

GEOLOGICAL SURVEY CIRCULAR 325



STRATIGRAPHIC SECTIONS
OF THE PHOSPHORIA
FORMATION IN WYOMING
1952

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UNITED STATES DEPARTMENT OF THE INTERIOR

Douglas McKay, Secretary

GEOLOGICAL SURVEY

W. E. Wrather, Director

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By R. P. Sheldon, E. R. Cressman, L. D. Carswell, and R. A. Smart

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INTRODUCTION

The U. S. Geological Survey has measured and sampled the Phosphoria formation of Permian age at many localities in Wyoming and adjacent states. The data will not be fully synthesized for many years, but segments of the data, accompanied by little or no interpretation, are published as preliminary reports as they are assembled. This report, which contains abstracts of the sections measured in western Wyoming (fig. 1) during 1952, is the fourth Wyoming report of this series. The field and laboratory procedures adopted in these investigations are described in a previous report (McKelvey and others, 1953a).

Many people have taken part in this investigation. T. M. Cheney participated in the description of strata and the collection of samples referred to in this report and T. K. Rigby assisted in the collection of samples. The laboratory preparation of samples for chemical analysis was done in Denver, Colo., under the direction of L. F. Rader. The chemical analyses were made for the Survey by the U. S. Bureau of Mines at the Northwest Electrodevelopment Laboratory, Albany, Oreg., under the direction of S. M. Shelton and M. L. Wright.

K. S. Bergman compiled most of the data and Anita Wise organized the tabular data.

ACKNOWLEDGMENTS

Special thanks are due J. D. Love, W. W. Rubey, and J. Steele Williams, who contributed much in the way of advice and suggestions in planning and organization of the field program: The cost of both the field and laboratory investigations has been borne partly by the Division of Raw Materials of the Atomic Energy Commission. It is a pleasure to acknowledge the fine cooperation extended to the field parties by the local residents, property owners, and phosphate companies, who furnished information and services and gave access to property.

STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN WESTERN WYOMING

In northwestern Wyoming the Phosphoria formation is about 200 feet thick and has been divided into five members. These members have been tentatively correlated with the five members in Montana that are designated the A, B, C, D, and E, from oldest to youngest (Klepper and others in McKelvey, 1949). Member A, overlies the Tensleep sandstone of Pennsylvanian age and consists of cherty carbonate and detrital rocks; it may be equivalent to the upper part of the Wells formation in Idaho. Members B, C, and D, composed respectively of phosphatic, cherty,

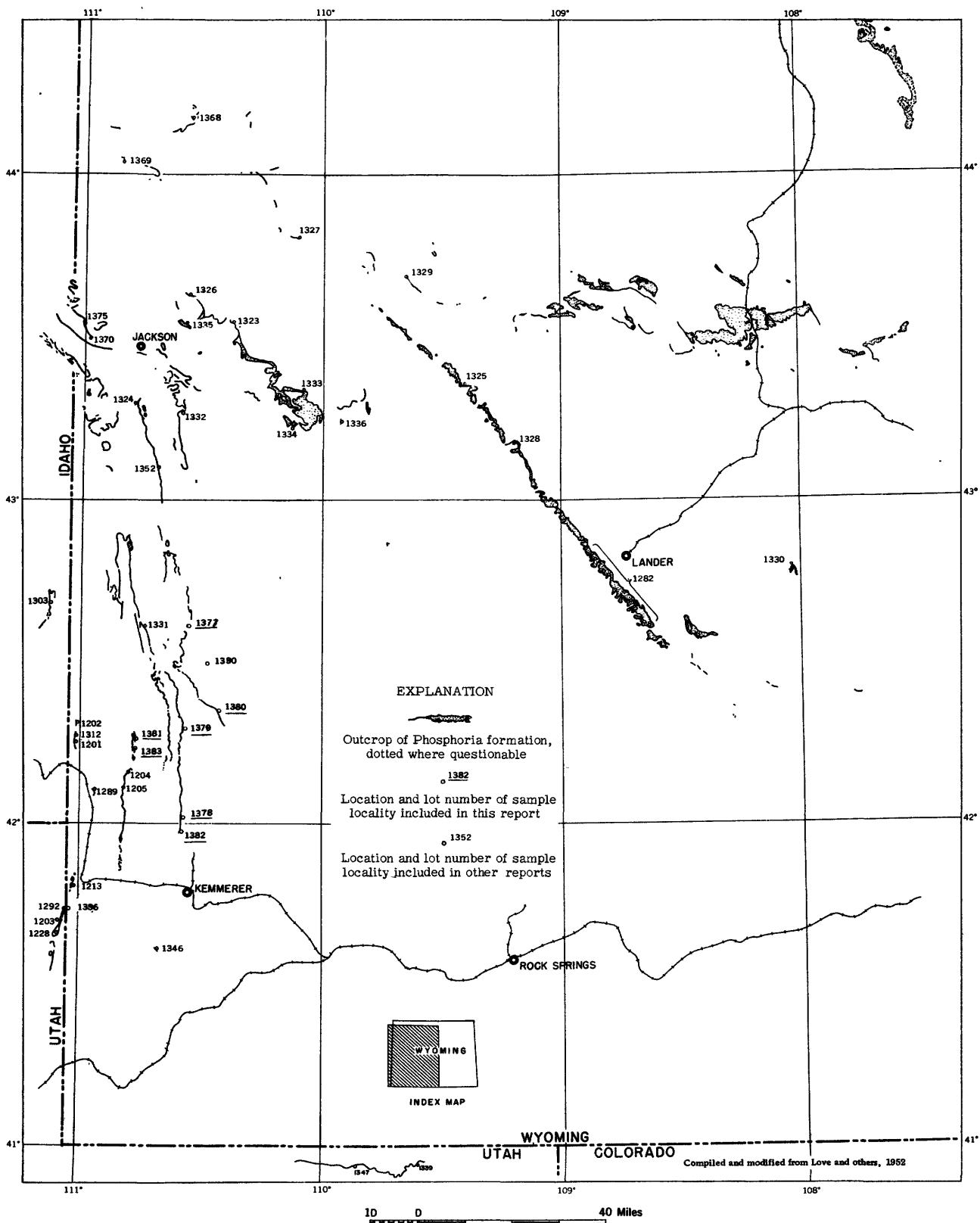


Figure 1. Outcrops of the Phosphoria formation in Wyoming and localities sampled.

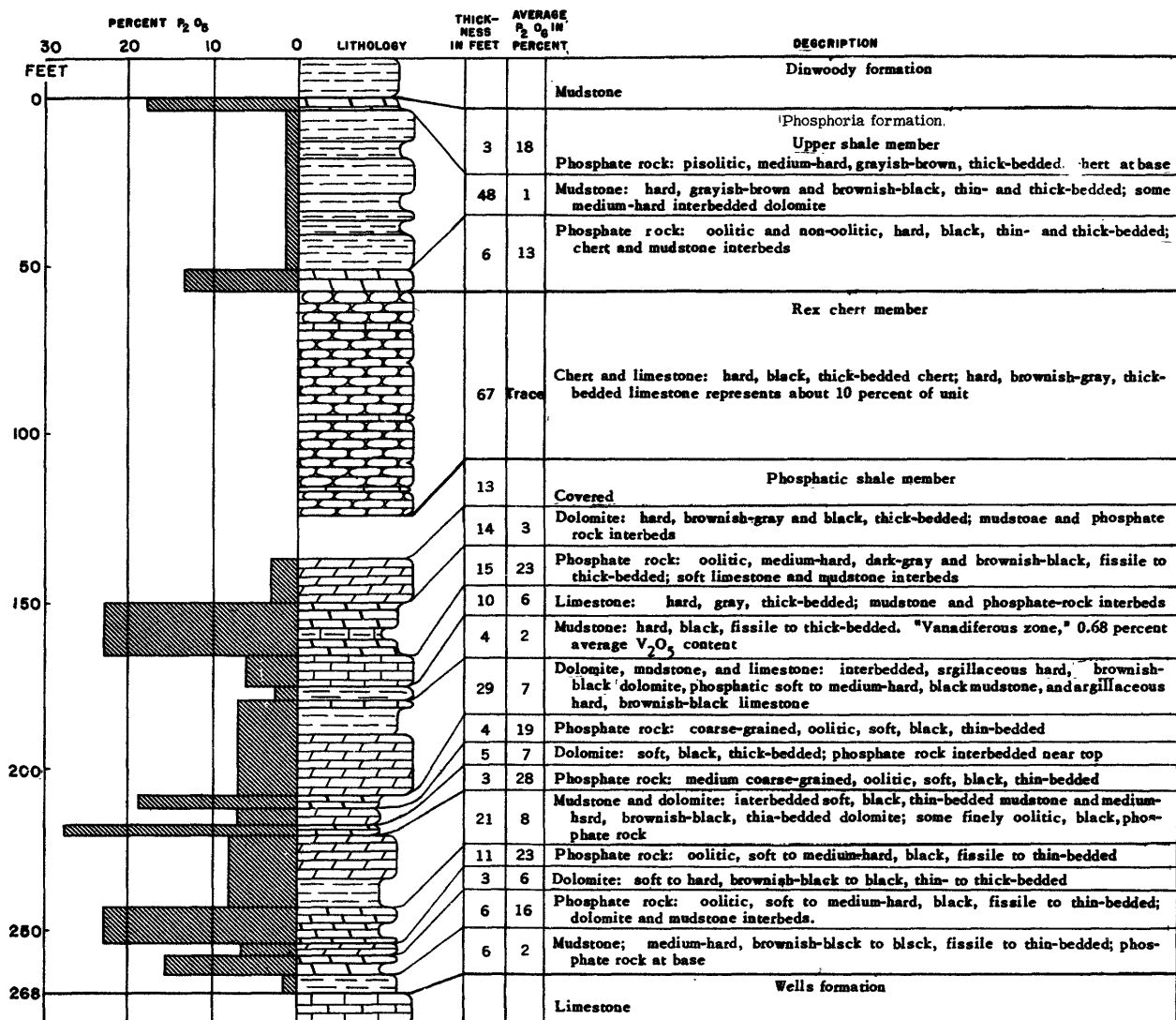


Figure 2. Generalized section of the Phosphoria formation at Coal Canyon, Wyoming (lot no. 1201).

and phosphatic rocks, are equivalent to the phosphatic shale member, the Rex chert member, and the upper shale member of the Phosphoria formation in Idaho and southwestern Wyoming (Sheldon in Swanson and others, 1953). Member E, not yet recognized in southeastern Idaho, consists of chert, sandstone, and carbonate rock and is overlain by the Dinwoody formation of Triassic age.

