.2	29.4
P-10	Phosphate rock, argillaceous	7050-ERC	.6	22.4	24.8
P- 9	Dolomite	7049-ERC	3.2	4.5	12.5
P- 8	Phosphate rock, argillaceous	7048-ERC	.5	20.4	30.7
P- 7	Mudstone, phosphatic	7047-ERC	.5	7.9	59.1
P- 6	Phosphate rock	7046-ERC	1.4	34.0	2.6
P- 5	Phosphate rock	7045-ERC	.6	27.7	16.5

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P- 4	Phosphate rock, silty	7044-ERC	.8	17.3	34.2
P- 3	Siltstone	7043-ERC	1.8	2.0	66.7
P- 2	Mudstone, phosphatic	7042-ERC	.5	13.2	40.8
P- 1	Phosphate rock, argillaceous, carbonatic	7041-LDC	1.4	25.5	14.9

Total thickness of phosphatic shale member 60.4

Wells formation--upper part only

Cw- 1	Limestone	N.S.	3.7	---	---
Cw- 2	Limestone	N.S.	2.6	---	---
Cw- 3	Mudstone, dolomitic	N.S.	.8	---	---
Cw- 4	Mudstone, sandy	N.S.	2.7	---	---
Cw- 5	Sandstone	N.S.	4.9		
Cw- 6	Siltstone	N.S.	2.1	---	---
Cw- 7	Mudstone, silty	N.S.	3.6	---	---
Cw- 8	Mudstone	N.S.	4.6	---	---
Cw- 9	Mudstone, dolomitic	N.S.	1.1	---	---
Cw-10	Mudstone	N.S.	2.0	---	---
Cw-11	Mudstone, phosphatic	7040-RAS	.4	8.4	57.5
Cw-12	Mudstone	N.S.	.3	---	---
Cw-13	Dolomite, argillaceous	N.S.	2.1	---	---
Cw-14	Mudstone	N.S.	1.7	---	---
Cw-15	Mudstone	N.S.	1.5	---	---
Cw-16	Mudstone, phosphatic, carbonatic	7039-RAS	.6	8.2	42.7
Cw-17	Chert	N.S.	1.2	---	---
Cw-18	Mudstone	N.S.	3.2	---	---
Cw-19	Mudstone	7038-RAS	.5	7.2	57.5
Cw-20	Dolomite	N.S.	1.2	---	---
Cw-21	Mudstone	N.S.	.8	---	---
Cw-22	Dolomite	N.S.	.9	---	---
Cw-23	Dolomite, argillaceous	N.S.	1.1	---	---
Cw-24	Mudstone	N.S.	.4	---	---
Cw-25	Mudstone, carbonatic	7037-RAS	.3	4.5	46.9
Cw-26	Limestone, argillaceous	N.S.	2.2	---	---
Cw-27	Sandstone, dolomitic	N.S.	3.0	---	---
Cw-28	Sandstone, argillaceous	N.S.	4.6	---	---
Cw-29	Dolomite, argillaceous and chert	N.S.	.7	---	---
Cw-30	Chert, argillaceous	N.S.	1.5	---	---
Cw-31	Chert	N.S.	.7	---	---
Cw-32	Dolomite	N.S.	4.6	---	---
Cw-33	Dolomite, cherty	N.S.	2.7	---	---

Total thickness of Wells formation measured 64.3

SOUTH MOUNTAIN PIT AND MINE, WYO., LOT 1382

Partial section of the Phosphoria formation measured and some phosphatic portions sampled in exposure in open pit mine and in mine raise on South Mountain, sec. 8 and 9, T. 23 N., R. 116 W., Lincoln County, Wyo., 13 miles northwest of Kemmerer. Beds strike north and dip moderately to the west. Section measured by R. A. Smart and L. D. Carswell and sampled by T. K. Rigby in July 1952. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
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Rex chert member of Phosphoria formation - partial section

