GEOLOGICAL SURVEY CIRCULAR 89

November 1950

# COAL RESOURCES OF NEW MEXICO

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C. B. Read, R. T. Duffner, G. H. Wood, and A. D. Zapp

UNITED STATES DEPARTMENT OF THE INTERIOR
Oscar L. Chapman, Secretary
GEOLOGICAL SURVEY
W. E. Wrather, Director

WASHINGTON, D. C.

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

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CONTENTS

| | Page |
|---|---|
| Preface | ii |
| Introduction | 1 |
| Acknowledgments | 1 |
| New Mexico coal reserves | 1 |
| Procedures used in estimating reserves | 1 |
| Classification according to characteristics of the coal | 1 |
| Rank of coal | 1 |
| Thickness of beds | 1 |
| Thickness of overburden | 4 |
| Weight of coal | 4 |
| Classification according to abundance of reliable data | 4 |
| Measured reserves | 4 |
| Indicated reserves | 4 |
| Inferred reserves | 4 |
| Inferred reserves by zone | 4 |
| Methods of calculating and presenting reserve data | 4 |
| Limitations of estimates | 5 |
| New Mexico coal fields | 5 |
| San Juan River region | 7 |
| Datil Mountain field | 8 |
| Cerrillos field | 8 |
| Una del Gato field | 9 |
| Tijeras field | 9 |
| Carthage field | 9 |
| Jornada del Muerto field | 9 |
| Sierra Blanca field | 9 |
| Raton field | 10 |
| Conclusions | 10 |
| Bibliography | 23 |
| Index to bibliography | 24 |

ILLUSTRATIONS

Plate 1. Map of New Mexico showing coal-bearing areas ........ Facing 24

TABLES

| | | Page |
|---|---|---|
| Table 1. | Classification of coals by rank | 2 |
| 2. | Representative analyses of New Mexico coals--as-received basis | 3 |
| 3. | Classification of coal beds in thickness groups | 4 |
| 4. | Weights of coals of various ranks | 4 |
| 5. | Generalized stratigraphic sections in the major coal-bearing areas in New Mexico | 6 |
| 6. | Measured original reserves of subbituminous coal in New Mexico | 12 |
| 7. | Indicated original reserves of subbituminous coal in New Mexico | 13 |
| 8. | Inferred original reserves of subbituminous coal in New Mexico | 14 |
| 9. | Measured original reserves of bituminous coal in New Mexico | 15 |
| 10. | Indicated original reserves of bituminous coal in New Mexico | 16 |
| 11. | Inferred original reserves of bituminous coal in New Mexico | 17 |
| 12. | Original reserves of anthracite in New Mexico | 18 |
| 13. | Inferred original reserves of coal on coal zone basis in New Mexico | 19 |
| 14. | Total original coal reserves in New Mexico | 20 |
| 15. | Coal production in New Mexico, 1882 to 1948 | 22 |

## PREFACE

This report, Coal Resources of New Mexico, is the fifth of a series of State summary reports prepared by the U. S. Geological Survey as part of a program to reappraise the coal reserves of the United States. Summary studies of the coal reserves in other states are contained in the following publications: Geology of the Deep River coal field, Chatham, Lee, and Moore Counties, North Carolina, Preliminary Map, 1949; Coal Resources of Montana, Circular 53, 1949; Coal Resources of Michigan, Circular 77, 1950; and Coal Resources of Wyoming, Circular 81, 1950.

WILLIAM E. WRATHER,
Director.

# INTRODUCTION

Coal is the largest assured source of energy in New Mexico, and although only locally developed at present, it is likely to be extensively developed to meet the future demands of industry, both within and without the limits of the State. The total original coal reserves in New Mexico are 61,754.6 million tons, divided by rank as follows:

| Rank | | Original reserves (In millions of short tons) |
|---|---|---|
| Subbituminous coal | | 50,801.2 |
| Bituminous coal | | 10,947.7 |
| Anthracite | | 5.7 |
| | Total | 61,754.6 |

Some of this huge total is in thin beds; some is in thick beds. A large part is near the surface; a small part is as much as 3,000 feet below the surface. A small amount has been accurately measured by trenching the outcrops and by drilling; a large amount is only inferred to be present on the basis of the known geologic continuity of the coal-bearing rocks. Amounts adequate for present use are near existing facilities for transportation and utilization; large amounts, however, are quite remote from such facilities. Most of the subbituminous coal reserves are in the San Juan River region in the northwestern part of the State, whereas, most of the bituminous coal reserves are in the Raton field in the northeastern part of the State.

If New Mexico's coal reserves are to be used to full advantage in the future it is necessary to take inventory of them now, and to appraise their availability and usefulness in connection with current and future planning for national and State development. It is hoped that the accompanying report on New Mexico's coal resources, which is the most detailed yet presented, will serve to call attention to areas favorable for prospecting and development, to areas needing further investigation, and to sources of available detailed geologic information about individual coal field areas.


## Acknowledgments

The authors extend their appreciation to the following people for their effective assistance in preparing this report: Robert P. Bryson, Elmer H. Baltz, Jr., Jack C. Barry, Robert J. Drake, Thomas A. Fitzgerald, Philip T. Hayes, Robert Haagensen, Diana Hinman, Jean W. Read, Thomas G. Wainwright, and State Mine Inspector, Mr. John Garcia.

The following coal companies permitted the use of information filed by them in the State Mine Inspector's office: Albuquerque and Cerrillos Coal Company, Madrid, New Mexico, Defiance Coal Company, Albuquerque, New Mexico, Gallup-Gamerco Coal Company, Gallup, New Mexico, Mutual Coal Company, Gallup, New Mexico, Phelps Dodge Corporation, Dawson, New Mexico, and the St. Louis, Rocky Mountain and Pacific Company, Raton, New Mexico.


# NEW MEXICO COAL RESERVES

The accompanying appraisal of New Mexico coal-reserves is based on a careful study of all available published and unpublished geologic and engineering information concerning the coal field areas. Much of the information was obtained from geologic maps, which show the outcrops of coal beds, and provide information about the nature and thickness of the overburden, and from the accompanying geologic reports, which describe the occurrences of coal. Drilling data were used wherever available, but unfortunately, such testing has been undertaken only in local areas. Information from existing mines and mine maps was also used to advantage in the areas of active mining.

## Procedures used in estimating reserves

### Classification according to characteristics of the coal

In preparing tonnage estimates from the available information on the thickness and areal distribution of the known coal beds, certain standardized procedures and definitions were adopted to insure uniformity in the treatment of the reserves according to rank of coal, thickness of beds, thickness of overburden, and weight of coal, as discussed under separate headings in the paragraphs below:

Rank of coal.--The ranks assigned to New Mexico coals accord with the generally accepted classification established by the American Society for Testing Materials. 34/ This classification, which is reproduced in Table 1, divides all coal into 13 groups on the basis of the dry, mineral-matter-free fixed carbon, the moist mineral-matter-free B.t.u. value, and the physical properties. Rank is important in determining utilization of coal, and is, therefore, used as the prime basis for reserve classification.

The areal distribution of the several ranks of coal in New Mexico is shown on the accompanying map, plate 1. The data for determining rank assignments were taken from published chemical analyses, 21, 33/ a representative list of which is presented in table 2. It is apparent from this table that New Mexico coals are mainly subbituminous and bituminous in rank, although a small amount of anthracite is present locally. Subbituminous coal occurs mainly in the northwestern part of the State; whereas bituminous coal appears to be concentrated in the northeastern part. However, valuable deposits of bituminous coal are widely distributed throughout the State.

Thickness of beds.--As the thickness of coal beds is an important factor in mining economy, the reserves of coal in New Mexico have been calculated and reported for beds in three groups with ranges of thickness for each rank as indicated in the following table.

TABLE I.—CLASSIFICATION OF COALS BY RANK.[a]

Legend: F.C. = Fixed Carbon. V.M. = Volatile Matter. Btu. = British thermal units.

| Class | Group | Limits of Fixed Carbon or Btu. Mineral-Matter-Free Basis | Requisite Physical Properties |
|---|---|---|---|
| I. Anthracitic | 1. Meta-anthracite | Dry F.C., 98 per cent or more (Dry V.M., 2 per cent or less) | |
| | 2. Anthracite | Dry F.C., 92 per cent or more and less than 98 per cent (Dry V.M., 8 per cent or less and more than 2 per cent) | |
| | 3. Semianthracite | Dry F.C., 86 per cent or more and less than 92 per cent (Dry V.M., 14 per cent or less and more than 8 per cent) | Nonagglomerating[b] |
| II. Bituminous[d] | 1. Low volatile bituminous coal | Dry F.C., 78 per cent or more and less than 86 per cent (Dry V.M., 22 per cent or less and more than 14 per cent) | |
| | 2. Medium volatile bituminous coal | Dry F.C., 69 per cent or more and less than 78 per cent (Dry V.M., 31 per cent or less and more than 22 per cent) | |
| | 3. High volatile *A* bituminous coal | Dry F.C., less than 69 per cent (Dry V.M., more than 31 per cent); and moist[c] Btu., 14,000[e] or more | |
| | 4. High volatile *B* bituminous coal | Moist[c] Btu., 13,000 or more and less than 14,000[e] | |
| | 5. High volatile *C* bituminous coal | Moist Btu., 11,000 or more and less than 13,000[e] | Either agglomerating or nonweathering[f] |
| III. Subbituminous | 1. Subbituminous *A* coal | Moist Btu., 11,000 or more and less than 13,000[e] | Both weathering and nonagglomerating |
| | 2. Subbituminous *B* coal | Moist Btu., 9500 or more and less than 11,000[e] | |
| | 3. Subbituminous *C* coal | Moist Btu., 8300 or more and less than 9500[e] | |
| IV. Lignitic | 1. Lignite | Moist Btu., less than 8300 | Consolidated |
| | 2. Brown coal | Moist Btu., less than 8300 | Unconsolidated |

[a] This classification does not include a few coals which have unusual physical and chemical properties and which come within the limits of fixed carbon or Btu. of the high-volatile bituminous and subbituminous ranks. All of these coals either contain less than 48 per cent dry, mineral-matter-free fixed carbon or have more than 15,500 moist, mineral-matter-free Btu.