In southwestern Wyoming the Phosphoria formation consists of 3 members: a lower phosphatic shale member, 95-145 feet in thickness; the medial Rex chert member, cherty limestone, 65-145 feet in thickness; and the upper shale member, 15-60 feet in thickness (fig. 2). It overlies the Wells formation of Pennsylvanian age and underlies the Dinwoody formation of Triassic age. Although the Wells formation consists largely of quartzose sandstone, calcareous in part; the upper 25 feet or more is dark-gray limestone and is equivalent to the upper member of the Wells formation in Idaho and may be the correlative of the lowermost member (A member) of the Phosphoria formation in northwestern Wyoming and Montana and, according to McKelvey, the lower limestone member of the Park City formation in Utah. The Dinwoody formation consists of limestone, calcareous siltstone, and sandstone.

The correlation of individual beds of the phosphatic shale members with those in adjacent parts of Idaho, Montana, and Utah will be discussed in greater detail in a later publication. The phosphatic shale member in southwestern Wyoming and its correlative, the B member, in northwestern Wyoming contain most of the phosphate-bearing layers. The upper shale member and its correlative, the D member, contain only thin layers of phosphatic chert and phosphatic layers of local significance.

STRATIGRAPHIC SECTIONS

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

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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, T. 30 N., R. 115 W., 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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|--|--|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Dinwoody formation—basal bed only | | | | | | | |
| Td-1 | Siltstone, carbonatic | -- | 8.0 | -- | -- | 8.0 | -- |
| -- | Covered interval; could be either Dinwoody or E (?) member or partially both | -- | 8.5 | -- | -- | 16.5 | -- |
| E (?) member of Phosphoria formation—top not exposed | | | | | | | |
| E- 1 | Chert | -- | 10.5 | -- | -- | 10.5 | -- |
| Upper shale member of Phosphoria formation | | | | | | | |
| U-12 | Mudstone, cherty | -- | 2.4 | -- | -- | 2.4 | -- |
| U-11 | Mudstone, phosphatic | -- | .5 | -- | -- | 2.9 | -- |
| U-10 | Mudstone, cherty | -- | 3.9 | -- | -- | 6.8 | -- |
| U- 9 | Chert | -- | 3.0 | -- | -- | 9.8 | -- |
| U- 8 | Chert, argillaceous and mudstone | -- | 2.7 | -- | -- | 12.5 | -- |
| U- 7 | Mudstone | -- | 5.4 | -- | -- | 17.9 | -- |
| U- 6 | Mudstone, cherty | -- | 1.1 | -- | -- | 19.0 | -- |
| U- 5 | Mudstone | -- | 3.8 | -- | -- | 22.8 | -- |
| U- 4 | Mudstone and chert | -- | 1.2 | -- | -- | 24.0 | -- |
| U- 3 | Carbonate rock, argillaceous | -- | 1.0 | -- | -- | 25.0 | -- |
| U- 2 | Mudstone | -- | 8.0 | -- | -- | 33.0 | -- |
| U- 1 | Phosphate rock | 7036-RPS | 1.5 | 29.7 | 12.5 | 34.5 | -- |
| Rex chert member of Phosphoria formation | | | | | | | |
| R-32 | Carbonate rock | -- | 2.0 | -- | -- | 2.0 | -- |
| R-31 | Carbonate rock | 7035-RPS | 4.0 | 6.9 | 8.2 | 6.0 | -- |
| R-30 | Carbonate rock | -- | 4.5 | -- | -- | 10.5 | -- |
| R-29 | Carbonate rock and chert | -- | 5.0 | -- | -- | 15.5 | -- |
| R-28 | Carbonate rock and chert | -- | 12.0 | -- | -- | 27.5 | -- |
| R-27 | Carbonate rock | -- | 6.0 | -- | -- | 33.5 | -- |
| R-26 | Carbonate rock and chert | -- | 6.0 | -- | -- | 39.5 | -- |
| R-25 | Carbonate rock | -- | 10.0 | -- | -- | 49.5 | -- |

Middle Piney Lakes—Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P_2O_5 (cumulative) |
|---|---|------------|------------------|-----------------------------|----------------|-----------------------------|---|
| | | | | P_2O_5 | Acid insoluble | | |
| R-24 | Carbonate rock, silty | -- | 8.0 | -- | -- | 57.5 | -- |
| R-23 | Covered interval | -- | 2.0 | -- | -- | 59.5 | -- |
| R-22 | Carbonate rock | -- | 12.0 | -- | -- | 71.5 | -- |
| R-21 | Carbonate rock | -- | 7.0 | -- | -- | 78.5 | -- |
| R-20 | Covered interval | -- | 1.5 | -- | -- | 80.0 | -- |
| R-19 | Sandstone | -- | 15.5 | -- | -- | 95.5 | -- |
| R-18 | Sandstone | -- | 5.8 | -- | -- | 101.3 | -- |
| R-17 | Carbonate rock and chert | -- | 8.5 | -- | -- | 109.8 | -- |
| R-16 | Carbonate rock and chert | -- | 6.5 | -- | -- | 116.3 | -- |
| R-15 | Carbonate rock | -- | 4.8 | -- | -- | 121.1 | -- |
| R-14 | Phosphate rock | -- | .3 | -- | -- | 121.4 | -- |
| R-13 | Chert and sandy carbonate rock | -- | 2.4 | -- | -- | 123.8 | -- |
| R-12 | Carbonate rock, sandy | -- | .8 | -- | -- | 124.6 | -- |
| R-11 | Chert | -- | 3.5 | -- | -- | 128.1 | -- |
| R-10 | Sandstone, cherty | -- | 2.5 | -- | -- | 130.6 | -- |
| R-9 | Sandstone, carbonatic | -- | 2.7 | -- | -- | 133.3 | -- |
| R-8 | Carbonate rock | -- | 1.0 | -- | -- | 134.3 | -- |
| R-7 | Chert | -- | 1.7 | -- | -- | 136.0 | -- |
| R-6 | Carbonate rock and chert | -- | 2.7 | -- | -- | 138.7 | -- |
| R-5 | Carbonate rock, argillaceous | -- | .8 | -- | -- | 139.5 | -- |
| R-4 | Phosphate rock | -- | .1 | -- | -- | 139.6 | -- |
| R-3 | Carbonate rock | -- | .7 | -- | -- | 140.3 | -- |
| R-2 | Chert | -- | 2.7 | -- | -- | 143.0 | -- |
| R-1 | Carbonate rock | -- | .3 | -- | -- | 143.3 | -- |
| Phosphatic shale member of Phosphoria formation | | | | | | | |
| P-35 | Chert | 7034-RPS | 1.7 | 7.2 | 70.6 | 1.7 | 12.24 |
| P-34 | Carbonate rock | 7033-RPS | .3 | 1.6 | 7.7 | 2.0 | 12.72 |
| P-33 | Phosphate rock and phosphatic, calcareous chert | | | | | | |
| P-32 | Mudstone | 7032-RPS | 1.3 | 29.4 | 15.6 | 3.3 | 50.94 |
| P-31 | Phosphate rock | 7031-RPS | 4.0 | 5.3 | 70.8 | 7.3 | 72.14 |
| | | 7030-RPS | .4 | 31.2 | 10.0 | 7.7 | 84.62 |
| P-30 | Mudstone | 7029-RPS | 1.5 | 3.1 | 72.1 | 9.2 | 89.27 |
| P-29 | Phosphate rock, argillaceous | 7028-RPS | .4 | 18.7 | 31.7 | 9.6 | 96.75 |
| P-28 | Mudstone | 7027-RPS | .9 | .6 | 76.1 | 10.5 | 97.29 |
| P-27 | Carbonate rock, argillaceous | 7026-RPS | .4 | .4 | 20.3 | 10.9 | 97.45 |
| P-26 | Mudstone | 7025-RPS | 3.5 | 2.3 | 76.5 | 14.4 | 105.50 |

| | | | | | | | |
|------|--|----------|-----|------|------|------|----------|
| P-25 | Mudstone ----- | 7024-RPS | 3.0 | -- | -- | 17.4 | -- |
| P-24 | Carbonate rock, argillaceous ----- | 7023-RPS | 2.0 | .2 | 23.2 | 19.4 | *0.40 |
| P-23 | Mudstone, carbonatic ----- | 7022-RPS | 2.5 | 1.2 | 63.8 | 21.9 | 3.40 |
| P-22 | Carbonate rock, argillaceous ----- | 7021-RPS | 2.5 | .3 | 35.3 | 24.4 | 4.15 |
| P-21 | Carbonate rock, argillaceous ----- | 7020-RPS | 1.0 | 4.7 | 35.4 | 25.4 | 8.85 |
| P-20 | Mudstone, carbonatic ----- | 7019-RPS | 2.5 | 4.5 | 42.2 | 27.9 | 20.10 |
| P-19 | Carbonate rock and mudstone ----- | 7018-LDC | 2.5 | 1.9 | 27.3 | 30.4 | 24.85 |
| P-18 | Carbonate rock, argillaceous ----- | 7017-LDC | 1.8 | 1.3 | 28.8 | 32.2 | 27.19 |
| P-17 | Carbonate rock, argillaceous ----- | 7016-LDC | 2.0 | .8 | 43.6 | 34.2 | 28.79 |
| P-16 | Mudstone ----- | 7015-LDC | 4.4 | 2.2 | 77.2 | 38.6 | 38.47 |
| P-15 | Mudstone, phosphatic ----- | 7014-LDC | .5 | 8.7 | 51.8 | 39.1 | 42.82 |
| P-14 | Carbonate rock, argillaceous ----- | 7013-LDC | .9 | 2.6 | 22.9 | 40.0 | 45.16 |
| P-13 | Phosphate rock, argillaceous, carbonatic and carbonatic mudstone ----- | 7012-RPS | 1.0 | 11.0 | 26.3 | 41.0 | 56.16 |
| P-12 | Carbonate rock ----- | 7011-RPS | .5 | 1.6 | 9.0 | 41.5 | 56.96 |
| P-11 | Phosphate rock, argillaceous and phosphatic mudstone ----- | 7010-RPS | 1.5 | 22.9 | 17.0 | 43.0 | 91.31 |
| P-10 | Carbonate rock, argillaceous ----- | 7009-RPS | 1.2 | 1.5 | 20.4 | 44.2 | 93.11 |
| P-9 | Carbonate rock, argillaceous and argillaceous phosphate rock ----- | 7008-RPS | 3.0 | 11.6 | 21.8 | 47.2 | 127.91 |
| P-8 | Phosphate rock and phosphatic mudstone ----- | 7007-RPS | 1.4 | 25.1 | 12.6 | 48.6 | 163.05 |
| P-7 | Carbonate rock, argillaceous ----- | 7006-RPS | 4.6 | 2.0 | 28.7 | 53.2 | 172.25 |
| P-6 | Mudstone, carbonatic ----- | 7005-RPS | 2.7 | 4.3 | 40.0 | 55.9 | 183.86 |
| P-5 | Phosphate rock, argillaceous ----- | 7004-RPS | 5.0 | 15.1 | 28.6 | 60.9 | 259.36 |
| P-4 | Carbonate rock ----- | 7003-RPS | .8 | 1.6 | 4.1 | 61.7 | 260.64 |
| P-3 | Phosphate rock and mudstone ----- | 7002-RPS | .4 | 20.0 | 25.1 | 62.1 | 268.64 |
| P-2 | Phosphate rock ----- | 7001-RPS | 1.4 | 34.4 | 4.4 | 63.5 | 316.80 |
| P-1 | Chert, phosphatic ----- | 7000-RPS | .5 | 14.5 | 44.6 | 64.0 | **324.05 |