R-22	Mudstone	N.S.	0.8	---	---
R-21	Carbonate rock	N.S.	30.0	---	---
R-20	Carbonate rock	N.S.	60.0	---	---
R-19	Mudstone, calcareous	N.S.	7.5	---	---
R-18	Carbonate rock	N.S.	3.0	---	---
R-17	Carbonate rock	N.S.	10.0	---	---
R-16	Carbonate rock, cherty	N.S.	18.0	---	---
R-15	Mudstone, phosphatic	N.S.	1.8	---	---
R-14	Mudstone	N.S.	.9	---	---
R-13	Mudstone, phosphatic	N.S.	.5	---	---
R-12	Mudstone	N.S.	.9	---	---
R-11	Phosphate rock	N.S.	1.4	---	---
R-10	Mudstone	N.S.	1.0	---	---
R- 9	Carbonate rock	N.S.	11.7	---	---
R- 8	Carbonate rock	N.S.	.6	---	---
R- 7	Carbonate rock, siliceous	N.S.	5.0	---	---
R- 6	Carbonate rock, argillaceous	N.S.	8.0	---	---
R- 5	Carbonate rock, cherty	N.S.	6.0	---	---
R- 4	Chert	N.S.	7.5	---	---
R- 3	Mudstone and chert	N.S.	1.9	---	---
R- 2	Chert	N.S.	3.0	---	---
R- 1	Chert	N.S.	8.0	---	---

Total thickness of Rex chert member measured	187.5
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Phosphatic shale member of Phosphoria formation

Note: Samples 7158-RAS through 7133-LDC taken in open pit.

P-27	Phosphate rock, argillaceous	7157-RAS	1.8	22.6	31.7
P-26	Mudstone, carbonatic	7156-RAS	3.3	.6	50.6
P-25	Mudstone	7155-RAS	.8	4.5	69.8
P-24	Phosphate rock	7154-RAS	.5	27.3	11.1
P-23	Mudstone, carbonatic	7153-RAS	.8	3.2	60.5

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P-22	Mudstone, carbonatic and phosphate rock	7152-RAS	2.0	13.6	33.3
P-21	Mudstone, carbonatic	7151-RAS	1.3	7.6	38.3
P-20	Carbonate rock	7150-RAS	1.6	1.2	8.0
P-19	Mudstone	7149-RAS	.8	1.5	71.8
P-18	Mudstone, carbonatic	7148-RAS	.5	.4	59.7
P-17	Mudstone	7147-RAS	2.1	3.0	66.9
P-16	Carbonate rock, argillaceous	7146-RAS	1.6	2.2	37.2
P-15	Mudstone	7145-RAS	1.2	3.4	75.6
P-14	Mudstone	7144-RAS	1.1	3.8	65.6
P-13	Mudstone	7143-RAS	2.9	1.1	84.1
P-12	Mudstone	7142-RAS	2.6	.7	86.5
P-11	Mudstone, carbonatic	7141-RAS	.7	2.3	51.2
P-10	Carbonate rock, argillaceous	7140-RAS	3.2	5.5	33.7
P- 9	Mudstone, carbonatic	7139-LDC	3.4	5.3	46.4
P- 8	Carbonate rock, argillaceous	7138-LDC	3.0	7.5	25.5
P- 7	Phosphate rock, carbonatic	7137-LDC	1.9	21.5	10.4
P- 6	Phosphate rock, argillaceous, carbonatic	7136-LDC	1.0	13.9	27.3
P- 5	Carbonate rock, argillaceous	7135-LDC	3.0	1.5	30.7
P- 4	Mudstone, phosphatic, carbonatic	7134-LDC	2.2	10.2	42.9
P- 3	Carbonate rock, argillaceous, phosphatic	7133-LDC	3.9	8.6	28.7
P- 2	Carbonate rock, argillaceous, phosphatic	7158-LDC	4.2	11.6	18.8
---	Covered interval	N.S.	5-10	---	---
Note: Sample 7159-RAS taken in mine.					
P- 1	Phosphate rock, argillaceous	7159-RAS	2.7	20.7	22.7
Total thickness of Phosphatic shale member			<u>61.6±</u>		

LITTLE WATER CANYON, MONT., LOT 1341

B, and D members of Phosphoria formation sampled in two bulldozer trenches and C member measured from natural exposures near the head of Little Water Canyon between Timber Butte and Dixon Mountain on the north limb of a synclinal structure, SE $\frac{1}{4}$ sec. 4, T. 13 S., R. 10 W., Beaverhead County, Mont. Most beds strike N. 50° W. and dip 45-50° SW. but faulted segment of E member is nearly horizontal. Section measured and sampled by R. F. Gosman, R. G. Waring, T. M. Cheney, and F. D. Frieske in September 1950. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P_2O_5	ACID INSOLUBLE
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E member of Phosphoria formation--lower part (?) only

E- 2	Chert and mudstone	--	7.4	--	--
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Note: Fault of unknown displacement.