[b] If agglomerating, classify in low-volatile group of the bituminous class.

[c] Moist Btu. refers to coal containing its natural bed moisture but not including visible water on the surface of the coal.

[d] It is recognized that there may be noncaking varieties in each group of the bituminous class.

[e] Coals having 69 per cent or more fixed carbon on the dry, mineral-matter-free basis shall be classified according to fixed carbon, regardless of Btu.

[f] There are three varieties of coal in the high-volatile C bituminous coal group, namely, Variety 1, agglomerating and nonweathering; Variety 2, agglomerating and weathering; Variety 3, nonagglomerating and nonweathering.

Table 2. — Representative analyses of New Mexico coals — as-received basis

| Location | Sample Laboratory Number | Formation | Bed | Proximate Analysis: Moisture | Proximate Analysis: Volatile Matter | Proximate Analysis: Fixed Carbon | Proximate Analysis: Ash | Ultimate Analysis: Sulfur | Ultimate Analysis: Hydrogen | Ultimate Analysis: Carbon | Ultimate Analysis: Nitrogen | Ultimate Analysis: Oxygen | Heating Value: Calories | Heating Value: British Thermal Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monero area: | | | | | | | | | | | | | | |
| 1. T.31N.,R.1W. | 94197 | Mesaverde | Unnamed | 6.8 | 34.2 | 48.4 | 10.6 | 2.2 | 5.5 | 68.7 | 1.5 | 11.5 | 6,844 | 12,320 |
| 2. T.31N.,R.1W. | 2121 | Mesaverde | Upper | 3.0 | 39.0 | 48.3 | 9.7 | 3.5 | 5.6 | 70.7 | 1.5 | 9.0 | 7,183 | 12,930 |
| Farmington area: | | | | | | | | | | | | | | |
| 3. T.30N.,R.15W. | 29025 | Fruitland | Carbonero | 8.8 | 41.7 | 41.2 | 8.3 | .6 | - | - | - | - | 6,478 | 11,660 |
| 4. T.22N.,R.13W. | 23003 | Fruitland | Carbonero | 19.0 | 32.4 | 43.2 | 5.4 | .9 | - | - | - | - | 5,661 | 10,190 |
| 5. T.30N.,R.16W. | 17750 | Mesaverde | Hogback | 10.6 | 36.7 | 49.6 | 3.1 | .6 | - | - | - | - | 6,117 | 11,010 |
| Gallup area: | | | | | | | | | | | | | | |
| 6. T.16N.,R.18W. | A3191 | Mesaverde | No. 5 | 12.1 | 37.4 | 42.6 | 7.9 | .7 | - | - | - | - | 6,222 | 11,200 |
| 7. T.15N.,R.18W. | A89048 | Mesaverde | Black Diamond | 10.5 | 38.2 | 44.8 | 6.5 | .9 | - | - | - | - | 6,511 | 11,720 |
| 8. T.15N.,R.19W. | A11467 | Mesaverde | Defiance | 10.7 | 40.6 | 42.0 | 6.7 | .5 | - | - | - | - | 6,472 | 11,650 |
| La Ventana area: | | | | | | | | | | | | | | |
| 9. T.19N.,R.1W. | A46366 | Mesaverde | Unnamed | 15.7 | 32.0 | 45.1 | 7.2 | .6 | 6.2 | 61.5 | 1.2 | 23.3 | 5,994 | 10,790 |
| 10. T.19N.,R.2W. | A75539 | Mesaverde | Unnamed | 19.1 | 34.0 | 40.7 | 6.2 | .6 | - | - | - | - | 5,672 | 10,210 |
| 11. T.19N.,R.2W. | A46367 | Mesaverde | Upper | 14.8 | 33.9 | 41.4 | 9.9 | 1.2 | 5.5 | 52.8 | 1.1 | 29.5 | 4,950 | 8,910 |
| Datil Mountain area: | | | | | | | | | | | | | | |
| 12. T.1N.,R.5W. | 17602 | Mesaverde | Unnamed | 6.5 | 34.5 | 51.9 | 7.1 | .5 | 5.3 | 69.4 | 1.2 | 16.5 | 6,661 | 11,900 |
| 13. T.3N.,R.9W. | 17728 | Mesaverde | Unnamed | 18.5 | 31.7 | 39.0 | 10.8 | .4 | - | - | - | - | 4,711 | 8,480 |
| 14. T.2N.,R.6W. | 20007 | Mesaverde | Unnamed | 25.9 | 30.3 | 34.7 | 9.1 | .4 | 5.7 | 46.5 | .9 | 37.4 | 4,128 | 7,430 |
| Carthage area: | | | | | | | | | | | | | | |
| 15. T.5S.,R.2E. | 890D | Mesaverde | Carthage | 3.9 | 38.9 | 46.8 | 10.4 | .7 | - | - | - | - | 7,078 | 12,740 |
| 16. T.5S.,R.2E. | 96134 | Mesaverde | Carthage | 2.2 | 34.0 | 52.2 | 11.6 | .7 | - | - | - | - | 7,172 | 12,910 |
| Sierra Blanca area: | | | | | | | | | | | | | | |
| 17. T.10S.,R.8E. | 96545 | Mesaverde | Unnamed | 3.1 | 30.0 | 52.6 | 14.3 | 1.0 | 4.9 | 68.9 | 1.3 | 9.6 | 6,789 | 12,220 |
| 18. T.6S.,R.13E. | 15054 | Mesaverde | Unnamed | 2.5 | 34.6 | 46.0 | 16.9 | .8 | 5.0 | 66.7 | 1.3 | 9.3 | 6,644 | 11,960 |
| Tijeras area: | | | | | | | | | | | | | | |
| 19. T.11N.,R.6E. | 13201 | Mesaverde | Unnamed | 1.4 | 36.2 | 53.6 | 8.8 | .9 | - | - | - | - | 7,725 | 13,900 |
| 20. T.10N.,R.6E. | 12650 | Mesaverde | Unnamed | 1.6 | 31.1 | 36.2 | 31.1 | 3.2 | - | - | - | - | 5,580 | 10,050 |
| Hagan area: | | | | | | | | | | | | | | |
| 21. T.13N.,R.6E. | 96546 | Mesaverde | Hopewell | 6.1 | 29.1 | 51.0 | 13.8 | .9 | 5.1 | 66.8 | 1.3 | 12.1 | 6,600 | 11,880 |
| 22. T.13N.,R.6E.(?) | A6843 | Mesaverde | Hopewell | 11.1 | 37.7 | 41.7 | 9.5 | .8 | - | - | - | - | 6,067 | 10,920 |
| Cerrillos area: | | | | | | | | | | | | | | |
| 23. Ortiz Mine Grant | 6153 | Mesaverde | White Ash | 5.7 | 2.2 | 86.1 | 6.0 | .7 | 2.4 | 82.9 | 1.3 | 6.7 | 7,372 | 13,270 |
| 24. Ortiz Mine Grant | 14886 | Mesaverde | White Ash | 7.6 | 7.3 | 75.8 | 9.3 | .8 | 2.1 | 79.0 | 1.0 | 7.8 | 6,722 | 12,100 |
| 25. Mesita de Juana Lopez Grant | A68861 | Mesaverde | Cook & White | 1.9 | 34.1 | 49.0 | 15.0 | 1.1 | - | - | - | - | 6,894 | 12,410 |
| 26. Ortiz Mine Grant | 14885 | Mesaverde | Cook & White | 3.7 | 35.1 | 49.4 | 11.8 | 1.0 | 5.0 | 69.9 | 1.3 | 11.0 | 6,861 | 12,350 |
| Raton area: | | | | | | | | | | | | | | |
| 27. T.30N.,R.22E. | 32593 | Vermejo | Raton | 2.6 | 35.1 | 50.4 | 11.9 | .6 | 5.3 | 71.4 | 1.3 | 9.5 | 7,056 | 12,700 |
| 28. T.31N.,R.24E. | A1563 | Vermejo | Unnamed | 5.3 | 35.0 | 48.1 | 11.6 | .6 | - | - | - | - | 6,772 | 12,190 |
| 29. T.28N.,R.20E. | 98443 | Vermejo | Raton | 2.5 | 34.6 | 44.4 | 18.5 | .7 | 5.1 | 66.6 | 1.2 | 7.9 | 6,606 | 11,890 |
| 30. T.31N.,R.23E. | 17703 | Raton | Tin Pan | 2.6 | 36.1 | 45.2 | 16.1 | .6 | 5.4 | 67.6 | 1.6 | 8.7 | 6,750 | 12,150 |

Analyses 1-18 and 21-30: Analyses of New Mexico coals: U. S. Bureau of Mines Tech. Paper 569, pp. 44-108, 1936.

Analyses 19 and 20: Woodruff, E. G. and Lee, W. T., Coal fields in Colorado and New Mexico: U. S. Geological Survey Bull. 471-H, p. 16, 1912.

Table 3.--Classification of coal beds in thickness groups

| Coal rank | Thickness groups | | |
| --- | --- | --- | --- |
| | Thin | Intermediate | Thick |
| Anthracite | 14-28 inches | 28-42 inches | more than 42 inches |
| Semianthracite | 14-28 inches | 28-42 inches | more than 42 inches |
| Bituminous | 14-28 inches | 28-42 inches | more than 42 inches |
| Subbituminous | 2½-5 feet | 5-10 feet | more than 10 feet |
| Lignite | 2½-5 feet | 5-10 feet | more than 10 feet |

Observations of the thickness of coal beds at the outcrop, in mines, and in drill holes were used to determine variations in the thickness of coal beds and to establish areas assignable to the groups set forth above. In preparing the accompanying estimates of New Mexico reserves it was assumed that the beds would show thickness variations behind the outcrops similar to those indicated by available measurements at the outcrops and in drill holes. In areas where there has been drilling during or prior to mining development, information on coal thickness and variations in thickness is reasonably adequate. In many undeveloped districts, however, the data are restricted to outcrop measurements, and in these areas, lines of equal thickness based on the groups shown in table 3 were determined by interpolation.