Wells formation—upper part only

| | | | | | | | |
|-------|-------------------------|----|------|----|----|-------|----|
| Cw-1 | Carbonate rock ----- | -- | 2.1 | -- | -- | 2.1 | -- |
| Cw-2 | Carbonate rock ----- | -- | 5.5 | -- | -- | 7.6 | -- |
| Cw-3 | Carbonate rock ----- | -- | .9 | -- | -- | 8.5 | -- |
| Cw-4 | Sandstone ----- | -- | .5 | -- | -- | 9.0 | -- |
| Cw-5 | Chert, carbonatic ----- | -- | 23.0 | -- | -- | 32.0 | -- |
| Cw-6 | Sandstone ----- | -- | 19.0 | -- | -- | 51.0 | -- |
| Cw-7 | Carbonate rock ----- | -- | 1.5 | -- | -- | 52.5 | -- |
| Cw-8 | Sandstone ----- | -- | 12.3 | -- | -- | 64.8 | -- |
| Cw-9 | Sandstone ----- | -- | 13.1 | -- | -- | 77.9 | -- |
| Cw-10 | Covered interval ----- | -- | 18.0 | -- | -- | 95.9 | -- |
| Cw-11 | Sandstone ----- | -- | 8.3 | -- | -- | 104.2 | -- |

* Cumulative data incomplete because of missing information. Computations start from zero after interruption.

** Note incompleteness of cumulative data.

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 L. 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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|--|------------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Dinwoody formation—not measured | | | | | | | |
| E (?) member of Phosphoria formation | | | | | | | |
| E- 1 | Chert | -- | 20.0 | -- | -- | 20.0 | -- |
| Upper shale member of Phosphoria formation | | | | | | | |
| U-20 | Mudstone, cherty, carbonatic | 7218-TMC | 1.0 | 6.5 | 60.5 | 1.0 | 6.5 |
| U-19 | Phosphate rock, cherty | 7217-TMC | .7 | 11.0 | 57.2 | 1.7 | 14.2 |
| U-18 | Chert, carbonatic | 7216-TMC | 1.0 | 5.9 | 63.6 | 2.7 | 20.1 |
| U-17 | Phosphate rock, carbonatic | 7215-TMC | .5 | 13.2 | 43.4 | 3.2 | 26.7 |
| U-16 | Mudstone, phosphatic | 7214-TMC | 1.2 | 9.5 | 46.3 | 4.4 | 38.1 |
| U-15 | Chert | 7213-RAS | 2.9 | 4.8 | 60.1 | 7.3 | 52.0 |
| U-14 | Mudstone, carbonatic, cherty | 7212-RAS | 1.2 | 4.7 | 39.7 | 8.5 | 57.7 |
| U-13 | Chert, argillaceous | 7211-RAS | 2.1 | 7.3 | 57.2 | 10.6 | 73.0 |
| U-12 | Chert, phosphatic | 7210-RAS | 1.0 | 14.7 | 47.6 | 11.6 | 87.7 |
| U-11 | Mudstone | 7209-RAS | .4 | 2.4 | 80.9 | 12.0 | 88.6 |
| U-10 | Mudstone | 7208-RAS | 2.1 | 2.7 | 77.1 | 14.1 | 94.3 |
| U- 9 | Mudstone | 7207-RAS | 2.0 | 2.4 | 75.7 | 16.1 | 99.1 |
| U- 8 | Mudstone | 7206-RAS | 3.8 | 3.0 | 75.6 | 19.9 | 110.5 |
| U- 7 | Mudstone | 7205-RAS | 6.5 | 2.8 | 69.7 | 26.4 | 128.7 |
| U- 6 | Mudstone | 7204-RAS | 3.1 | 2.4 | 76.9 | 29.5 | 136.2 |
| U- 5 | Mudstone, phosphatic | 7203-RAS | .5 | 10.7 | 53.5 | 30.0 | 141.5 |
| U- 4 | Phosphate rock, argillaceous | 7202-RAS | 1.3 | 28.4 | 16.5 | 31.3 | 178.4 |
| U- 3 | Mudstone, phosphatic | 7201-RAS | 1.1 | 10.0 | 47.7 | 32.4 | 189.4 |
| U- 2 | Phosphate rock | 7200-RAS | .9 | 31.7 | 6.7 | 33.3 | 218.0 |
| U- 1 | Phosphate rock | 7199-RAS | .5 | 25.3 | 14.7 | 33.8 | 230.6 |
| Rex chert member of Phosphoria formation | | | | | | | |
| R-19 | Carbonate rock, argillaceous | -- | 1.1 | -- | -- | 1.1 | -- |
| R-18 | Carbonate rock, argillaceous | -- | 1.3 | -- | -- | 2.4 | -- |
| R-17 | Mudstone, cherty | -- | .4 | -- | -- | 2.8 | -- |
| R-16 | Carbonate rock | -- | 1.4 | -- | -- | 4.2 | -- |
| R-15 | Chert, carbonatic | -- | 2.6 | -- | -- | 6.8 | -- |

| | | | | | | | |
|------|--|----------|-------|------|-----|-------|----|
| R-14 | Chert and cherty carbonate rock | -- | 2.5 | -- | -- | 9.3 | -- |
| R-13 | Carbonate rock | -- | 1.0 | -- | -- | 10.3 | -- |
| R-12 | Carbonate rock | -- | 3.5 | -- | -- | 13.8 | -- |
| R-11 | Carbonate rock | -- | 2.5 | -- | -- | 16.3 | -- |
| R-10 | Carbonate rock | -- | 2.5 | -- | -- | 18.8 | -- |
| R-9 | Carbonate rock | -- | 2.0 | -- | -- | 20.8 | -- |
| R-8 | Carbonate rock | -- | 3.0 | -- | -- | 23.8 | -- |
| R-7 | Covered interval; chert, carbonate rock, and sandstone float | -- | 200.0 | -- | -- | 223.8 | -- |
| R-6 | Carbonate rock | -- | 2.0 | -- | -- | 225.8 | -- |
| R-5 | Phosphate rock | 7198-TMC | 1.7 | 32.4 | 4.6 | 227.5 | -- |
| R-4 | Carbonate rock | -- | .6 | -- | -- | 228.1 | -- |
| R-3 | Covered interval; carbonate rock and chert float | -- | 35.0 | -- | -- | 263.1 | -- |
| R-2 | Carbonate rock | -- | 2.7 | -- | -- | 265.8 | -- |
| R-1 | Chert | -- | 4.7 | -- | -- | 270.5 | -- |

Phosphatic shale member of Phosphoria formation

| | | | | | | | |
|------|------------------------------|-----------|-----|------|------|------|-------|
| P-39 | Mudstone | 7197- RAS | 0.5 | 2.0 | 78.3 | 0.5 | -- |
| P-38 | Chert, carbonatic | 7196- RAS | .8 | 4.5 | 46.9 | 1.3 | -- |
| P-37 | Phosphate rock, argillaceous | 7195- RAS | 1.3 | 26.7 | 20.0 | 2.6 | -- |
| P-36 | Covered interval | -- | 5.0 | -- | -- | 7.6 | -- |
| P-35 | Mudstone | 7194- LDC | .5 | 6.3 | 57.5 | 8.1 | 3.15 |
| P-34 | Mudstone, phosphatic | 7193- LDC | .7 | 8.1 | 55.6 | 8.8 | 8.82 |
| P-33 | Mudstone | 7192- LDC | .5 | 5.1 | 70.1 | 9.3 | 11.37 |
| P-32 | Mudstone | 7191- LDC | .4 | 7.6 | 52.0 | 9.7 | 14.41 |
| P-31 | Mudstone | 7190- LDC | .8 | .3 | 78.5 | 10.5 | 14.65 |
| P-30 | Mudstone | 7189- RAS | .8 | 4.6 | 66.0 | 11.3 | 18.33 |
| P-29 | Mudstone | 7188- RAS | 2.0 | 1.2 | 68.1 | 13.3 | 20.73 |
| P-28 | Mudstone, phosphatic | 7187- RAS | .4 | 10.5 | 50.8 | 13.7 | 24.93 |
| P-27 | Mudstone | 7186- RAS | 7.5 | .4 | 70.8 | 21.2 | 27.93 |
| P-26 | Mudstone, carbonatic | 7185- RAS | 1.1 | 4.6 | 48.5 | 22.3 | 32.99 |
| P-25 | Mudstone, carbonatic | 7184- RAS | .6 | 1.6 | 63.4 | 22.9 | 33.95 |
| P-24 | Mudstone | 7183- RAS | .8 | .7 | 68.4 | 23.7 | 34.51 |
| P-23 | Mudstone | 7182- RAS | .5 | 5.4 | 64.3 | 24.2 | 37.21 |
| P-22 | Mudstone, carbonatic | 7181- RAS | 1.0 | 3.7 | 56.8 | 25.2 | 40.91 |
| P-21 | Mudstone | 7180- RAS | .6 | 4.8 | 69.4 | 25.8 | 43.79 |
| P-20 | Mudstone | 7179- RAS | .8 | 1.4 | 74.8 | 26.6 | 44.91 |
| P-19 | Mudstone, carbonatic | 7178- RAS | 1.1 | 1.4 | 52.2 | 27.7 | 46.45 |
| P-18 | Mudstone | 7177- RAS | 4.3 | .6 | 76.5 | 32.0 | 49.03 |
| P-17 | Mudstone, phosphatic | 7176- RAS | .5 | 9.1 | 53.4 | 32.5 | 53.58 |
| P-16 | Carbonate rock, argillaceous | 7175- RAS | .9 | .9 | 38.2 | 33.4 | 54.39 |
| P-15 | Carbonate rock, argillaceous | 7174- RAS | 1.9 | .7 | 29.0 | 35.3 | 55.72 |
| P-14 | Mudstone | 7173- RAS | .6 | 2.0 | 64.7 | 35.9 | 56.92 |