E- 1	Mudstone and chert	--	13.8	--	--
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Note: Probable fault between D and E members, strata sheared and bedding indistinct.

D member of Phosphoria formation

D-25	Mudstone, carbonatic	5364-TMC	2.6	4.1	53.8
D-24	Mudstone, carbonatic	5363-TMC	2.4	4.5	49.2
D-23	Mudstone, carbonatic	5362-TMC	2.4	5.5	47.4
D-22	Mudstone, phosphatic	5361-TMC	.9	8.3	51.9
D-21	Mudstone, carbonatic	5360-TMC	2.2	6.1	51.7
D-20	Mudstone	5359-TMC	1.5	6.1	52.4
D-19	Mudstone, phosphatic, carbonatic	5358-RGW	1.1	10.4	39.7
D-18	Phosphate rock, argillaceous	5357-RGW	1.2	21.9	24.0
D-17	Phosphate rock, argillaceous	5356-RGW	1.5	19.5	29.9
D-16	Phosphate rock	5355-RGW	.8	31.5	5.0
D-15	Mudstone, carbonatic	5354-RGW	.6	4.1	53.8
D-14	Mudstone, carbonatic and phosphatic mudstone	5353-RGW	.6	4.5	49.2
D-13	Mudstone, carbonatic	5352-RGW	.8	5.5	47.4
D-12	Mudstone, phosphatic	5351-RGW	1.4	13.3	40.3
D-11	Phosphate rock and mudstone	5350-RGW	1.9	22.7	19.9
D-10	Mudstone	5349-RGW	1.6	3.8	68.5
D- 9	Mudstone, phosphatic	5348-RFG	1.5	13.9	41.3
D- 8	Phosphate rock, argillaceous	5347-RFG	1.8	21.1	24.6
D- 7	Mudstone and phosphatic mudstone	5346-RFG	1.2	10.2	52.6
D- 6	Mudstone and phosphatic mudstone	5345-RGW	.9	10.4	51.8
D- 5	Mudstone, phosphatic	5344-RGW	1.8	13.5	41.0
D- 4	Mudstone	5343-RGW	1.3	5.2	56.1
D- 3	Mudstone, phosphatic	5342-RGW	.9	9.2	55.5
D- 2	Sandstone, phosphatic	5341-RGW	1.9	11.1	58.2

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
D- 1	Sandstone	5340-RGW	.9	6.4	64.1
Total thickness of D member			<u>35.7</u>		
<u>C member of Phosphoria formation</u>					
C- 8	Carbonate rock	N.S.	2.9	---	---
C- 7	Covered interval	N.S.	21.	---	---
C- 6	Carbonate rock, cherty	N.S.	23.5	---	---
C- 5	Covered interval	N.S.	10.	---	---
C- 4	Sandstone, calcareous	N.S.	14.2	---	---
C- 3	Carbonate rock	N.S.	2.8	---	---
C- 2	Sandstone, calcareous	N.S.	24.8	---	---
C- 1	Chert	N.S.	20.0	---	---
Total thickness of C member			<u>119.2</u>		
<u>B member of Phosphoria formation</u>					
B-21	Phosphate rock, sandy	5373-TMC	0.2	18.2	45.6
B-20	Carbonate rock and carbonatic chert	N.S.	.9	---	---
B-19	Chert, carbonatic	N.S.	1.6	---	---
B-18	Chert	N.S.	14.2	---	---
B-17	Mudstone	N.S.	3.4	---	---
B-16	Mudstone, cherty and chert	N.S.	2.0	---	---
B-15	Mudstone	N.S.	4.6	---	---
B-14	Chert	N.S.	1.4	---	---
B-13	Mudstone	N.S.	.6	---	---
B-12	Chert	N.S.	.6	---	---
B-11	Mudstone	N.S.	2.3	---	---
B-10	Mudstone, calcareous	N.S.	1.0	---	---
B- 9	Mudstone	N.S.	1.5	---	---
B- 8	Mudstone and phosphate rock	5372-RGW	2.1	14.2	43.0
B- 7	Phosphate rock	5371-RGW	.8	24.2	12.8
B- 6	Mudstone, phosphatic and mudstone	5370-RGW	1.6	17.0	28.2
B- 5	Carbonate rock	5369-RGW	2.6	7.0	17.3
B- 4	Mudstone, phosphatic	5368-RGW	2.3	12.7	40.2
B- 3	Phosphate rock and mudstone	5367-RGW	.8	20.2	22.2
B- 2	Phosphate rock, argillaceous	5366-RGW	1.1	19.5	29.9
B- 1	Phosphate rock	5365-RGW	1.5	31.5	5.0
Total thickness of B member			<u>47.1</u>		
<u>A member of Phosphoria formation--top bed only</u>					
A- 1	Carbonate rock	N.S.	5.6	---	---