The areal extent of coal beds was determined by lengths of outcrops, and by drilling data where such information was available. In the absence of drilling information the lengths of the outcrops within the thickness classes were considered to establish the diameters of semicircular areas underlain by coal of such ranges of thickness.

Thickness of overburden.--An appraisal of reserves in terms of the overburden resting on the coal beds is important in considering the feasibility of various mining operations. In preparing the accompanying reserve estimates three overburden thickness categories were established as follows: 0 to 1000 feet, 1000 to 2000 feet, and 2000 to 3000 feet. Coal beds at depths greater than 3000 feet were not considered.

Weight of coal.--In the absence of precise data the following values were assigned as the weights of coals of various ranks in New Mexico:

Table 4.--Weights of coals in various ranks

| Rank | Weight per acre foot* |
| --- | --- |
| Anthracite | 2000 short tons |
| Semianthracite | 2000 short tons |
| Bituminous coal | 1800 short tons |
| Subbituminous coal | 1770 short tons |
| Lignite | 1750 short tons |

*Acre-foot: A volume of coal equivalent to one acre one foot thick.

Classification according to abundance of reliable data

Three categories of reserves according to the relative abundance of reliable information available for making the estimates were adopted and used in the accompanying tables as follows:

Measured reserves.--Measured reserves are those for which tonnage was computed from measurements at the outcrop, in trenches, in mine workings, and in drill holes, with points of observation so closely spaced that the estimates are considered accurate to within 20 percent of the tonnage that will be proven by mining development. For such purposes the spacing of the individual points of information usually did not exceed one-half mile.

Indicated reserves.--Indicated reserves are those for which tonnage was computed partly from direct measurements and partly from a reasonable projection of such data on geologic evidence. In general, points of observations were not greater than one mile apart, although where coal beds were known to be uniform in thickness over large areas, the points of observation were as much as 1½ miles apart.

Inferred reserves.--Inferred reserves are those for which tonnage estimates were based largely on geologic information concerning the character and continuity of the beds supported by a few, widely spaced points of observation.

Inferred reserves by zone.--Most of the coal beds in New Mexico are of limited areal extent. Commonly the beds occur in thin zones, which consist of a series of lenticular deposits of coal interbedded with carbonaceous shale and sandstone. Although few single beds within such coal zones exceed a township in areal distribution, the coal zones may be regional in occurrence. In consequence, the analysis of reserves by beds does not yield the total possible coal resources in the State. Accordingly, the coal zones were subjected to further examination and the results recorded under the heading, inferred by zone.

The methods used for calculating reserves by coal zones were similar to those used for coal beds. They required the computation of the variations in total thickness of mineable coal beds in a zone at numerous points along the outcrop of the zone, and at depth beyond the outcrop. These data were then analyzed by the use of thickness lines, as were the data for other classes of coal.

Methods of calculating and presenting reserve data

The methods of analysis described above required preparation of a series of maps of individual coal beds to show all pertinent information. Average thicknesses within the areas limited by the lines of equal thickness and overburden were calculated, the areas measured, and the tonnages computed, using the weight factors given in table 4. Because less than .2 percent of New Mexico's coal reserves have been mined, and because the exact limits of mined-out areas in certain beds could not be determined, the original coal reserves, before mining, were calculated first. Tables 6 to 14 present the results of these calculations of original reserves.

On the basis of a number of recent studies of recoverability in mining coal on individual properties in various parts of the United States, it can be stated that only about 50 percent of the coal originally in the ground is actually recovered. Coal that is left underground includes pillars, barrier pillars, top and bottom parts of beds, coal under roads, towns, railroads, and at the outcrop, coal around oil and gas wells, and coal lost through burning and slumping.

As shown in table 15 the amount of coal produced in New Mexico from 1882, when production records were first maintained, to January 1, 1948, is 119,419,231 tons. The total amount of coal mined and lost in mining, therefore, is two times this amount, or 238,838,462 tons.

Subtracting 238,838,462 tons, the amount of coal mined and lost in mining to January 1, 1948, from 61,754,600,000 tons, the original reserves before mining, yields 61,515,761,538 tons, the reserves remaining in the ground on January 1, 1948. Assuming that from the overall point of view, losses in mining in the future will be the same as those in the past, recoverable reserves as of January 1, 1948, are half of the remaining reserves, or 30,757,880,769 tons. It is undoubtedly true, however, that for some individual mines recoverability will be much higher than 50 percent.

### Limitations of estimates

The reserve estimates given in this report, are, of course, subject to change as new information is obtained through new geologic mapping, exploration, and development. It should be noted, also, that the calculations are based on a series of assumptions concerning the continuity and thickness of the coal beds. Departures from these assumptions obviously will result in modification of the present estimate, for very slight changes in the basic assumptions in calculating reserves make great changes in the resulting figures. It is primarily for this reason that the procedures and assumptions used in preparing the present estimate have been carefully recorded herein.

Except for a few small districts where coal beds have been extensively mined, the data available for use in computing reserves for this report are largely restricted to observations of the outcrops of coal beds. It may be predicted therefore, that the present estimates will be modified in detail, as exploration progresses. The extent of such changes cannot be determined at present, but it is probable that on a state-wide basis they will be small.

Areas where changes are most likely to be made are those for which little information was available for the preparation of the present estimate. The Datil Mountain field is an example of a very important area that cannot, at present, be adequately appraised. The Sierra Blanca field, likewise, has not been carefully mapped, and, therefore, its full potentialities are unknown. The western part of the San Juan River region has been only partially mapped, and, accordingly, the accompanying appraisal must be regarded as tentative.

## NEW MEXICO COAL FIELDS

The New Mexico coal fields occur in several physiographic and geologic provinces. The important Raton field is on the margin of the Great Plains adjacent to the southern Rocky Mountains. The San Juan River region is entirely in the Colorado Plateau province. A number of smaller fields lie in intermontane basins in the southern Rocky Mountain province, and in the adjacent Basin and Range province. The index map, plate 1, shows the locations of the various fields.

The coal-bearing formations in New Mexico range in age from Pennsylvanian to Tertiary. The deposits of principal economic importance, however, are of Upper Cretaceous and Tertiary (Paleocene) age. Coals in these rocks range in rank from subbituminous to anthracite although the greater portion of the reserves are of subbituminous rank.

Rocks of Pennsylvanian age contain thin coal beds at many places in New Mexico. Locally these coal beds attain mineable thicknesses and have been mined on a small scale. Along the Pecos River, above the town of Pecos, there are several small mine openings from which coal has been removed.12, 13/ Near Santa Fe and Las Vegas there have been similar operations.

The Pennsylvanian coal beds are commonly impure, and it is unlikely that they can be considered an important supply. In any event, currently available data regarding their occurrence do not permit the establishment of reserve estimates for them.

The strata of Permian, Triassic, and Jurassic age, which overlie the Pennsylvanian coal-bearing formations, do not contain commercial deposits of coal.

The rocks of the Cretaceous system, which are next in the vertical stratigraphic succession, contain major reserves of coal in all important coal-bearing areas in New Mexico. The subdivisions and thicknesses of these rocks are given in table 5. The Dakota sandstone, which lies at or near the base of the system, commonly contains lenticular beds of coal that locally are of mineable thickness. These coals have not been developed, and very little is known concerning their distribution and characteristics. It is improbable that they constitute an important supply.

The Mesaverde formation, of Upper Cretaceous age, contains large amounts of subbituminous and bituminous coal in extensive areas in northwestern and central New Mexico. Coal beds of commercial importance occur in this formation in the San Juan River region, the Datil Mountain field, the Cerrillos field, the Una del Gato field, the Tijeras field, the Carthage field, the Jornada del Muerto field, and the Sierra Blanca field. Locally these coal beds have been mined commercially, but large reserves remain undeveloped.

In the San Juan River region substantial deposits of subbituminous coal occur in the Fruitland formation,

Table 5.-Generalized stratigraphic sections in the major coal-bearing areas in New Mexico

**San Juan River Region — Southwestern part**

| Era | System | Series | Group | Group, formation, and member | Approx. thickness in feet |
|---|---|---|---|---|---|
| Cenozoic | Tertiary | Eocene | | "Wasatch" formation | 250 |
| Cenozoic | Tertiary | Paleocene | | ***Puerco and Torrejon formations (undifferentiated) | 630-1140 |
| Mesozoic | Cretaceous | Upper | | Ojo Alamo sandstone | 30- 130 |
| Mesozoic | Cretaceous | Upper | | McDermott formation | 40 |
| Mesozoic | Cretaceous | Upper | | Kirtland shale | 700 |
| Mesozoic | Cretaceous | Upper | | *Fruitland formation | 230 |
| Mesozoic | Cretaceous | Upper | | Pictured Cliffs sandstone | 50- 90 |
| Mesozoic | Cretaceous | Upper | | Lewis shale | 76- 270 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | **Chacra sandstone member | 300- 360 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | **Allison member | 1500 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | *Upper part of Gibson coal member | 300 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | Hosta sandstone member | 0- 200 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | *Lower part of Gibson coal member | 275- 300 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | Bartlett barren member | 330- 400 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | Dalton sandstone member | 100- 180 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | *Dilco coal member | 240- 300 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | **Gallup sandstone member | 180- 250 |
| Mesozoic | Cretaceous | Upper | | Mancos shale | 700- 950 |
| Mesozoic | Cretaceous | L? | | ***Dakota sandstone | 50- 250 |