Deadline Ridge — Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | | Cumulative thickness (feet) | Thickness x percent P_2O_5 (cumulative) |
|------------------------------|---|------------|------------------|-----------------------------|----------------|--|-----------------------------|---|
| | | | | P_2O_5 | Acid insoluble | | | |
| P-13 | Mudstone----- | 7172- RAS | 2.6 | 1.3 | 68.9 | | 38.5 | 60.30 |
| P-12 | Carbonate rock, argillaceous----- | 7171- RAS | 1.2 | 4.8 | 34.9 | | 39.7 | 66.06 |
| P-11 | Mudstone, phosphatic, carbonatic----- | 7170- RAS | 1.2 | 8.8 | 38.1 | | 40.9 | 76.62 |
| P-10 | Phosphate rock, argillaceous, carbonatic----- | 7169- RAS | .8 | 12.6 | 24.9 | | 41.7 | 86.70 |
| P- 9 | Phosphate rock, argillaceous ----- | 7168- RAS | 1.4 | 24.2 | 14.5 | | 43.1 | 120.58 |
| P- 8 | Carbonate rock, argillaceous----- | 7167- RAS | .5 | 3.6 | 20.2 | | 43.6 | 122.38 |
| P- 7 | Carbonate rock, argillaceous----- | 7166- RAS | 2.5 | 1.1 | 25.4 | | 46.1 | 125.13 |
| P- 6 | Mudstone, carbonatic----- | 7165- RAS | 5.1 | 5.5 | 45.3 | | 51.2 | 153.18 |
| P- 5 | Carbonate rock ----- | 7164- RAS | .4 | 1.0 | 6.8 | | 51.6 | 153.58 |
| P- 4 | Phosphate rock, argillaceous ----- | 7163- RAS | 3.5 | 17.9 | 27.7 | | 55.1 | 216.23 |
| P- 3 | Carbonate rock ----- | 7162- RAS | 3.4 | 2.1 | 5.4 | | 58.5 | 223.37 |
| P- 2 | Phosphate rock, argillaceous----- | 7161- RAS | 1.0 | 18.8 | 27.0 | | 59.5 | 242.17 |
| P- 1 | Carbonate rock, phosphatic ----- | 7160- RAS | 1.2 | 14.4 | 6.9 | | 60.7 | 259.45 |
| Wells formation—not measured | | | | | | | | |
| Cw-1 | Chert and carbonate rock ----- | -- | -- | -- | -- | | -- | -- |

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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|--|--|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Dinwoody formation— not measured | | | | | | | |
| Trd-1 | Mudstone, carbonatic----- | -- | -- | -- | -- | -- | -- |
| E (?) member of Phosphoria formation | | | | | | | |
| E- 4 | Carbonate rock ----- | 7132- RAS | 2.2 | 7.4 | 15.5 | 2.2 | -- |
| E- 3 | Chert with mudstone partings ----- | -- | 30.0 | -- | -- | 32.2 | -- |
| E- 2 | Chert ----- | -- | 1.8 | -- | -- | 34.0 | -- |
| E- 1 | Chert with mudstone partings and mudstone ----- | -- | 4.1 | -- | -- | 38.1 | -- |
| Upper shale member of Phosphoria formation | | | | | | | |
| U-18 | Chert and mudstone ----- | -- | 1.3 | -- | -- | 1.3 | -- |
| U-17 | Mudstone, cherty ----- | -- | 1.4 | -- | -- | 2.7 | -- |
| U-16 | Mudstone, carbonatic----- | -- | 1.7 | -- | -- | 4.4 | -- |
| U-15 | Chert ----- | -- | .5 | -- | -- | 4.9 | -- |
| U-14 | Mudstone, carbonatic----- | -- | 2.1 | -- | -- | 7.0 | -- |
| U-13 | Carbonate rock, cherty ----- | -- | .4 | -- | -- | 7.4 | -- |
| U-12 | Mudstone, carbonatic----- | -- | 1.2 | -- | -- | 8.6 | -- |
| U-11 | Mudstone, carbonatic----- | -- | .7 | -- | -- | 9.3 | -- |
| U-10 | Mudstone, carbonatic----- | -- | 2.7 | -- | -- | 12.0 | -- |
| U- 9 | Chert ----- | -- | 2.4 | -- | -- | 14.4 | -- |
| U- 8 | Mudstone----- | -- | 1.6 | -- | -- | 16.0 | -- |
| U- 7 | Carbonate rock, argillaceous----- | -- | 1.7 | -- | -- | 17.7 | -- |
| U- 6 | Mudstone----- | -- | 2.3 | -- | -- | 20.0 | -- |
| U- 5 | Chert ----- | -- | .3 | -- | -- | 20.3 | -- |
| U- 4 | Mudstone, phosphatic and carbonatic mudstone ----- | -- | .6 | -- | -- | 20.9 | -- |
| U- 3 | Phosphate rock ----- | 7131-ERC | .9 | 29.2 | 13.5 | 21.8 | -- |
| U- 2 | Carbonate rock ----- | -- | .7 | -- | -- | 22.5 | -- |
| U- 1 | Phosphate rock ----- | 7130-LDC | .9 | 26.7 | 10.4 | 23.4 | -- |

Fontenelle Creek—Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) ⁵ |
|---|---|------------|------------------|-------------------------------|----------------|-----------------------------|---|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Rex chert member of Phosphoria formation | | | | | | | |
| R-29 | Carbonate rock, argillaceous----- | -- | 9.0 | -- | -- | 9.0 | -- |
| R-28 | Carbonate rock and chert ----- | -- | 10.6 | -- | -- | 19.6 | -- |
| R-27 | Carbonate rock ----- | -- | 43.0 | -- | -- | 62.6 | -- |
| R-26 | Carbonate rock ----- | -- | 6.0 | -- | -- | 68.6 | -- |
| R-25 | Carbonate rock ----- | -- | 6.5 | -- | -- | 75.1 | -- |
| R-24 | Mudstone ----- | -- | .8 | -- | -- | 75.9 | -- |
| R-23 | Mudstone, carbonatic----- | -- | 2.8 | -- | -- | 78.7 | -- |
| R-22 | Carbonate rock ----- | -- | 3.8 | -- | -- | 82.5 | -- |
| R-21 | Carbonate rock, argillaceous----- | -- | 3.6 | -- | -- | 86.1 | -- |
| R-20 | Sandstone, carbonatic.----- | -- | 1.3 | -- | -- | 87.4 | -- |
| R-19 | Chert, sandy ----- | -- | 1.5 | -- | -- | 88.9 | -- |
| R-18 | Sandstone, carbonatic ----- | -- | 3.3 | -- | -- | 92.2 | -- |
| R-17 | Carbonate rock ----- | -- | 4.0 | -- | -- | 96.2 | -- |
| R-16 | Sandstone, carbonatic ----- | -- | 6.5 | -- | -- | 102.7 | -- |
| R-15 | Carbonate rock ----- | -- | 7.5 | -- | -- | 110.2 | -- |
| R-14 | Chert ----- | -- | 7.0 | -- | -- | 117.2 | -- |
| R-13 | Phosphate rock, cherty ----- | 7129-RPS | .4 | 20.2 | 30.9 | 117.6 | -- |
| R-12 | Carbonate rock ----- | -- | 5.0 | -- | -- | 122.6 | -- |
| R-11 | Carbonate rock, phosphatic and chert ----- | -- | 1.5 | -- | -- | 124.1 | -- |
| R-10 | Carbonate rock ----- | -- | .7 | -- | -- | 124.8 | -- |
| R-9 | Chert, phosphatic, carbonatic----- | 7128-RPS | .4 | 7.8 | 40.6 | 125.2 | -- |
| R-8 | Carbonate rock ----- | -- | .5 | -- | -- | 125.7 | -- |
| R-7 | Chert----- | -- | .2 | -- | -- | 125.9 | -- |
| R-6 | Phosphate rock, cherty ----- | 7127-RPS | .3 | 18.4 | 39.7 | 126.2 | -- |
| R-5 | Carbonate rock ----- | -- | 2.3 | -- | -- | 128.5 | -- |
| R-4 | Mudstone----- | -- | .6 | -- | -- | 129.1 | -- |
| R-3 | Carbonate rock ----- | -- | 4.0 | -- | -- | 133.1 | -- |
| R-2 | Carbonate rock ----- | -- | 1.8 | -- | -- | 134.9 | -- |
| R-1 | Chert and argillaceous carbonate rock ----- | -- | 3.2 | -- | -- | 138.1 | -- |
| Phosphatic shale member of Phosphoria formation | | | | | | | |
| P-45 | Carbonate rock ----- | 7126-RAS | 0.8 | 0.5 | 15.8 | 0.8 | 0.40 |
| P-44 | Mudstone, carbonatic----- | 7125-RAS | .9 | 1.3 | 62.1 | 1.7 | 1.57 |
| P-43 | Mudstone, carbonatic----- | 7124-RAS | 5.9 | 1.1 | 63.6 | 7.6 | 8.06 |
| P-42 | Mudstone, carbonatic----- | 7123-RAS | .4 | .7 | 63.2 | 8.0 | 8.34 |
| P-41 | Mudstone, carbonatic----- | 7122-RAS | 1.0 | 1.2 | 59.4 | 9.0 | 9.54 |