GRAVEL CREEK DIVIDE, IDAHO, LOT 1308

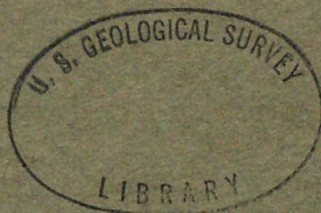
Phosphatic shale member of Phosphoria formation measured and sampled in a trench on south limb of Gray anticline on Gravel Creek Divide, sec. 34, T. 5 S., R. 43 E., Caribou County, Idaho. Beds strike N. 50° W. and dip 45° S. Section measured by R. G. Waring, H. W. Peirce, and R. A. Smart and sampled by Peirce and M. A. Warner in August 1949. Samples analyzed by U. S. Bureau of Mines laboratory, Albany, Oreg.

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
<u>Rex chert member of Phosphoria formation--basal bed only</u>					
R- 1	Chert and mudstone	N.S.	1.7	---	---
<u>Phosphatic shale member of Phosphoria formation</u>					
P-74	Mudstone	5849-RGW	1.1	2.0	72.7
P-73	Mudstone	5848-RGW	.8	1.4	74.4
P-72	Mudstone	5847-RGW	1.8	.4	78.5
P-71	Mudstone	5846-RGW	1.8	.1	81.3
P-70	Mudstone	5844-RGW	2.3	2.1	72.1
---	Mudstone lens in bed P-70	5845-RGW	(1.3)	.4	78.9
P-69	Mudstone	5843-RGW	1.8	5.5	64.6
P-68	Mudstone	5842-RGW	1.2	6.5	59.5
P-67	Mudstone	5841-RGW	1.7	1.1	81.4
P-66	Mudstone	5840-RGW	.5	2.7	66.4
P-65	Mudstone and chert	5839-RGW	1.1	2.2	84.4
P-64	Chert	5838-RGW	1.3	2.1	89.6
P-63	Phosphate rock, cherty	5837-RGW	.6	25.7	29.8
P-62	Mudstone	5821-HWP	.9	4.7	72.2
P-61	Mudstone	5820-HWP	1.3	1.3	81.6
P-60	Mudstone	5819-HWP	.7	1.3	79.2
P-59	Phosphate rock	5818-HWP	1.1	36.8	4.5
P-58	Phosphate rock	5817-HWP	.8	35.2	8.7
P-57	Phosphate rock	5816-HWP	1.0	36.6	4.3
P-56	Phosphate rock	5815-HWP	1.3	34.0	10.3
P-55	Phosphate rock	5814-HWP	1.0	37.2	2.3
P-54	Phosphate rock	5813-HWP	2.0	32.0	9.0
P-53	Phosphate rock, argillaceous	5812-HWP	1.5	28.2	16.7
P-52	Mudstone, phosphatic	5811-HWP	1.5	9.6	57.7
P-51	Carbonate rock	5810-HWP	1.4	.6	12.0
P-50	Phosphate rock, argillaceous	5870-RAS	1.3	16.8	39.2
P-49	Phosphate rock, argillaceous	5869-RAS	1.3	16.4	41.3
P-48	Mudstone	5868-RAS	1.4	6.7	64.7
P-47	Mudstone, phosphatic	5867-RAS	1.7	14.1	46.5
P-46	Phosphate rock, argillaceous	5866-RAS	1.4	19.3	36.6
P-45	Carbonate rock, argillaceous	5865-RAS	1.4	2.8	31.8
P-44	Mudstone	5864-RAS	.9	6.4	71.2