**San Juan River Region — Northwestern part**

| Era | System | Series | Group | Group, formation, and member | Approx. thickness in feet |
|---|---|---|---|---|---|
| Cenozoic | Tertiary | Eocene | | "Wasatch" formation | 1000 |
| Cenozoic | Tertiary | Paleocene | | ***Puerco and Torrejon formations (undifferentiated) | 1450 |
| Mesozoic | Cretaceous | Upper | | Ojo Alamo sandstone | 0- 400 |
| Mesozoic | Cretaceous | Upper | | McDermott formation | 40- 245 |
| Mesozoic | Cretaceous | Upper | Kirtland shale | Upper member | 110- 475 |
| Mesozoic | Cretaceous | Upper | Kirtland shale | Farmington sandstone member | 350- 500 |
| Mesozoic | Cretaceous | Upper | Kirtland shale | Lower member | 240- 400 |
| Mesozoic | Cretaceous | Upper | | *Fruitland formation | 241- 530 |
| Mesozoic | Cretaceous | Upper | | Pictured Cliffs sandstone | 160- 275 |
| Mesozoic | Cretaceous | Upper | | Lewis shale | 475-1710 |
| Mesozoic | Cretaceous | Upper | Mesaverde group | Cliff House sandstone | 390- 750 |
| Mesozoic | Cretaceous | Upper | Mesaverde group | *Menefee formation | 356-1076 |
| Mesozoic | Cretaceous | Upper | Mesaverde group | Point Lookout sandstone | 274- 300 |
| Mesozoic | Cretaceous | Upper | | Mancos shale | 1880-2000 |
| Mesozoic | Cretaceous | L? | | ***Dakota sandstone | 200 |

**San Juan River Region — Northeastern part**

| Era | System | Series | Group | Group, formation, and member | Approx. thickness in feet |
|---|---|---|---|---|---|
| Cenozoic | Tertiary | Eocene | | "Wasatch" formation | 2000 |
| Cenozoic / Mesozoic | Tertiary / Cretaceous | Paleocene / Upper | | ***Animas formation | 1500-3000 |
| Mesozoic | Cretaceous | Upper | | *Fruitland formation | 160 |
| Mesozoic | Cretaceous | Upper | | Pictured Cliffs sandstone | 100 |
| Mesozoic | Cretaceous | Upper | | Lewis shale | 2000 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | La Ventana sandstone member | 30- 80 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | *Gibson coal member | 80- 130 |
| Mesozoic | Cretaceous | Upper | Mesaverde formation | Hosta sandstone member | 75- 160 |
| Mesozoic | Cretaceous | Upper | Mancos shale | Upper shale member | 650 |
| Mesozoic | Cretaceous | Upper | Mancos shale | Niobrara calcareous shale member | 800 |
| Mesozoic | Cretaceous | Upper | Mancos shale | Carlile shale member | 440 |
| Mesozoic | Cretaceous | Upper | Mancos shale | Greenhorn limestone member | 70 |
| Mesozoic | Cretaceous | Upper | Mancos shale | Graneros shale member | 100 |
| Mesozoic | Cretaceous | L? | | ***Dakota sandstone | 175- 200 |

**Raton Mesa Region**

| Era | System | Series | Group, formation, and member | Approx. thickness in feet |
|---|---|---|---|---|
| Cenozoic | Tertiary | Eocene | | |
| Cenozoic | Tertiary | Paleocene | Poison Canyon formation | 300 |
| Cenozoic / Mesozoic | Tertiary / Cretaceous | Paleocene / Upper | *Raton formation | 1000-1700 |
| Mesozoic | Cretaceous | Upper | *Vermejo formation | 0- 425 |
| Mesozoic | Cretaceous | Upper | Trinidad sandstone | 100 |
| Mesozoic | Cretaceous | Upper | Pierre shale | 1500-1700 |
| Mesozoic | Cretaceous | Upper | Niobrara formation | 800-1000 |
| Mesozoic | Cretaceous | Upper | Benton formation | 350- 450 |
| Mesozoic | Cretaceous | L? | ***Dakota sandstone | 200 |

* Formation or member contains important coal resources.
** Formation or member contains locally important coal resources.
*** Formation or member contains coal beds that are not believed to be important resources.

also of Upper Cretaceous age. This formation with its contained coal beds is stratigraphically higher than the Mesaverde formation, from which it is separated by the Lewis shale and the Pictured Cliffs sandstone. Most of the coal beds in the Fruitland formation are lenticular, but a few underlie large areas. The beds in this formation constitute a very important reserve in the northern part of the San Juan River region.

In the Raton field of northeastern New Mexico there are valuable deposits of bituminous coal in the Vermejo formation of Upper Cretaceous age. The coal has been mined at some points, but large reserves remain undeveloped.

The Raton formation of Upper Cretaceous and Paleocene age likewise contains coal supplies in the Raton area. As in the coals of the underlying Vermejo formation, mining has been carried on only locally, and substantial deposits remain.

Younger strata that are assigned to the Tertiary system are not known to contain coal reserves in New Mexico. However, beds of carbonaceous material that locally approach coal in purity and rank are occasionally encountered.

## San Juan River region

The San Juan River region, as shown on plate 1, is an area of about 11,000 square miles that includes much of northwestern New Mexico, and extends into southwestern Colorado. The region roughly coincides with the San Juan Basin, a great saucer-shaped structural depression, but includes a narrow southward extension, the Gallup-Zuni Basin, in the southwestern part of the region.

The San Juan River and its tributaries drain most of the region, but the Continental Divide crosses it near its eastern margin, and the extreme eastern portion is coursed by tributaries of the Rio Grande. A small area in the southwestern part is drained by tributaries of the Little Colorado River. The San Juan River and its larger tributaries from the north are perennial streams, but the streams south of the San Juan River are largely intermittent and characteristically have wide, dry, sandy bottoms.

Most of the San Juan River region is arid and uninviting, and, in general, it is sparsely settled and little developed. Lack of railroad facilities has prevented extensive development of the coal resources. The main line of the Atchison, Topeka, and Santa Fe Railway skirts the southern margin of the region and crosses some of the area of coal-bearing rocks near the town of Gallup. In the northeastern part of the region, a narrow-gage branch of the Denver and Rio Grande Western Railway crosses the outcrop of the coal-bearing strata near the towns of Lumberton and Monero, and a spur of this line extends from Durango, Colorado, into the northwestern part of the region as far as the town of Farmington. It is noteworthy that the only extensive development of coal in the New Mexico part of the San Juan River region has been in the vicinity of Gallup, where there are standard-gage rail facilities. The coals have been exploited to a lesser extent in the Monero district, which is served only by a narrow-gage railway. Elsewhere, coal production has been limited to scattered small mines, which supply local markets.

Hard-surfaced highways roughly parallel the south and west margins of the region, and a paved highway connecting the southeastern and northwestern portions was completed in recent years. Most other portions of the region are accessible by earth roads.

As indicated in table 5, two zones containing coal beds of major economic importance occur in Upper Cretaceous strata. The lower, or older zone is contained in the Mesaverde formation throughout most of the region and in the Menefee formation of the Mesaverde group in the northwestern part of the region. The higher, or younger zone occurs in the Fruitland formation. The outcrop of the coals in the Mesaverde formation defines the margin of the region, and the coals of the Fruitland formation crop out in a roughly circular band around the central part of the region. Local occurrences of coal have been reported in the Dakota sandstone, which is stratigraphically below the Mesaverde formation, and in the Nacimento group of Eocene age, which is stratigraphically above the Fruitland formation; but, inasmuch as these occurrences of coal are not apparently of potential economic importance, they were not considered in preparing the present estimate of reserves.

The strata in the central and southern part of the region dip very gently toward the center of the structural basin, but on the north and east sides they are turned up sharply on the flanks of bordering mountain masses. On the west side the strata are tilted sharply along a series of monoclines. The San Juan structural basin is deepest in its northern and eastern parts where the coals of the Fruitland formation are more than 3000 feet below the surface and the coals of the Mesaverde formation are more than 5000 feet below the surface.

The region is, in general, a moderately dissected plateau with relatively low relief. The topography of the area of coal outcrops is controlled by resistant sandstone layers associated with the coal. Where the dip of these sandstones is gentle, they form low cuestas; where the dip is steep, they form sharp hogback ridges rising several hundred feet above adjacent lowlands. Because of the relatively low relief and the inclination of the strata toward the center of the basin, the coal beds dip well below the surface within a short distance from the outcrop, and in most places the outcrop pattern of the coal beds is essentially linear. This is in contrast to many of the coal fields of the Great Plains province, where the strata are nearly flat-lying and dissection is well advanced, resulting in extensive, sinuous outcrop patterns of the individual coal beds.

The extent of geologic investigations of the coal resources of the San Juan River region has been determined largely by the extent of need for such information in the administration of public lands. During the period 1905-1910, reconnaissance study and mapping by geologists of the U. S. Geological Survey 5, 8, 9, 10, 11, 15/ served to outline the general extent of the coal region. Beginning in 1915, and continuing intermittently to the present, a series of U. S. Geological Survey projects has resulted in more detailed studies of the coals of the Fruitland formation over the entire New Mexico portion of the region, and of the coals in the Mesaverde formation from the

Gallup district around the entire south and east sides of the region. 25, 29, 30, 31, 32/ Except in a single township north of the San Juan River, the coal of the Mesaverde formation on the western side of the San Juan River region is yet to be studied and mapped; but this work is now in progress. Because of the great irregularity of distribution and the lenticularity of the coal beds, exceedingly detailed surface mapping, supplemented in most areas by core drilling, will be necessary to establish accurately the distribution and quantity of coal. When the studies on the western side of the region are completed, it will be possible to make a more accurate estimate of the quantity of coal in the San Juan River region, than the estimate presented in this report.