| | | | | | | | |
|------|---|----------|-----|------|------|------|----------|
| P-40 | Carbonate rock, argillaceous | 7121-RAS | .8 | 1.9 | 22.2 | 9.8 | 11.06 |
| P-39 | Mudstone | 7120-RAS | 3.2 | 1.5 | 67.1 | 13.0 | 15.86 |
| P-38 | Carbonate rock, argillaceous | 7119-RAS | 1.1 | .6 | 22.9 | 14.1 | 16.52 |
| P-37 | Mudstone | 7118-RAS | .8 | 2.2 | 64.0 | 14.9 | 18.28 |
| P-36 | Carbonate rock | 7117-RAS | 1.5 | 1.0 | 1.3 | 16.4 | 19.78 |
| P-35 | Mudstone and chert | 7116-RAS | .5 | 5.3 | 64.3 | 16.9 | 22.43 |
| P-34 | Phosphate rock | 7115-RAS | 2.6 | 34.3 | 1.3 | 19.5 | 111.61 |
| P-33 | Mudstone, carbonatic | 7114-RAS | 2.7 | .5 | 64.3 | 22.2 | 112.96 |
| P-32 | Phosphate rock | 7113-RAS | 1.0 | 31.8 | 3.9 | 23.2 | 144.76 |
| P-31 | Mudstone | 7112-RAS | 1.1 | 5.3 | 70.8 | 24.3 | 150.59 |
| P-30 | Phosphate rock | 7111-RAS | 1.2 | 30.6 | 7.1 | 25.5 | 187.31 |
| P-29 | Phosphate rock, argillaceous | 7110-RAS | 1.5 | 23.9 | 23.6 | 27.0 | 223.16 |
| P-28 | Phosphate rock, argillaceous | 7109-ERC | .9 | 26.6 | 17.7 | 27.9 | 247.10 |
| P-27 | Phosphate rock | 7108-ERC | 1.8 | 22.7 | 9.7 | 29.7 | 287.96 |
| P-26 | Mudstone and calcareous phosphate rock | 7107-ERC | .7 | 12.0 | 24.4 | 30.4 | 296.36 |
| P-25 | Phosphate rock, argillaceous and carbonate rock | 7106-ERC | 1.8 | 18.6 | 35.0 | 32.2 | 329.84 |
| P-24 | Carbonate rock, argillaceous | 7105-ERC | 1.7 | 1.5 | 24.1 | 33.9 | 332.39 |
| P-23 | Mudstone, carbonatic | 7104-ERC | 1.2 | .2 | 57.7 | 35.1 | 332.63 |
| P-22 | Mudstone | 7103-ERC | .9 | .4 | 70.4 | 36.0 | 332.99 |
| P-21 | Mudstone | 7102-ERC | .7 | 3.2 | 62.4 | 36.7 | 335.23 |
| P-20 | Mudstone | 7101-ERC | 2.7 | 3.9 | 71.9 | 39.4 | 345.76 |
| P-19 | Mudstone, carbonatic | 7100-ERC | 3.9 | .7 | 53.8 | 43.3 | 348.49 |
| P-18 | Mudstone, carbonatic | 7099-ERC | 3.1 | .5 | 45.8 | 46.4 | 350.04 |
| P-17 | Mudstone, carbonatic | 7098-RAS | 2.2 | 5.9 | 44.7 | 48.6 | 363.02 |
| P-16 | Carbonate rock, argillaceous | 7097-RAS | 1.3 | .6 | 22.6 | 49.9 | 363.80 |
| P-15 | Mudstone, phosphatic, carbonatic | 7096-RAS | .6 | 11.4 | 37.2 | 50.5 | 370.64 |
| P-14 | Carbonate rock | 7095-RAS | 1.4 | 2.5 | 15.6 | 51.9 | 374.14 |
| P-13 | Phosphate rock, argillaceous, carbonatic | 7094-RAS | 3.9 | 14.4 | 18.1 | 55.8 | 430.30 |
| P-12 | Carbonate rock, argillaceous | 7093-RAS | 2.8 | 1.7 | 20.1 | 58.6 | 435.06 |
| P-11 | Carbonate rock, argillaceous | 7092-RAS | .8 | 4.7 | 29.3 | 59.4 | 438.82 |
| P-10 | Mudstone | -- | 2.9 | -- | -- | 62.3 | -- |
| P-9 | Carbonate rock, argillaceous | 7091-RAS | .8 | 3.9 | 22.6 | 63.1 | *3.12 |
| P-8 | Mudstone, carbonatic | 7090-RAS | 1.5 | 7.5 | 42.8 | 64.6 | 14.37 |
| P-7 | Carbonate rock | 7089-RAS | 3.3 | 6.8 | 14.6 | 67.9 | 36.81 |
| P-6 | Phosphate rock | 7088-RAS | .9 | 24.1 | 11.4 | 68.8 | 58.50 |
| P-5 | Phosphate rock, argillaceous, carbonatic | 7087-RAS | 1.9 | 15.5 | 17.3 | 70.7 | 87.95 |
| P-4 | Carbonate rock, phosphatic | 7086-RAS | 1.4 | 13.4 | 7.8 | 72.1 | 106.71 |
| P-3 | Phosphate rock | 7085-RAS | .4 | 25.0 | 4.6 | 72.5 | 116.71 |
| P-2 | Carbonate rock, argillaceous | 7084-RAS | .5 | 1.4 | 35.9 | 73.0 | 117.41 |
| P-1 | Phosphate rock, argillaceous | 7083-RAS | .7 | 25.2 | 23.1 | 73.7 | **135.05 |

* Cumulative data incomplete because of missing information. Computations start from zero after interruption.

** Note incompleteness of cumulative data.

Fontenelle Creek—Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | | Cumulative thickness (feet) | Thickness x percent P_2O_5 (cumulative) |
|---------------------------------|--|------------|------------------|-----------------------------|----------------|------|-----------------------------|---|
| | | | | P_2O_5 | Acid insoluble | | | |
| Wells formation—upper part only | | | | | | | | |
| Cw-1 | Carbonate rock | -- | 1.3 | -- | -- | 1.3 | -- | |
| Cw-2 | Chert, carbonatic | -- | 4.4 | -- | -- | 5.7 | -- | |
| Cw-3 | Chert | -- | 2.5 | -- | -- | 8.2 | -- | |
| Cw-4 | Carbonate rock and cherty, argillaceous carbonate rock | -- | 3.5 | -- | -- | 11.7 | -- | |
| Cw-5 | Chert | -- | 3.0 | -- | -- | 14.7 | -- | |
| Cw-6 | Chert, carbonatic and chert | -- | 10.3 | -- | -- | 25.0 | -- | |
| Cw-7 | Chert and carbonatic chert | -- | .8 | -- | -- | 25.8 | -- | |
| Cw-8 | Mudstone | -- | .4 | -- | -- | 26.2 | -- | |
| Cw-9 | Chert and carbonatic chert | -- | 5.0 | -- | -- | 31.2 | -- | |
| Cw-10 | Chert, carbonatic | -- | 4.8 | -- | -- | 36.0 | -- | |
| Cw-11 | Chert and carbonatic chert | -- | 5.0 | -- | -- | 41.0 | -- | |
| Cw-12 | Carbonate rock, argillaceous | -- | 4.2 | -- | -- | 45.2 | -- | |
| Cw-13 | Carbonate rock, argillaceous | -- | 1.9 | -- | -- | 47.1 | -- | |
| Cw-14 | Mudstone | -- | .7 | -- | -- | 47.8 | -- | |
| Cw-15 | Sandstone, carbonatic | -- | .5 | -- | -- | 48.3 | -- | |
| Cw-16 | Sandstone, carbonatic | -- | 3.4 | -- | -- | 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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|---|--|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Dinwoody formation—not measured | | | | | | | |
| Upper shale member of Phosphoria formation | | | | | | | |
| U-17 | Phosphate rock, argillaceous----- | 7276- RAS | 1.2 | 18.2 | 39.8 | 1.2 | 21.84 |
| U-16 | Phosphate rock, argillaceous----- | 7275- RAS | .9 | 26.4 | 18.6 | 2.1 | 45.60 |
| U-15 | Phosphate rock, argillaceous----- | 7274- RAS | 1.1 | 25.5 | 23.8 | 3.2 | 73.65 |
| U-14 | Phosphate rock, argillaceous----- | 7273- RAS | 1.7 | 24.6 | 27.1 | 4.9 | 115.47 |
| U-13 | Phosphate rock, argillaceous----- | 7272- RAS | 1.3 | 21.5 | 33.2 | 6.2 | 143.42 |
| U-12 | Phosphate rock, argillaceous----- | 7271- RAS | 1.2 | 22.0 | 33.5 | 7.4 | 169.82 |
| U-11 | Phosphate rock, argillaceous----- | 7270- RAS | .9 | 22.1 | 31.7 | 8.3 | 189.71 |
| U-10 | Phosphate rock, argillaceous----- | 7269- RAS | 2.3 | 19.1 | 40.0 | 10.6 | 233.64 |
| U-9 | Mudstone, phosphatic----- | 7268-TMC | .5 | 13.9 | 51.3 | 11.1 | 240.59 |
| U-8 | Mudstone, phosphatic----- | 7267-TMC | .2 | 12.6 | 59.9 | 11.3 | 243.11 |
| U-7 | Mudstone----- | 7266-TMC | .4 | 4.6 | 62.9 | 11.7 | 244.95 |
| U-6 | Phosphate rock, argillaceous----- | 7265-TMC | 1.0 | 24.5 | 30.0 | 12.7 | *269.45 |
| U-5 | Chert and argillaceous carbonate rock----- | -- | 13.0 | -- | -- | 25.7 | -- |
| U-4 | Mudstone ----- | -- | 5.0 | -- | -- | 30.7 | -- |
| Beds U-4, U-3, and U-2 are fractured and cut by faults. | | | | | | | |
| U-3 | Chert and argillaceous carbonate rock----- | -- | 2.0 | -- | -- | 32.7 | -- |
| U-2 | Mudstone----- | -- | 1.0 | -- | -- | 33.7 | -- |
| U-1 | Phosphate rock, cherty and phosphatic chert----- | 7264- LDC | 2.1 | 21.6 | 39.4 | 35.8 | -- |
| Rex chert member of Phosphoria formation | | | | | | | |
| R-21 | Carbonate rock and cherty carbonate rock----- | -- | 25.0 | -- | -- | 25.0 | -- |
| Bed R-21 probably cut by fault. | | | | | | | |

*Cumulative data incomplete because of missing information.