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P-43	Mudstone, phosphatic	5863-RAS	2.1	12.1	54.4
P-42	Mudstone, phosphatic	5862-RAS	1.0	8.9	64.3
P-41	Mudstone	5861-RAS	1.8	—	—
P-40	Carbonate rock, argillaceous	5860-RAS	.8	1.2	39.2
P-39	Mudstone, phosphatic	5859-RAS	.9	13.3	41.8
P-38	Phosphate rock, argillaceous	5858-RAS	1.0	17.1	32.5
P-37	Mudstone, carbonatic	5857-RAS	.8	5.4	43.5
P-36	Phosphate rock, argillaceous, carbonatic	5856-RAS	1.6	16.6	23.2
P-35	Phosphate rock, argillaceous	5855-RAS	1.5	17.5	28.8
P-34	Mudstone	5854-RAS	1.7	2.2	70.9
P-33	Phosphate rock, argillaceous	5853-RAS	1.3	17.6	34.0
P-32	Mudstone, phosphatic and phosphate rock	5852-RAS	1.1	20.5	26.8
P-31	Carbonate rock, argillaceous	5851-RAS	1.0	4.5	24.1
P-30	Phosphate rock, argillaceous	5809-HWP	.9	20.5	22.8
P-29	Phosphate rock, argillaceous	5808-HWP	.8	17.0	38.2
P-28	Carbonate rock	5807-HWP	1.7	1.3	6.4
P-27	Carbonate rock	5806-HWP	3.0	1.4	6.7
P-26	Mudstone, phosphatic	5805-HWP	2.5	8.1	62.4
P-25	Phosphate rock, argillaceous	5804-HWP	1.0	26.1	18.9
P-24	Mudstone, carbonatic	5803-HWP	1.0	2.8	48.0
P-23	Phosphate rock	5802-HWP	3.0	28.1	13.2
P-22	Phosphate rock, argillaceous and mudstone	5801-HWP	1.9	18.7	29.7
P-21	Phosphate rock	5836-RGW	2.0	27.1	14.7
P-20	Phosphate rock, argillaceous	5835-RGW	2.4	24.7	18.3
P-19	Phosphate rock, argillaceous	5834-RGW	1.9	16.6	35.9
P-18	Phosphate rock, argillaceous	5833-RGW	1.4	16.3	36.3
P-17	Phosphate rock, argillaceous, carbonatic	5832-RGW	.9	13.8	17.4
P-16	Phosphate rock, argillaceous	5831-RGW	2.0	16.9	37.4
—	Carbonate rock lens in bed P-16	5830-RGW	(1.5)	6.4	10.4
P-15	Mudstone, phosphatic	5829-RGW	2.1	12.9	39.9
P-14	Phosphate rock	5828-RGW	.8	34.9	2.6
P-13	Phosphate rock, argillaceous	5827-RGW	1.6	27.6	15.8
P-12	Carbonate rock, argillaceous	5826-RGW	2.1	2.1	22.1
P-11	Phosphate rock, argillaceous	5889-HWP	2.8	19.5	32.4
P-10	Mudstone, phosphatic	5888-HWP	1.2	16.8	43.2
P- 9	Carbonate rock, argillaceous	5887-HWP	1.6	5.8	24.2
P- 8	Phosphate rock	5886-HWP	3.0	28.8	12.8
P- 7	Phosphate rock	5885-HWP	2.4	33.6	5.3
P- 6	Phosphate rock, argillaceous	5881-HWP	.7	27.7	18.2
P- 5	Phosphate rock	5880-MAW	1.7	35.2	2.1
P- 4	Phosphate rock	5879-MAW	1.7	33.8	3.6

BED NO.	ROCK DESCRIPTION	SAMPLE NO.	THICKNESS (FEET)	P ₂ O ₅	ACID INSOLUBLE
P- 3	Phosphate rock	5878-MAW	2.4	30.6	10.4
P- 2	Carbonate rock, argillaceous	5877-MAW	4.8	.8	32.8
P- 1	Phosphate rock	5876-MAW	.4	34.5	4.7
Total thickness of phosphatic shale member			<u>112.2</u>		





PAMPHLET BINDERS

This is No. 1529

also carried in stock in the following sizes

	HIGH		WIDE	THICKNESS		HIGH		WIDE	THICKNESS
	inches		inches	$\frac{1}{2}$ inch		inches		inches	$\frac{1}{2}$ inch
1523	9	"	7	"	1529	12	"	10	"
1524	10	"	7	"	1530	12	"	9 $\frac{1}{2}$	"
1525	9	"	6	"	1532	13	"	10	"
1526	9 $\frac{1}{2}$	"	7 $\frac{1}{2}$	"	1533	14	"	11	"
1527	10 $\frac{1}{2}$	"	7 $\frac{1}{2}$	"	1534	16	"	12	"
1528	11	"	8	"					

Other sizes made to order.

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