The Mesaverde formation, the lower important coal-bearing formation of the San Juan River region, consists of irregularly bedded and lenticular sandstone, shale, and coal beds. In the southwestern part of the region the Mesaverde formation attains a thickness of 1800 feet with an unknown thickness removed from the top by erosion. In the northeastern part of the region the formation thins until it is only about 220 feet thick. In the southwestern part of the region the Mesaverde formation has been divided into a number of members, of which the Dilco and Gibson members are the main coal-bearing units, although coal beds locally thick enough to mine are also present in the Gallup sandstone member. Farther northeast, the Dilco member disappears, and coal beds appear near the top of the Allison member. Still farther northeast, the coals in the Allison member disappear, but the Gibson member continues to be coal-bearing as far north as the Monero district, although these coals finally grade into non-coal-bearing sandstone between Monero and the Colorado State line.

In the northwestern part of the San Juan River region, the coal-bearing rocks of the same general age as some of those near Gallup have been assigned to the Menefee formation of the Mesaverde group, following the nomenclature used in southwestern Colorado. Determination of the exact relation of the Menefee formation to the members of the Mesaverde formation near Gallup must await further geologic mapping on the west side of the region.

The Fruitland formation is similar in lithology to the Mesaverde formation. It is 530 feet thick near the Colorado-New Mexico State line in the northwestern part of the San Juan River region, but thins southeastward along the outcrop, with the coal beds decreasing in number and thickness until, in the southeastern part of the region, no commercially important coal beds are present at this horizon. The thickest and most extensive coals in the Fruitland formation occur in the lower part of the formation.

The coals of the Fruitland formation generally are thicker than the coals of the Mesaverde formation, but are split by numerous thin partings and have higher ash contents. The maximum reported thickness for a coal bed of the Fruitland is 38 feet, including numerous thin partings, near the Colorado State line in the northwestern part of the region. The coals of the Mesaverde rarely exceed 10 feet in thickness, and are for the most part less than 5 feet thick.

Coals of both the Mesaverde and Fruitland formations are of subbituminous rank over most of the San Juan River region, but the coals of the Mesaverde attain bituminous rank in the northwestern and northeastern parts. The chemical and physical data are insufficient to determine precisely where the changes from subbituminous to bituminous rank take place, but the coals of the Mesaverde apparently become bituminous a short distance south of the San Juan River in the northwestern part of the region. In the northeastern part, the coals of the Mesaverde are of bituminous rank in the Monero district, but it has not been determined how far southward along the east margin of the region bituminous coal is present. Plate 1 shows areas underlain by coal of the Mesaverde abritrarily assumed to be of bituminous rank for the purpose of preparing the accompanying reserve estimates. The coals of the Fruitland are believed to be of subbituminous rank throughout the New Mexico part of the San Juan River region.

## Datil Mountain field

The Datil Mountain field lies in parts of Valencia, Socorro, and Catron Counties in the drainage basins of Alamosa Creek, Rio Salado, and Rio Puerco. 26/ The area is rugged and sparsely inhabited; it is remote from railroads and is accessible only by secondary and unimproved roads.

The coal in the Datil Mountain field occurs in Upper Cretaceous strata that are correlated with portions of the Mesaverde formation in the adjacent San Juan River region. The scanty information available concerning the deposits indicates that the coal is of subbituminous rank over most of the area, though locally it may be of bituminous rank. The beds usually are thin and are rarely reported to be more than 3 feet in thickness.

In general, the area is synclinal, but the geologic structure is complicated as a result of some folding, faulting, and igneous intrusion. Until more detailed studies of the coal beds are made, estimates of the coal reserves must be classed as inferred.

## Cerrillos field

The Cerrillos field is an area of approximately 80 square miles in south-central Santa Fe County. 18, 36/ It is 25 miles southeast of Santa Fe, from which it is accessible by State Highway 10. The Atchison, Topeka, and Santa Fe Railway passes through the field, and railheads are located at Cerrillos and Waldo. From the latter point a spur line extends to Madrid, the site of present mining operations.

The coal-bearing strata occur in a rugged area immediately south of Rio Galisteo. The geologic structure is synclinal and has been complicated by numerous intrusions of igneous rocks, some of which lie in close proximity to, or cut, the coal beds.

The coal in the Cerrillos field occurs in the Mesaverde formation of Upper Cretaceous age. Three beds of mineable thickness and quality are known. The lowest of these is the Miller Gulch coal bed, which is approximately 190 feet above the base of the Mesaverde formation. The Cook and White coal bed is about 465 feet higher, and the White Ash coal bed is nearly 100 feet above the latter.

Both the Cook and White and the White Ash beds have been mined extensively in the vicinity of Madrid. The Miller Gulch bed has been developed only slightly because it is believed to have smaller areal extent than the overlying beds.

The coal in the Cerrillos field ranges in rank from bituminous to semianthracite and anthracite as indicated in table 2, and, at present, coal of several ranks is being produced from a number of active mines. Although most of the bituminous coal is non-agglomerating, some coking coal has been mined in the area. Unfortunately, reserves of such fuel appear to be small on the basis of present information.

## Una del Gato field

The Una del Gato field is in Sandoval County, New Mexico, about 10 miles south of the Cerrillos field. 2, 7/ Coal occurs in an area of about 30 square miles in a rugged depression between the Sandia and Ortiz Mountains. It is accessible by State Highway 10 and secondary county roads.

Only the general geologic features of the Una del Gato field are known. Structurally it is a highly faulted homocline that has been modified locally by the intrusion of igneous rocks. Several beds of coal occur in the Mesaverde formation of Upper Cretaceous age, and lie at approximately the stratigraphic position of coal beds in the Cerrillos field, with which they may be correlative. The coal beds in the Una del Gato field attain a maximum thickness of 5 feet, although at most points of recorded measurement the thicknesses are less than 4 feet. The coal is of excellent quality and is of bituminous rank.

Mining operations have been undertaken at a number of points in the field but only small quantities of coal appear to have been removed. At present, the area is inactive owing to its inaccessibility and to structural conditions that inhibit development.

## Tijeras field

The Tijeras field is in eastern Bernalillo County, New Mexico, approximately 20 miles east of Albuquerque. 16/ The area is readily accessible by U. S. Highway 66 and by state and county roads. It lies on the eastern slope of the Sandia Mountains in a rugged and picturesque region.

Coal-bearing rocks occur in a small syncline that occupies a portion of the Tijeras graben or down-faulted block. The strata are of Upper Cretaceous age, and are assigned to the Mesaverde formation.

Several beds of bituminous coal occur in the field, but in general, appear to be of less than mineable thickness. There have been only desultory mining operations, which produced only small quantities of coal.

## Carthage field

The Carthage field is an area of approximately 10 square miles in T. 5 S., R. 2 E., Soccorro County, New Mexico. 14/ The field is part of an extensive desert region that lies east of the Rio Grande and is accessible by Federal Highway 380. The nearest railhead is San Antonio, New Mexico, approximately 12 miles west of the field.

The coal in the Carthage field occurs in the Mesaverde formation of Upper Cretaceous age. Two beds are present; the lower, or Carthage coal bed at a position 40 to 60 feet above the base of the formation, and an unnamed coal bed approximately 30 to 40 feet higher. The Carthage coal bed attains a maximum thickness of 6 feet and commonly occurs in two benches. The coal is of bituminous rank and is of excellent quality, as indicated by the analyses (table 2). The upper, unnamed coal bed locally may be as much as 7 feet thick but is very impure and does not constitute a mineable reserve.

The Carthage field is structurally complex. It is situated on a fault-bounded block that has been uplifted and internally fractured. In consequence, the Mesaverde formation and its contained coal beds are faulted into blocks of various sizes and shapes. This structure is a controlling factor in mining development. Recent mining practice has been to limit the operations of a mine to the area of a single fault block.

The Carthage field has been rather thoroughly developed and the reserves are now nearly depleted. In 1948 one small mine was reported to be active.

## Jornada del Muerto field

The Jornada del Muerto field is in Socorro County, east and northeast of the Carthage field in a remote part of the Jornada del Muerto desert. It is accessible only by Federal Highway 380 and county roads.

Coal of bituminous rank occurs in the Mesaverde formation of Upper Cretaceous age in parts of Tps. 3, 4, and 5 S., R. 3 E., and possibly underlies a much larger area.

Bedrock exposures are poor in this area owing to the occurrence of a rather persistent cover of gravel and fine wind-blown material. In consequence, detailed information on the distribution of the coal-bearing rocks and on the geologic structure of the area is not available.

Meager information indicates that coal beds may be as much as 3 feet thick in parts of the area. Except for desultory prospecting, there has been no mining development in the area.

## Sierra Blanca field

The Sierra Blanca field covers an area of about 450 square miles in Lincoln County, New Mexico. 3, 6, 20/ It is accessible by several state and federal highways, as well as by the Southern

Pacific Railroad at the railheads of Carrizozo and White Oaks. The area lies on the rugged flanks of the great Sierra Blanca Range.

The geologic structure of the Sierra Blanca field is complex. The coal occurs in parts of a broad syncline that has been strikingly modified by faulting and by the intrusion of numerous sills and dikes of igneous rock. In consequence, mining operations are extremely difficult.

The coal in the Sierra Blanca field occurs in the Mesaverde formation of Upper Cretaceous age. Several beds that may be as much as 7 feet thick, are reported as a result of preliminary examination of the area. The areal extent of these beds is, however, unknown at present. In the main, the coal appears to be of bituminous rank, but varies over a wide range.

Mining operations have been undertaken at many points in the Sierra Blanca field owing to the excellent qualities of the coal and its proximity to points where it can be utilized. White Oaks has been the center of most of the operations, although coal has been removed in the vicinity of Capitan, Ft. Stanton, and Carrizozo.

## Raton field

The Raton field is on the western margin of the Great Plains province in Colfax County, New Mexico. 24, 27, 28/ The area is a rugged plateau that has been deeply trenched by numerous canyons. It is accessible by U. S. Highway 85 and secondary roads, and has railheads at Raton and Dawson.