Basin Creek—Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|---------|-----------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| R-20 | Mudstone----- | -- | 5.0 | -- | -- | 30.0 | -- |
| R-19 | Mudstone----- | -- | 2.0 | -- | -- | 32.0 | -- |
| R-18 | Chert----- | -- | 5.0 | -- | -- | 37.0 | -- |
| R-17 | Chert and mudstone----- | -- | 20.0 | -- | -- | 57.0 | -- |
| R-16 | Chert and mudstone----- | -- | 5.0 | -- | -- | 62.0 | -- |
| R-15 | Covered interval----- | -- | 4.0 | -- | -- | 66.0 | -- |
| R-14 | Carbonate rock, cherty----- | -- | 30.0 | -- | -- | 96.0 | -- |
| R-13 | Chert and mudstone----- | -- | 4.5 | -- | -- | 100.5 | -- |
| R-12 | Phosphate rock----- | -- | .3 | -- | -- | 100.8 | -- |
| R-11 | Covered interval----- | -- | 2.6 | -- | -- | 103.4 | -- |
| R-10 | Sandstone, carbonatic----- | -- | 3.3 | -- | -- | 106.7 | -- |
| R-9 | Carbonate rock----- | -- | 6.0 | -- | -- | 112.7 | -- |
| R-8 | Covered interval----- | -- | 7.5 | -- | -- | 120.2 | -- |
| R-7 | Carbonate rock, cherty----- | -- | 12.0 | -- | -- | 132.2 | -- |
| R-6 | Carbonate rock----- | -- | 2.0 | -- | -- | 134.2 | -- |
| R-5 | Carbonate rock, cherty----- | -- | 1.9 | -- | -- | 136.1 | -- |
| R-4 | Mudstone and chert----- | -- | 1.2 | -- | -- | 137.3 | -- |
| R-3 | Chert----- | -- | 1.4 | -- | -- | 138.7 | -- |
| R-2 | Mudstone----- | -- | .8 | -- | -- | 139.5 | -- |
| R-1 | Carbonate rock----- | -- | 2.3 | -- | -- | 141.8 | -- |

Phosphatic shale member of Phosphoria formation

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|---------|---------------------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| P-51 | Mudstone----- | -- | 1.0 | -- | -- | 1.0 | -- |
| P-50 | Mudstone, phosphatic, carbonatic----- | 7260- RAS | .5 | 32.9 | 12.4 | 1.5 | 6.20 |
| P-49 | Carbonate rock, argillaceous----- | 7259- RAS | 2.6 | 35.6 | 3.4 | 4.1 | 98.76 |
| P-48 | Mudstone, phosphatic----- | 7258- RAS | 2.7 | 10.7 | 63.6 | 6.8 | 127.65 |
| P-47 | Phosphate rock----- | 7257- RAS | .5 | 31.1 | 14.0 | 7.3 | 143.20 |
| P-46 | Mudstone----- | 7256- RAS | .3 | 3.5 | 79.8 | 7.6 | 144.25 |
| P-45 | Phosphate rock----- | 7255- RAS | 1.7 | 32.4 | 11.5 | 9.3 | 199.33 |
| P-44 | Phosphate rock, argillaceous----- | 7254- RAS | 1.8 | 26.8 | 22.5 | 11.1 | 247.57 |
| P-43 | Phosphate rock----- | 7253- RAS | .8 | 32.7 | 13.0 | 11.9 | 273.73 |
| P-42 | Mudstone----- | 7252- RAS | .7 | 1.5 | 85.6 | 12.6 | 274.78 |
| P-41 | Phosphate rock, argillaceous----- | 7251- RAS | .3 | 23.8 | 28.5 | 12.9 | 281.92 |
| P-40 | Mudstone----- | 7250- RAS | 2.0 | 2.4 | 83.5 | 14.9 | 286.72 |
| P-39 | Phosphate rock and mudstone----- | 7249- RAS | .6 | 22.5 | 30.1 | 15.5 | 300.22 |
| P-38 | Mudstone----- | 7248- RAS | .6 | 1.4 | 82.1 | 16.1 | 301.06 |
| P-37 | Phosphate rock, argillaceous----- | 7247- RAS | .3 | 27.4 | 19.3 | 16.4 | 309.28 |
| P-36 | Mudstone----- | -- | .9 | -- | -- | 17.3 | -- |
| P-35 | Mudstone----- | -- | .7 | -- | -- | 18.0 | -- |
| P-34 | Mudstone----- | -- | 2.2 | -- | -- | 20.2 | -- |

| | | | | | | | |
|------|--|-----------|-------|------|------|------|----------|
| P-33 | Mudstone----- | -- | 1.2 | -- | -- | 21.4 | -- |
| P-32 | Mudstone----- | -- | 3.4 | -- | -- | 24.8 | -- |
| P-31 | Mudstone----- | -- | 1.4 | -- | -- | 26.2 | -- |
| P-30 | Mudstone----- | -- | 1.6 | -- | -- | 27.8 | -- |
| P-29 | Mudstone----- | -- | 1.3 | -- | -- | 29.1 | -- |
| P-28 | Mudstone, carbonatic----- | -- | 2.7 | -- | -- | 31.8 | -- |
| P-27 | Mudstone, phosphatic----- | 7246- RAS | 3.5 | 14.1 | 35.7 | 35.3 | *49.35 |
| P-26 | Phosphate rock, argillaceous----- | 7245- RAS | .7 | 27.9 | 18.2 | 36.0 | 68.88 |
| P-25 | Phosphate rock----- | 7244- RAS | .7 | 32.5 | 7.1 | 36.7 | 91.63 |
| P-24 | Mudstone----- | 7243- RAS | 1.2 | 3.2 | 60.7 | 37.9 | 95.47 |
| P-23 | Carbonate rock, argillaceous----- | 7242- RAS | 1.0 | .5 | 35.7 | 38.9 | 95.97 |
| P-22 | Mudstone----- | 7241- RAS | .6 | 2.6 | 80.2 | 39.5 | 97.53 |
| P-21 | Phosphate rock, argillaceous----- | 7240- LDC | 3.5 | 17.3 | 40.6 | 43.0 | 158.08 |
| P-20 | Phosphate rock, argillaceous----- | 7239- LDC | 1.8 | 22.7 | 28.6 | 44.8 | 198.94 |
| P-19 | Mudstone, phosphatic and mudstone----- | 7238- LDC | .7 | 21.3 | 34.7 | 45.5 | 213.85 |
| P-18 | Carbonate rock, argillaceous----- | 7237- LDC | 2.5 | 3.6 | 23.9 | 48.0 | 222.85 |
| P-17 | Mudstone and phosphate rock----- | 7236- LDC | .6 | 15.2 | 50.3 | 48.6 | 231.97 |
| P-16 | Phosphate rock----- | 7235- LDC | .7 | 33.5 | 8.2 | 49.3 | 255.42 |
| P-15 | Phosphate rock----- | 7234- LDC | .7 | 32.3 | 5.1 | 50.0 | 278.03 |
| P-14 | Phosphate rock, argillaceous----- | 7233- LDC | .6 | 26.8 | 18.6 | 50.6 | 294.11 |
| P-13 | Phosphate rock----- | 7232- LDC | 1.0 | 28.7 | 9.6 | 51.6 | 322.81 |
| P-12 | Phosphatic mudstone and mudstone----- | 7231- LDC | 1.5 | 14.7 | 41.6 | 53.1 | 344.86 |
| P-11 | Mudstone----- | 7230- LDC | .8 | 6.3 | 55.7 | 53.9 | 349.90 |
| P-10 | Carbonate rock, argillaceous----- | 7229- LDC | 2.7 | 2.3 | 39.8 | 56.6 | 356.11 |
| P- 9 | Phosphate rock----- | 7228- LDC | 1.7 | 29.9 | 17.7 | 58.3 | 406.94 |
| P- 8 | Mudstone----- | 7227- LDC | .6 | 4.2 | 68.7 | 58.9 | 409.46 |
| P- 7 | Mudstone----- | 7226- LDC | 1.3 | .5 | 77.3 | 60.2 | 410.11 |
| P- 6 | Mudstone----- | 7225- LDC | .3 | 4.1 | 73.6 | 60.5 | 411.34 |
| P- 5 | Mudstone----- | 7224- LDC | 1.0 | 3.0 | 78.3 | 61.5 | 414.34 |
| P- 4 | Mudstone, carbonatic----- | 7223- LDC | 1.7 | 4.7 | 55.7 | 63.2 | 422.33 |
| P- 3 | Phosphate rock----- | 7221- LDC | .7 | 31.0 | 10.3 | 63.9 | 444.03 |
| P- 2 | Phosphate rock----- | 7220- LDC | .8 | 30.5 | 18.1 | 64.7 | 468.43 |
| P- 1 | Phosphate rock, argillaceous----- | 7219- LDC | 1.1 | 16.7 | 34.4 | 65.8 | **486.80 |
| -- | Phosphate rock, argillaceous----- | 7263- LDC | (1.9) | 26.2 | 28.7 | -- | -- |
| | Sample 7263-LDC represents beds P-1 and P-2, but taken in road cut below measured section. | | | | | | |

Wells formation — upper part only

| | | | | | | | |
|------|-------------------------------|----|-----|----|----|-----|----|
| Cw-1 | Carbonate rock----- | -- | 0.7 | -- | -- | 0.7 | -- |
| Cw-2 | Chert and carbonate rock----- | -- | 8.0 | -- | -- | 8.7 | -- |

* Cumulative data incomplete because of missing information. Computations start from zero after interruption.
 ** Note incompleteness of cumulative data.

Basin Creek—Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) ⁵ |
|------------|------------------------------------|---------------|---------------------|--------------------------------|-------------------|-----------------------------------|---|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Cw- 3 | Carbonate rock ----- | 7262-LDC | 0.9 | -- | -- | 9.6 | -- |
| Cw- 4 | Phosphate rock, argillaceous ----- | | .3 | 22.2 | 20.5 | 9.9 | -- |
| Cw- 5 | Carbonate rock ----- | | 3.0 | -- | -- | 12.9 | -- |
| Cw- 6 | Mudstone ----- | | 1.0 | -- | -- | 13.9 | -- |
| Cw- 7 | Carbonate rock ----- | 7261-LDC | 5.0 | -- | -- | 18.9 | -- |
| Cw- 8 | Mudstone ----- | | 3.0 | -- | -- | 21.9 | -- |
| Cw- 9 | Phosphate rock, argillaceous ----- | | .3 | 21.3 | 42.3 | 22.2 | -- |
| Cw-10 | Covered interval ----- | | 7.0 | -- | -- | 29.2 | -- |
| Cw-11 | Carbonate rock ----- | -- | .2 | -- | -- | 29.4 | -- |
| Cw-12 | Sandstone ----- | | 1.7 | -- | -- | 31.1 | -- |
| Cw-13 | Mudstone ----- | | 1.7 | -- | -- | 32.8 | -- |
| Cw-14 | Sandstone ----- | -- | 1.0 | -- | -- | 33.8 | -- |
| Cw-15 | Sandstone ----- | -- | 1.5 | -- | -- | 35.3 | -- |