The Raton coal field lies wholly in the southern part of an asymmetric structural depression, which has been named the Raton Basin. The axis of the basin trends sinuously in a northerly direction paralleling the foothills and valleys of the Sangre de Cristo Mountains. Coal-bearing strata on the western limb of the basin crop out in a narrow belt several miles in width. They dip steeply to the east, and locally may be vertical or overturned. In contrast, coal-bearing strata on the eastern limb have low dips and are exposed over most of the areal extent of the basin.

As shown in table 5, the coal in the Raton field occurs in the Vermejo formation of Upper Cretaceous age, and in the Raton formation of late Upper Cretaceous and Paleocene age. 35/ The coal beds in the Vermejo formation generally are more persistent in areal extent and in thickness than coal beds in the Raton formation. Most of the coal is of high volatile B bituminous rank, and has coking qualities. Representative analyses are given in table 2.

The Vermejo formation thins from a maximum of 425 feet thick in the northwestern part of the field to only a few feet thick in the vicinity of the mining camp at Van Houten and the city of Raton, and it is absent east of Raton. Coal beds occur throughout the vertical and lateral extent of the formation, and much of the coal produced in the Raton field has been mined from beds in this formation. The Raton coal bed, which lies in the lower part of the Vermejo formation, has been an important western source of coking coal. Several of the larger mines in the southeastern and eastern part of the field have removed coal from the Raton bed or from beds considered to be its stratigraphic equivalent. No other commercially valuable coal beds in the Vermejo formation are known to be as extensive along the outcrop, as thick, or as persistent as the Raton bed.

The Raton formation ranges from approximately 1,000 to 1,700 feet in thickness. Incomplete data suggest that it may thin gradually from west to east. Coal beds occur throughout the lateral extent of the formation. On the western margin of the Raton coal field, however, the strata consist mostly of conglomerate and sandstone beds with a small percentage of shale and coal beds. In the eastern part of the field, in contrast, the strata consist of shale and sandstone beds, with a varying number of coal beds. In the central and eastern parts of the field the formation has been divided into two coal-bearing zones that are separated by approximately 300 feet of strata. The lower of the coal-bearing zones, averaging about 100 feet in thickness, lies a few feet above the basal sandstone beds of the formation. The only known commercial bed in this zone is the Sugarite coal bed. It has been traced laterally from a point a short distance east of the Sugarite mine to the vicinity of the mining camp at Van Houten. The upper coal-bearing zone averages about 500 feet in thickness. The oldest commercial coal in this zone was named the Yankee coal bed. It was mined east of Raton and traced for a distance of approximately five miles to the northeast of Raton. A number of small coal beds overlie the Yankee bed and underlie the Tinpan bed. The Tinpan coal bed is believed to extend over the greatest acreage of any of the coal beds present in the upper coal zone. It has been traced in a southwesterly direction from the coal mine at Brilliant to Potato Canyon, a tributary of the Canadian River. Several coal beds of diverse thickness crop out in local areas and lie over the Tinpan bed and under the Potato Canyon bed. No coal beds in this interval are known to be commercially valuable. Correlation of the Potato Canyon coal bed beyond the confines of the canyon of the same name is uncertain. A number of coal beds, some of which may be of economic value, overlie the Potato Canyon bed.

Most of the major coal beds in the Raton field contain shale or rock partings, which in some areas have adversely influenced development. Mining activities, in general, have been limited to the southeastern and eastern parts of the field. In 1948, two large companies were operating mines in the Raton coal field. Wagon mines were also being operated in the vicinity of Raton.

# CONCLUSIONS

New Mexico's coal reserves, which according to the present estimate total 61 billion tons, are more than adequate for present needs, and will support an expanded industrial economy. The estimate is believed to be a conservative statement of the total potential reserves in the ground, but it is based in part on insufficient data, and thus is subject to considerable modification in the future. In particular, the present estimate of less than 1.5 billion tons of measured reserves, is quite small in proportion to the total estimated reserves. Rigid standards are applied to coal included in the measured category, however, and the geologic and exploratory data necessary to permit the classification of reserves as measured were available only in a few localities. Additional geologic mapping and exploration in areas where little such exploration has been carried out, notably the western part of the San Juan Basin region, the Datil Mountain field, and the Sierra Blanca field, as well in the better known areas, should greatly increase the measured reserves in New Mexico.

Although an entirely adequate appraisal of the coal reserves of New Mexico can be obtained only after all areas of coal-bearing rocks have been carefully mapped, and the expansion of transportation facilities has made possible the development of remote areas, it is hoped that the present appraisal will serve to indicate the location and extent of coal reserves sufficient to supply present needs, and will provide the groundwork to which new reserve data can be readily added as further mapping and exploration is carried on in the various coal fields in the State.

Table 6. - Measured original reserves of subbituminous coal in New Mexico
(In millions of short tons)

| Region and county | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Region and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | |
| **Fruitland coal** | | | | | | | | | | | | | | | | |
| San Juan River region | | | | | | | | | | | | | | | | |
| McKinley County..... | 2.6 | 1.7 | ... | 4.3 | ... | ... | ... | ... | ... | ... | ... | ... | 2.6 | 1.7 | ... | 4.3 |
| Rio Arriba County... | 0.9 | ... | ... | 0.9 | ... | ... | ... | ... | ... | ... | ... | ... | 0.9 | ... | ... | 0.9 |
| Sandoval County..... | 0.1 | 0.1 | ... | 0.2 | ... | ... | ... | ... | ... | ... | ... | ... | 0.1 | 0.1 | ... | 0.2 |
| San Juan County..... | 208.4 | 160.6 | 145.1 | 514.1 | ... | ... | ... | ... | ... | ... | ... | ... | 208.4 | 160.6 | 145.1 | 514.1 |
| Total.............. | 212.0 | 162.4 | 145.1 | 519.5 | ... | ... | ... | ... | ... | ... | ... | ... | 212.0 | 162.4 | 145.1 | 519.5 |
| **Mesaverde coal** | | | | | | | | | | | | | | | | |
| San Juan River region | | | | | | | | | | | | | | | | |
| Bernalillo County... | 1.0 | ... | ... | 1.0 | ... | ... | | ... | ... | ... | ... | ... | 1.0 | ... | ... | 1.0 |
| McKinley County..... | 183.6 | 40.2 | 5.7 | 229.5 | ... | ... | ... | ... | ... | ... | ... | ... | 183.6 | 40.2 | 5.7 | 229.5 |
| Rio Arriba County... | 4.1 | 0.9 | ... | 5.0 | ... | ... | ... | ... | ... | ... | ... | ... | 4.1 | 0.9 | ... | 5.0 |
| Sandoval County..... | 42.7 | 23.8 | 0.8 | 67.3 | ... | ... | ... | ... | ... | ... | ... | ... | 42.7 | 23.8 | 0.8 | 67.3 |
| San Juan County..... | 0.6 | 0.7 | ... | 1.3 | ... | ... | ... | ... | ... | ... | ... | ... | 0.6 | 0.7 | ... | 1.3 |
| Valencia County..... | 2.8 | 0.1 | ... | 2.9 | ... | ... | ... | ... | ... | ... | ... | ... | 2.8 | 0.1 | ... | 2.9 |
| Total.............. | 234.8 | 65.7 | 6.5 | 307.0 | ... | ... | ... | ... | ... | ... | ... | ... | 234.8 | 65.7 | 6.5 | 307.0 |
| Grand total.......... | 446.8 | 228.1 | 151.6 | 826.5 | .... | ... | ... | ... | ... | ... | ... | ... | 446.8 | 228.1 | 151.6 | 826.5 |

Table 7. - Indicated original reserves of subbituminous coal in New Mexico
(In millions of short tons)

| Region and county | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Region and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | |
| **Fruitland coal** | | | | | | | | | | | | | | | | |
| San Juan River region | | | | | | | | | | | | | | | | |
| McKinley County | 42.4 | 16.8 | ... | 59.2 | ... | ... | ... | ... | ... | ... | ... | ... | 42.4 | 16.8 | ... | 59.2 |
| Rio Arriba County | 0.8 | ... | ... | 0.8 | ... | ... | ... | ... | ... | ... | ... | ... | 0.8 | ... | ... | 0.8 |
| Sandoval County | 0.5 | ... | ... | 0.5 | ... | ... | ... | ... | ... | ... | ... | ... | 0.5 | ... | ... | 0.5 |
| San Juan County | 573.8 | 269.0 | 148.7 | 991.5 | 9.0 | 36.2 | 121.3 | 166.5 | 1.1 | 12.1 | ... | 13.2 | 583.9 | 317.3 | 270.0 | 1,171.2 |
| Total | 617.5 | 285.8 | 148.7 | 1,052.0 | 9.0 | 36.2 | 121.3 | 166.5 | 1.1 | 12.1 | ... | 13.2 | 627.6 | 334.1 | 270.0 | 1,231.7 |
| **Mesaverde coal** | | | | | | | | | | | | | | | | |
| San Juan River region | | | | | | | | | | | | | | | | |
| McKinley County | 131.1 | 37.2 | 11.9 | 180.2 | ... | ... | ... | ... | ... | ... | ... | ... | 131.1 | 37.2 | 11.9 | 180.2 |
| Rio Arriba County | 28.5 | 2.1 | ... | 30.6 | ... | ... | ... | ... | ... | ... | ... | ... | 28.5 | 2.1 | ... | 30.6 |
| Sandoval County | 240.1 | 23.2 | 0.3 | 263.6 | 51.9 | 2.9 | ... | 54.8 | 2.5 | ... | ... | 2.5 | 294.5 | 26.1 | 0.3 | 320.9 |
| San Juan County | 4.1 | 0.1 | ... | 4.2 | ... | ... | ... | ... | ... | ... | ... | ... | 4.1 | 0.1 | ... | 4.2 |
| Total | 403.8 | 62.6 | 12.2 | 478.6 | 51.9 | 2.9 | ... | 54.8 | 2.5 | ... | ... | 2.5 | 458.2 | 65.5 | 12.2 | 535.9 |
| Grand total | 1,021.3 | 348.4 | 160.9 | 1,530.6 | 60.9 | 39.1 | 121.3 | 221.3 | 3.6 | 12.1 | .... | 15.7 | 1,085.8 | 399.6 | 282.2 | 1,767.6 |