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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|--|-------------------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Dinwoody formation—basal bed only | | | | | | | |
| Td-1 | Mudstone----- | -- | 3.0 | -- | -- | 3.0 | -- |
| Upper shale member of Phosphoria formation—upper part only | | | | | | | |
| U- 8 | Mudstone, phosphatic----- | 7283-TMC | 1.2 | 16.0 | 43.1 | 1.2 | 19.20 |
| U- 7 | Mudstone----- | 7282-TMC | .5 | 5.7 | 62.9 | 1.7 | 22.05 |
| U- 6 | Mudstone, phosphatic----- | 7281-TMC | .8 | 13.7 | 55.4 | 2.5 | 33.01 |
| U- 5 | Mudstone, cherty ----- | 7280-TMC | 1.3 | 2.9 | 85.9 | 3.8 | 36.78 |
| U- 4 | Mudstone, cherty ----- | 7279-TMC | 2.1 | 1.7 | 87.4 | 5.9 | 40.35 |
| U- 3 | Mudstone, cherty and mudstone ----- | 7287-TMC | 1.6 | 1.4 | 89.1 | 7.5 | 42.59 |
| U- 2 | Chert ----- | 7277-TMC | 2.6 | 1.6 | 85.5 | 10.1 | 46.75 |
| U- 1 | Mudstone----- | -- | 1.0 | -- | -- | 11.1 | -- |

Phosphoria formation measured and phosphatic portions sampled in bulldozer trench on west limb of anticline near the head of Wheat Creek, sec. 4, T. 23 N., R. 116 W., 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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|--|------------------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| E (?) member of Phosphoria formation—top not exposed | | | | | | | |
| E- 6 | Chert ----- | -- | 18.0 | -- | -- | 18.0 | -- |
| E- 5 | Mudstone, phosphatic ----- | -- | .3 | -- | -- | 18.3 | -- |
| E- 4 | Chert ----- | -- | 8.5 | -- | -- | 26.8 | -- |
| E- 3 | Mudstone, phosphatic ----- | -- | .5 | -- | -- | 27.3 | -- |
| E- 2 | Chert ----- | -- | 4.6 | -- | -- | 31.9 | -- |
| E- 1 | Chert ----- | -- | 2.9 | -- | -- | 34.8 | -- |
| Upper shale member of Phosphoria formation | | | | | | | |
| U- 8 | Mudstone ----- | 7082-RAS | 1.2 | -- | -- | 1.2 | -- |
| U- 7 | Phosphate rock, argillaceous ----- | -- | 1.7 | 22.7 | 25.1 | 2.9 | -- |
| U- 6 | Mudstone ----- | -- | 3.6 | -- | -- | 6.5 | -- |
| U- 5 | Mudstone ----- | -- | 9.6 | -- | -- | 16.1 | -- |
| U- 4 | Mudstone ----- | -- | 3.2 | -- | -- | 19.3 | -- |
| U- 3 | Mudstone ----- | -- | 1.1 | -- | -- | 20.4 | -- |
| U- 2 | Mudstone ----- | -- | .7 | -- | -- | 21.1 | -- |
| U- 1 | Phosphate rock, argillaceous ----- | 7081-RAS | 1.1 | 25.1 | 15.6 | 22.2 | -- |
| Rex chert member of Phosphoria formation | | | | | | | |
| R-22 | Carbonate rock, argillaceous ----- | -- | 8.4 | -- | -- | 8.4 | -- |
| R-21 | Covered interval ----- | -- | 112.5 | -- | -- | 120.9 | -- |
| R-20 | Carbonate rock, sandy ----- | -- | 10.0 | -- | -- | 130.9 | -- |
| R-19 | Chert ----- | -- | 9.0 | -- | -- | 139.9 | -- |
| R-18 | Carbonate rock ----- | -- | 1.3 | -- | -- | 141.2 | -- |
| R-17 | Chert and phosphate rock ----- | -- | .6 | -- | -- | 141.8 | -- |
| R-16 | Carbonate rock ----- | -- | 4.0 | -- | -- | 145.8 | -- |
| R-15 | Phosphate rock ----- | 7080-RPS | .5 | 32.5 | 2.7 | 146.3 | -- |
| R-14 | Carbonate rock ----- | -- | 2.5 | -- | -- | 148.8 | -- |
| R-13 | Phosphate rock ----- | 7079-RPS | .3 | 31.0 | 4.7 | 149.1 | -- |
| R-12 | Carbonate rock ----- | -- | 2.6 | -- | -- | 151.7 | -- |
| R-11 | Phosphate rock ----- | 7078-RPS | 1.5 | 29.3 | 3.7 | 153.2 | -- |

| | | | | | | | |
|------|---|----------|------|------|------|-------|----|
| R-10 | Carbonate rock----- | -- | 1.5 | -- | -- | 154.7 | -- |
| R-9 | Phosphate rock----- | 7077-RPS | .5 | 26.9 | 12.5 | 155.2 | -- |
| R-8 | Carbonate rock----- | -- | 1.0 | -- | -- | 156.2 | -- |
| R-7 | Phosphate rock----- | 7076-RPS | 1.0 | 27.7 | 15.2 | 157.2 | -- |
| R-6 | Carbonate rock, argillaceous----- | 7075-RPS | 2.0 | 1.9 | 28.6 | 159.2 | -- |
| R-5 | Sandstone, carbonatic and sandy carbonate rock----- | -- | 13.5 | -- | -- | 172.7 | -- |
| R-4 | Chert----- | -- | 1.5 | -- | -- | 174.2 | -- |
| R-3 | Carbonate rock, sandy----- | -- | 9.0 | -- | -- | 183.2 | -- |
| R-2 | Chert----- | -- | 8.0 | -- | -- | 191.2 | -- |
| R-1 | Chert----- | -- | 13.0 | -- | -- | 204.2 | -- |

Phosphatic shale member of Phosphoria formation

| | | | | | | | |
|------|---|----------|-----|------|------|------|--------|
| P-34 | Phosphate rock, cherty----- | 7074-ERC | 0.7 | 17.4 | 36.8 | 0.7 | 12.18 |
| P-33 | Mudstone----- | 7073-ERC | 1.3 | 1.5 | 80.9 | 2.0 | 14.13 |
| P-32 | Carbonate rock, argillaceous----- | 7072-ERC | 1.2 | .4 | 36.3 | 3.2 | 14.61 |
| P-31 | Mudstone and phosphate rock----- | 7071-ERC | 2.9 | 10.9 | 51.4 | 6.1 | 46.22 |
| P-30 | Mudstone, carbonatic and phosphate rock----- | 7070-ERC | 1.1 | 11.4 | 37.6 | 7.2 | 58.76 |
| P-29 | Carbonate rock----- | 7069-ERC | 2.3 | 1.3 | 10.9 | 9.5 | 61.75 |
| P-28 | Mudstone----- | 7068-ERC | 2.5 | 2.2 | 72.8 | 12.0 | 67.25 |
| P-27 | Carbonate rock, argillaceous----- | 7067-ERC | 2.1 | .5 | 35.9 | 14.1 | 68.30 |
| P-26 | Mudstone----- | 7066-ERC | 1.9 | 5.8 | 67.5 | 16.0 | 79.32 |
| P-25 | Carbonate rock, argillaceous----- | 7065-ERC | 4.1 | .3 | 37.2 | 20.1 | 80.55 |
| P-24 | Mudstone----- | 7064-ERC | 2.3 | .6 | 85.4 | 22.4 | 81.93 |
| P-23 | Mudstone, carbonatic----- | 7063-ERC | 3.8 | 5.8 | 39.6 | 26.2 | 103.97 |
| P-22 | Carbonate rock, cherty and argillaceous carbonate rock----- | 7062-ERC | 1.9 | 2.8 | 24.6 | 28.1 | 109.29 |
| P-21 | Mudstone, phosphatic----- | 7061-ERC | 1.0 | 12.2 | 41.1 | 29.1 | 121.49 |
| P-20 | Carbonate rock, argillaceous----- | 7060-ERC | .5 | 1.4 | 26.4 | 29.6 | 122.19 |
| P-19 | Carbonate rock, argillaceous, phosphatic----- | 7059-ERC | 3.4 | 9.1 | 27.6 | 33.0 | 153.13 |
| P-18 | Phosphate rock and argillaceous carbonate rock----- | 7058-ERC | 2.2 | 16.9 | 15.9 | 35.2 | 190.31 |
| P-17 | Carbonate rock, argillaceous----- | 7057-ERC | 2.5 | 1.0 | 38.4 | 37.7 | 192.81 |
| P-16 | Mudstone----- | 7056-ERC | 2.5 | 7.6 | 51.5 | 40.2 | 211.81 |
| P-15 | Mudstone, phosphatic, carbonatic----- | 7055-ERC | 1.4 | 11.5 | 24.1 | 41.6 | 227.91 |
| P-14 | Mudstone, phosphatic, carbonatic----- | 7054-ERC | 1.5 | 8.2 | 42.4 | 43.1 | 240.21 |
| P-13 | Phosphate rock, argillaceous----- | 7053-ERC | 2.5 | 15.3 | 28.7 | 45.6 | 278.46 |
| P-12 | Phosphate rock, argillaceous----- | 7052-ERC | 1.7 | 26.3 | 15.6 | 47.3 | 323.17 |
| P-11 | Phosphate rock, argillaceous----- | 7051-ERC | 1.8 | 16.2 | 29.4 | 49.1 | 352.33 |
| P-10 | Phosphate rock, argillaceous----- | 7050-ERC | .6 | 22.4 | 24.8 | 49.7 | 365.77 |
| P-9 | Carbonate rock----- | 7049-ERC | 3.2 | 4.5 | 12.5 | 52.9 | 380.17 |
| P-8 | Phosphate rock, argillaceous----- | 7048-ERC | .5 | 20.4 | 30.7 | 53.4 | 390.37 |
| P-7 | Mudstone, phosphatic----- | 7047-ERC | .5 | 7.9 | 59.1 | 53.9 | 394.32 |
| P-6 | Phosphate rock----- | 7046-ERC | 1.4 | 34.0 | 2.6 | 55.3 | 441.92 |
| P-5 | Phosphate rock, argillaceous----- | 7045-ERC | .6 | 27.7 | 16.5 | 55.9 | 458.54 |

Wheat Creek—Continued

| Bed no. | Rock description | Sample no. | Thickness (feet) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) ^b |
|---------|-----------------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|---|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| P- 4 | Phosphate rock, argillaceous----- | 7044-ERC | .8 | 17.3 | 34.2 | 56.7 | 472.38 |
| P- 3 | Mudstone----- | 7043-ERC | 1.8 | 2.0 | 66.7 | 58.5 | 475.98 |
| P- 2 | Mudstone, phosphatic----- | 7042-ERC | .5 | 13.2 | 40.8 | 59.0 | 482.58 |
| P- 1 | Phosphate rock, argillaceous----- | 7041-LDC | 1.4 | 25.5 | 14.9 | 60.4 | 518.28 |

Wells formation—upper part only

| | | | | | | | |
|-------|--|----------|-----|-----|------|------|----|
| Cw- 1 | Carbonate rock ----- | -- | 3.7 | -- | -- | 3.7 | -- |
| Cw- 2 | Carbonate rock ----- | -- | 2.6 | -- | -- | 6.3 | -- |
| Cw- 3 | Mudstone, carbonatic----- | -- | .8 | -- | -- | 7.1 | -- |
| Cw- 4 | Mudstone, sandy ----- | -- | 2.7 | -- | -- | 9.8 | -- |
| Cw- 5 | Sandstone ----- | -- | 4.9 | -- | -- | 14.7 | -- |
| Cw- 6 | Mudstone----- | -- | 2.1 | -- | -- | 16.8 | -- |
| Cw- 7 | Mudstone, argillaceous ----- | -- | 3.6 | -- | -- | 20.4 | -- |
| Cw- 8 | Mudstone----- | -- | 4.6 | -- | -- | 25.0 | -- |
| Cw- 9 | Mudstone, carbonatic----- | -- | 1.1 | -- | -- | 26.1 | -- |
| Cw-10 | Mudstone----- | -- | 2.0 | -- | -- | 28.1 | -- |
| Cw-11 | Mudstone, phosphatic----- | 7040-RAS | .4 | 8.4 | 57.5 | 28.5 | -- |
| Cw-12 | Mudstone----- | -- | .3 | -- | -- | 28.8 | -- |
| Cw-13 | Carbonate rock, argillaceous----- | -- | 2.1 | -- | -- | 30.9 | -- |
| Cw-14 | Mudstone----- | -- | 1.7 | -- | -- | 32.6 | -- |
| Cw-15 | Mudstone----- | -- | 1.5 | -- | -- | 34.1 | -- |
| Cw-16 | Mudstone, phosphatic, carbonatic----- | 7039-RAS | .6 | 8.2 | 42.7 | 34.7 | -- |
| Cw-17 | Chert ----- | -- | 1.2 | -- | -- | 35.9 | -- |
| Cw-18 | Mudstone----- | -- | 3.2 | -- | -- | 39.1 | -- |
| Cw-19 | Mudstone----- | 7038-RAS | .5 | 7.2 | 57.5 | 39.6 | -- |
| Cw-20 | Carbonate rock ----- | -- | 1.2 | -- | -- | 40.8 | -- |
| Cw-21 | Mudstone----- | -- | .8 | -- | -- | 41.6 | -- |
| Cw-22 | Carbonate rock ----- | -- | .9 | -- | -- | 42.5 | -- |
| Cw-23 | Carbonate rock, argillaceous----- | -- | 1.1 | -- | -- | 43.6 | -- |
| Cw-24 | Mudstone----- | -- | .4 | -- | -- | 44.0 | -- |
| Cw-25 | Mudstone, carbonatic----- | 7037-RAS | .3 | 4.5 | 46.9 | 44.3 | -- |
| Cw-26 | Carbonate rock, argillaceous----- | -- | 2.2 | -- | -- | 46.5 | -- |
| Cw-27 | Sandstone, carbonatic ----- | -- | 3.0 | -- | -- | 49.5 | -- |
| Cw-28 | Sandstone, argillaceous----- | -- | 4.6 | -- | -- | 54.1 | -- |
| Cw-29 | Carbonate rock, argillaceous and chert ----- | -- | .7 | -- | -- | 54.8 | -- |
| Cw-30 | Chert, argillaceous ----- | -- | 1.5 | -- | -- | 56.3 | -- |
| Cw-31 | Chert ----- | -- | .7 | -- | -- | 57.0 | -- |
| Cw-32 | Carbonate rock ----- | -- | 4.6 | -- | -- | 61.6 | -- |
| Cw-33 | Carbonate rock, cherty ----- | -- | 2.7 | -- | -- | 64.3 | -- |

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, 13 miles northwest of Kemmerer, secs. 8 and 9, T. 23 N., R. 116 W., Lincoln County, Wyo. 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) | Chemical analyses (percent) | | Cumulative thickness (feet) | Thickness x percent P ₂ O ₅ (cumulative) |
|--|------------------------------|------------|------------------|-------------------------------|----------------|-----------------------------|--|
| | | | | P ₂ O ₅ | Acid insoluble | | |
| Rex chert member of Phosphoria formation—top not exposed | | | | | | | |
| R-22 | Mudstone | -- | 0.8 | -- | -- | 0.8 | -- |
| R-21 | Carbonate rock | -- | 30.0 | -- | -- | 30.8 | -- |
| R-20 | Carbonate rock | -- | 60.0 | -- | -- | 90.8 | -- |
| R-19 | Mudstone, carbonatic | -- | 7.5 | -- | -- | 98.3 | -- |
| R-18 | Carbonate rock | -- | 3.0 | -- | -- | 101.3 | -- |
| R-17 | Carbonate rock | -- | 10.0 | -- | -- | 111.3 | -- |
| R-16 | Carbonate rock, cherty | -- | 18.0 | -- | -- | 129.3 | -- |
| R-15 | Mudstone, phosphatic | -- | 1.8 | -- | -- | 131.1 | -- |
| R-14 | Mudstone | -- | .9 | -- | -- | 132.0 | -- |
| R-13 | Mudstone, phosphatic | -- | .5 | -- | -- | 132.5 | -- |
| R-12 | Mudstone | -- | .9 | -- | -- | 133.4 | -- |
| R-11 | Phosphate rock | -- | 1.4 | -- | -- | 134.8 | -- |
| R-10 | Mudstone | -- | 1.0 | -- | -- | 135.8 | -- |
| R-9 | Carbonate rock | -- | 11.7 | -- | -- | 147.5 | -- |
| R-8 | Carbonate rock | -- | .6 | -- | -- | 148.1 | -- |
| R-7 | Carbonate rock, cherty | -- | 5.0 | -- | -- | 153.1 | -- |
| R-6 | Carbonate rock, argillaceous | -- | 8.0 | -- | -- | 161.1 | -- |
| R-5 | Carbonate rock, cherty | -- | 6.0 | -- | -- | 167.1 | -- |
| R-4 | Chert | -- | 7.5 | -- | -- | 174.6 | -- |
| R-3 | Mudstone and chert | -- | 1.9 | -- | -- | 176.5 | -- |
| R-2 | Chert | -- | 3.0 | -- | -- | 179.5 | -- |
| R-1 | Chert | -- | 8.0 | -- | -- | 187.5 | -- |
| Phosphatic shale member of Phosphoria formation | | | | | | | |
| Samples 7133 through 7158 taken in open pit. | | | | | | | |
| P-27 | Phosphate rock, argillaceous | 7157-RAS | 1.8 | 22.6 | 31.7 | 1.8 | 40.68 |
| P-26 | Mudstone, carbonatic | 7156-RAS | 3.3 | .6 | 50.6 | 5.1 | 42.66 |
| P-25 | Mudstone | 7155-RAS | .8 | 4.5 | 69.8 | 5.9 | 46.26 |
| P-24 | Phosphate rock | 7154-RAS | .5 | 27.3 | 11.1 | 6.4 | 59.91 |
| P-23 | Mudstone, carbonatic | 7153-RAS | .8 | 3.2 | 60.5 | 7.2 | 62.47 |

South Mountain Pit and Mine—Continued

| | | | | | | | |
|------|--|----------|-------|------|------|------|----------|
| P-22 | Mudstone, carbonatic and phosphate rock ----- | 7152-RAS | 2.0 | 13.6 | 33.3 | 9.2 | 89.67 |
| P-21 | Mudstone, carbonatic ----- | 7151-RAS | 1.3 | 7.6 | 38.3 | 10.5 | 99.55 |
| P-20 | Carbonate rock ----- | 7150-RAS | 1.6 | 1.2 | 8.0 | 12.1 | 101.47 |
| P-19 | Mudstone ----- | 7149-RAS | .8 | 1.5 | 71.8 | 12.9 | 102.67 |
| P-18 | Mudstone, carbonatic ----- | 7148-RAS | .5 | .4 | 59.7 | 13.4 | 102.87 |
| P-17 | Mudstone ----- | 7147-RAS | 2.1 | 3.0 | 66.9 | 15.5 | 109.17 |
| P-16 | Carbonate rock, argillaceous ----- | 7146-RAS | 1.6 | 2.2 | 37.2 | 17.1 | 112.69 |
| P-15 | Mudstone ----- | 7145-RAS | 1.2 | 3.4 | 75.6 | 18.3 | 116.77 |
| P-14 | Mudstone ----- | 7144-RAS | 1.1 | 3.8 | 65.6 | 19.4 | 120.95 |
| P-13 | Mudstone ----- | 7143-RAS | 2.9 | 1.1 | 84.1 | 22.3 | 124.14 |
| P-12 | Mudstone ----- | 7142-RAS | 2.6 | .7 | 86.5 | 24.9 | 125.96 |
| P-11 | Mudstone, carbonatic ----- | 7141-RAS | .7 | 2.3 | 51.2 | 25.6 | 127.57 |
| P-10 | Carbonate rock, argillaceous ----- | 7140-RAS | 3.2 | 5.5 | 33.7 | 28.8 | 145.17 |
| P-9 | Mudstone, carbonatic ----- | 7139-LDC | 3.4 | 5.3 | 46.4 | 32.2 | 163.19 |
| P-8 | Carbonate rock, argillaceous ----- | 7138-LDC | 3.0 | 7.5 | 25.5 | 35.2 | 185.69 |
| P-7 | Phosphate rock, carbonatic ----- | 7137-LDC | 1.9 | 21.5 | 10.4 | 37.1 | 226.54 |
| P-6 | Phosphate rock, argillaceous, carbonatic ----- | 7136-LDC | 1.0 | 13.9 | 27.3 | 38.1 | 240.44 |
| P-5 | Carbonate rock, argillaceous ----- | 7135-LDC | 3.0 | 1.5 | 30.7 | 41.1 | 244.94 |
| P-4 | Mudstone, phosphatic, carbonatic ----- | 7134-LDC | 2.2 | 10.2 | 42.9 | 43.3 | 267.38 |
| P-3 | Carbonate rock, argillaceous, phosphatic ----- | 7133-LDC | 3.9 | 8.6 | 28.7 | 47.2 | 300.92 |
| P-2 | Carbonate rock, argillaceous, phosphatic ----- | 7158-LDC | 4.2 | 11.6 | 18.8 | 51.4 | **349.64 |
| -- | Covered interval ----- | -- | 5-10? | -- | -- | -- | -- |
| | Sample 7159-RAS taken in mine. | | | | | | |
| P-1 | Phosphate rock, argillaceous ----- | 7159-RAS | 2.7 | 20.7 | 22.8 | -- | -- |

*** Note incompleteness of cumulative data.