Table 8.—Inferred original reserves of subbituminous coal in New Mexico
(In millions of short tons)

| Region and county | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Region and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | Total | In beds 2½ to 5 feet thick | In beds 5 to 10 feet thick | In beds more than 10 feet thick | |
| **Fruitland coal** | | | | | | | | | | | | | | | | |
| San Juan River region | | | | | | | | | | | | | | | | |
| McKinley County | 84.6 | ... | ... | 84.6 | ... | ... | ... | ... | ... | ... | ... | ... | 84.6 | ... | ... | 84.6 |
| Sandoval County | 1,014.2 | 987.1 | ... | 2,001.3 | 86.9 | 601.4 | 537.8 | 1,226.1 | 292.2 | 448.6 | 778.8 | 1,519.6 | 1,393.3 | 2,037.1 | 1,316.6 | 4,747.0 |
| Total | 1,098.8 | 987.1 | ... | 2,085.9 | 86.9 | 601.4 | 537.8 | 1,226.1 | 292.2 | 448.6 | 778.8 | 1,519.6 | 1,477.9 | 2,037.1 | 1,316.6 | 4,831.6 |
| **Mesaverde coal** | | | | | | | | | | | | | | | | |
| San Juan River region | | | | | | | | | | | | | | | | |
| McKinley County | 21.4 | ... | ... | 21.4 | ... | ... | ... | ... | ... | ... | ... | ... | 21.4 | ... | ... | 21.4 |
| Sandoval County | 106.8 | 10.5 | ... | 117.3 | 78.4 | 142.4 | ... | 220.8 | 209.8 | ... | ... | 209.8 | 395.0 | 152.9 | ... | 547.9 |
| Total | 128.2 | 10.5 | ... | 138.7 | 78.4 | 142.4 | ... | 220.8 | 209.8 | ... | ... | 209.8 | 416.4 | 152.9 | ... | 569.3 |
| Grand total | 1,227.0 | 997.6 | ... | 2,224.6 | 165.3 | 743.8 | 537.8 | 1,446.9 | 502.0 | 448.6 | 778.8 | 1,729.4 | 1,894.3 | 2,190.0 | 1,316.6 | 5,400.9 |

Table 9. - Measured original reserves of bituminous coal in New Mexico
(In millions of short tons)

| Region or field and county | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Region and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | |
| San Juan River region | | | | | | | | | | | | | | | | |
| Rio Arriba County (Mesaverde formation) | 3.8 | 2.9 | 0.3 | 7.0 | ... | ... | ... | ... | ... | ... | ... | ... | 3.8 | 2.9 | 0.3 | 7.0 |
| San Juan County (Mesaverde formation) | 6.0 | 10.0 | 33.1 | 49.1 | ... | ... | ... | ... | ... | ... | ... | ... | 6.0 | 10.0 | 33.1 | 49.1 |
| Raton field | | | | | | | | | | | | | | | | |
| Colfax County (Vermejo and Raton formations) | 54.9 | 133.5 | 379.5 | 567.9 | ... | ... | ... | ... | ... | ... | ... | ... | 54.9 | 133.5 | 379.5 | 567.9 |
| Miscellaneous small fields | | | | | | | | | | | | | | | | |
| Bernalillo County (Tijeras field) | 0.4 | ... | ... | 0.4 | ... | ... | ... | ... | ... | ... | ... | ... | 0.4 | ... | ... | 0.4 |
| Lincoln County (Sierra Blanca field) | 1.0 | 1.1 | 1.2 | 3.3 | ... | ... | ... | ... | ... | ... | ... | ... | 1.0 | 1.1 | 1.2 | 3.3 |
| Sandoval County (Una del Gato field) | 0.2 | 0.4 | ... | 0.6 | ... | ... | ... | ... | ... | ... | ... | ... | 0.2 | 0.4 | ... | 6.6 |
| Santa Fe County (Cerrillos field) | 1.9 | 3.4 | 0.9 | 5.2 | 0.4 | ... | ... | 0.4 | ... | ... | ... | ... | 2.3 | 3.4 | 0.9 | 5.6 |
| Socorro County (Carthage and Jornada del Muerto fields) | 4.6 | 0.6 | 14.5 | 19.7 | ... | ... | ... | ... | ... | ... | ... | ... | 4.6 | 0.6 | 14.5 | 19.7 |
| Total | 72.8 | 151.9 | 429.5 | 654.2 | 0.4 | ... | ... | 0.4 | ... | ... | ... | ... | 73.2 | 151.9 | 429.5 | 654.6 |

**Table 10. - Indicated original reserves of bituminous coal in New Mexico**
**(In millions of short tons)**

| Region or field and county | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Region and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | |
| <u>San Juan River region</u> | | | | | | | | | | | | | | | | |
| Rio Arriba County (Mesaverde formation) | 5.3 | 1.3 | ... | 6.6 | ... | ... | ... | ... | ... | ... | ... | ... | 5.3 | 1.3 | ... | 6.6 |
| San Juan County (Mesaverde formation) | 15.2 | 20.5 | 31.1 | 66.8 | ... | ... | ... | ... | ... | ... | ... | ... | 15.2 | 20.5 | 31.1 | 66.8 |
| <u>Raton field</u> | | | | | | | | | | | | | | | | |
| Colfax County (Vermejo and Raton formations) | 321.6 | 297.9 | 570.1 | 1,189.6 | 1.1 | 36.5 | 69.4 | 107.0 | ... | ... | ... | ... | 322.7 | 334.4 | 639.5 | 1,296.6 |
| <u>Miscellaneous small fields)</u> | | | | | | | | | | | | | | | | |
| Bernalillo County (Tijeras field) | 1.2 | ... | ... | 1.2 | ... | ... | ... | ... | ... | ... | ... | ... | 1.2 | ... | ... | 1.2 |
| Lincoln County (Sierra Blanca field) | 3.4 | 4.6 | ... | 8.0 | ... | ... | ... | ... | ... | ... | ... | ... | 3.4 | 4.6 | ... | 8.0 |
| Sandoval County (Una del Gato field) | 3.9 | 3.1 | ... | 7.0 | 2.9 | 2.8 | ... | 5.7 | 2.6 | 0.6 | ... | 3.2 | 9.4 | 6.5 | ... | 15.9 |
| Santa Fe County (Cerrillos field) | 6.6 | 4.7 | 0.1 | 11.4 | 3.1 | 0.1 | ... | 3.2 | ... | ... | ... | ... | 9.7 | 4.8 | 0.1 | 14.6 |
| Socorro County (Carthage and Jornada del Muerto fields) | 1.9 | 2.1 | 10.3 | 14.3 | ... | ... | ... | ... | ... | ... | ... | ... | 1.9 | 2.1 | 10.3 | 14.3 |
| Total | 359.1 | 334.2 | 611.6 | 1,304.9 | 7.1 | 39.4 | 69.4 | 115.9 | 2.6 | 0.6 | ... | 3.2 | 368.8 | 374.2 | 681.0 | 1,424.0 |

Table 11. - Inferred original reserves of bituminous coal in New Mexico
(In millions of short tons)

| Region or field and county | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Region and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | |
| **San Juan River region** | | | | | | | | | | | | | | | | |
| San Juan County (Mesaverde formation) | ... | ... | 12.4 | 12.4 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 12.4 | 12.4 |
| **Raton field** | | | | | | | | | | | | | | | | |
| Colfax County (Vermejo and Raton formations) | 328.7 | 27.1 | 347.4 | 703.2 | 668.5 | 355.4 | 715.3 | 1,739.2 | 25.2 | ... | 376.9 | 402.1 | 1,022.4 | 382.5 | 1,439.6 | 2,844.5 |
| **Miscellaneous small fields** | | | | | | | | | | | | | | | | |
| Sandoval County (Una del Gato field) | 0.5 | ... | ... | 0.5 | 0.2 | ... | ... | 0.2 | 0.1 | ... | ... | 0.1 | 0.8 | ... | ... | 0.8 |
| Santa Fe County (Cerrillos field) | 0.7 | ... | ... | 0.7 | 25.6 | ... | ... | 25.6 | ... | ... | ... | ... | 26.3 | ... | ... | 26.3 |
| Socorro County (Carthage and Jornada del Muerto fields) | 4.4 | ... | 0.3 | 4.7 | ... | ... | ... | ... | ... | ... | ... | ... | 4.4 | ... | 0.3 | 4.7 |
| Total | 334.3 | 27.1 | 360.1 | 721.5 | 694.3 | 355.4 | 715.3 | 1,765.0 | 25.3 | ... | 376.9 | 402.2 | 1,053.9 | 382.5 | 1,452.3 | 2,888.7 |

Table 12. - Original reserves of anthracite in New Mexico
(In millions of short tons)

| Field and County | 0 - 1,000 feet overburden | | | | 1,000 - 2,000 feet overburden | | | | 2,000 - 3,000 feet overburden | | | | Total in all overburden categories | | | Field and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | Total | In beds 14 to 28 in. thick | In beds 28 to 42 in. thick | In beds more than 42 inches thick | |
| **Measured reserves** | | | | | | | | | | | | | | | | |
| Cerrillos field (Mesaverde formation) Santa Fe County | 0.9 | 1.4 | 0.5 | 2.8 | ... | ... | ... | ... | ... | ... | ... | ... | 0.9 | 1.4 | 0.5 | 2.8 |
| **Indicated reserves** | | | | | | | | | | | | | | | | |
| Cerrillos field (Mesaverde formation) Santa Fe County | 2.5 | 0.3 | 0.1 | 2.9 | ... | ... | ... | ... | ... | ... | ... | ... | 2.5 | 0.3 | 0.1 | 2.9 |
| Total | 3.4 | 1.7 | 0.6 | 5.7 | ... | ... | ... | ... | ... | ... | ... | ... | 3.4 | 1.7 | 0.6 | 5.7 |

Table 13. - Inferred original reserves of coal on coal zone basis in New Mexico
(In millions of short tons)

| County | Subbituminous coal (Beds at least 30 inches thick) | | | | | | | | Bituminous coal (Beds at least 14 inches thick) | | | | Total, all ranks | | | Region, field, and county totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruitland coal | | | | Mesaverde coal | | | | | | | | | | | |
| | Overburden in feet | | | | Overburden in feet | | | | Overburden in feet | | | | Overburden in feet | | | |
| | 0-1000 | 1000-2000 | 2000-3000 | Total | 0-1000 | 1000-2000 | 2000-3000 | Total | 0-1000 | 1000-2000 | 2000-3000 | Total | 0-1000 | 1000-2000 | 2000-3000 | |
| **San Juan River region** | | | | | | | | | | | | | | | | |
| McKinley | 14.2 | 3.9 | .... | 18.1 | 9,916.2 | 1,845.0 | 836.2 | 12,597.4 | .... | .... | .... | .... | 9.930.4 | 1,848.9 | 836.2 | 12,615.5 |
| Rio Arriba | 40.6 | 84.5 | 2,010.6 | 2,135.7 | 252.8 | 100.6 | 117.3 | 470.7 | 186.7 | 77.3 | 126.3 | 390.3 | 480.1 | 262.4 | 2,254.2 | 2,996.7 |
| Sandoval | 303.5 | 593.7 | 712.4 | 1,609.6 | 495.3 | 970.2 | 933.6 | 2,399.1 | .... | .... | .... | .... | 798.8 | 1,563.9 | 1,646.0 | 4,008.7 |
| San Juan | 1,224.3 | 3,067.6 | 5,027.9 | 9,319.8 | 3,100.9 | 5,906.3 | 3,650.0 | 12,657.2 | 1,432.9 | 1,127.6 | 1,396.9 | 3,957.4 | 5,758.1 | 10,101.5 | 10,074.8 | 25,934.4 |
| Valencia | .... | .... | .... | .... | 278.4 | .... | .... | 278.4 | .... | .... | .... | .... | 278.4 | .... | .... | 278.4 |
| Total | 1,582.6 | 3,749.7 | 7,750.9 | 13,083.2 | 14,043.6 | 8,822.1 | 5,537.1 | 28,402.8 | 1,619.6 | 1,204.9 | 1,523.2 | 4,347.7 | 17,245.8 | 13,776.7 | 14,811.2 | 45,833.7 |
| **Datil Mountain field** | | | | | | | | | | | | | | | | |
| Catron | .... | .... | .... | .... | 80.2 | 187.2 | .... | 267.4 | .... | .... | .... | .... | 80.2 | 187.2 | .... | 267.4 |
| Socorro | .... | .... | .... | .... | 109.9 | .... | .... | 109.9 | .... | .... | .... | .... | 109.9 | .... | .... | 109.9 |
| Valencia | .... | .... | .... | .... | 547.2 | 395.7 | .... | 942.9 | .... | .... | .... | .... | 547.2 | 395.7 | .... | 942.9 |
| Total | .... | .... | .... | .... | 737.3 | 582.9 | .... | 1,320.2 | .... | .... | .... | .... | 737.3 | 582.9 | .... | 1,320.2 |
| **Sierra Blanca field** | | | | | | | | | | | | | | | | |
| Lincoln | .... | .... | .... | .... | .... | .... | .... | .... | 679.8 | 457.1 | 268.4 | 1,405.3 | 679.8 | 457.1 | 268.4 | 1,405.3 |
| Otero | .... | .... | .... | .... | .... | .... | .... | .... | 78.5 | 101.6 | 47.3 | 227.4 | 78.5 | 101.6 | 47.3 | 227.4 |
| Total | .... | .... | .... | .... | .... | .... | .... | .... | 758.3 | 558.7 | 315.7 | 1,632.7 | 758.3 | 558.7 | 315.7 | 1,632.7 |
| Total | 1,582.6 | 3,749.7 | 7,750.9 | 13,083.2 | 14,780.9 | 9,405.0 | 5,537.1 | 29,723.0 | 2,377.9 | 1,763.6 | 1,838.9 | 5,980.4 | 18,741.4 | 14,918.3 | 15,126.9 | 48,786.6 |

*These tonnages are in addition to those computed on the coal bed basis (Tables 6-12)

Table 14. - Total original coal reserves of New Mexico
(In millions of short tons)

| Region or field and county | Subbituminous coal (Beds more than 30 inches thick) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruitland formation | | | | | Mesaverde formation | | | | | Total Subbituminous coal |
| | Calculated on coal bed basis | | | Additional inferred on coal zone basis (Table 13) | Total Fruitland formation | Calculated on coal bed basis | | | Additional inferred on coal zone basis (Table 13) | Total Mesaverde formation | |
| | Measured (Table 6) | Indicated (Table 7) | Inferred (Table 8) | | | Measured (Table 6) | Indicated (Table 7) | Inferred (Table 8) | | | |
| **San Juan River region** | | | | | | | | | | | |
| Bernalillo County | ... | ... | ... | ... | ... | 1.0 | ... | .... | ... | 1.0 | 1.0 |
| McKinley County | 4.3 | 59.2 | 84.6 | 18.1 | 166.2 | 229.5 | 180.2 | 21.4 | 12,597.4 | 13,028.5 | 13,194.7 |
| Rio Arriba County | 0.9 | 0.8 | ... | 2,135.7 | 2,137.4 | 5.0 | 30.6 | ... | 470.7 | 506.3 | 2,643.7 |
| Sandoval Sounty | 0.2 | 0.5 | ... | 1,609.6 | 1.610.3 | 67.3 | 320.9 | 547.9 | 2,399.1 | 3,335.2 | 4,945.5 |
| San Juan County | 514.1 | 1,171.2 | 4,747.0 | 9,319.8 | 15,752.1 | 1.3 | 4.2 | ... | 12,657.2 | 12,662.7 | 28,414.8 |
| Valencia County | ... | ... | ... | ... | ... | 2.9 | ... | ... | 278.4 | 281.3 | 281.3 |
| **Raton field** | | | | | | | | | | | |
| Colfax County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **Miscellaneous small fields:** | | | | | | | | | | | |
| **Carthage and Jornada del Muerto fields** | | | | | | | | | | | |
| Socorro County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **Cerrillos field** | | | | | | | | | | | |
| Santa Fe County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **Datil Mountain field** | | | | | | | | | | | |
| Catron County | ... | ... | ... | ... | ... | ... | ... | ... | 267.4 | 267.4 | 267.4 |
| Socorro County | ... | ... | ... | ... | ... | ... | ... | ... | 109.9 | 109.9 | 109.9 |
| Valencia County | ... | ... | ... | ... | ... | ... | ... | ... | 942.9 | 942.9 | 942.9 |
| **Sierra Blanca field** | | | | | | | | | | | |
| Lincoln County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | .... |
| Otero County | ... | ... | ... | ... | ... | .... | ... | ... | ... | ... | ... |
| **Tijeras field** | | | | | | | | | | | |
| Bernalillo County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **Una del Gato field** | | | | | | | | | | | |
| Sandoval County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total original reserves | 519.5 | 1,231.7 | 4,831.6 | 13,083.2 | 19,666.0 | 307.0 | 535.9 | 569.3 | 29,723.0 | 31,135.2 | 50,801.2 |

Table 14 (continued). - Total original coal reserves of New Mexico
(In millions of short tons)

| Region or field and county | Bituminous coal (Beds more than 14 inches thick) |  |  |  |  | Anthracite (Beds more than 14 inches thick) |  |  | Total, all ranks |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Mesaverde, Raton, and Vermejo formations |  |  |  |  | Mesaverde formation |  |  |  |  |  |  |  |
|  | Calculated on coal bed basis |  |  | Additional inferred on coal zone basis (Table 13) | Total Bituminous coal | Calculated on coal bed basis |  | Total anthracite | Calculated on coal bed basis |  |  | Additional inferred on coal zone basis | Total |
|  | Measured (Table 9) | Indicated (Table 10) | Inferred (Table 11) |  |  | Measured (Table 12) | Indicated (Table 12) |  | Measured | Indicated | Inferred |  |  |
| San Juan River region |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bernalillo County | ... | ... | ... | ... | ... | ... | ... | ... | 1.0 | ... | .... | ... | 1.0 |
| McKinley County | ... | ... | ... | ... | ... | ... | ... | ... | 233.8 | 239.4 | 106.0 | 12,615.5 | 13,194.7 |
| Rio Arriba County | 7.0 | 6.6 | ... | 390.3 | 403.9 | ... | ... | ... | 12.9 | 38.0 | ... | 2,996.7 | 3,047.6 |
| Sandoval County | ... | ... | ... | ... | ... | ... | ... | ... | 67.5 | 321.4 | 547.9 | 4,008.7 | 4,945.5 |
| San Juan County | 49.1 | 66.8 | 12.4 | 3,957.4 | 4,085.7 | ... | ... | ... | 564.5 | 1,242.2 | 4,759.4 | 25,934.4 | 32,500.5 |
| Valencia County | ... | ... | ... | ... | ... | ... | ... | ... | 2.9 | ... | ... | 278.4 | 281.3 |
| Raton field |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Colfax County | 567.9 | 1,296.6 | 2,844.5 | ... | 4,709.0 | ... | ... | ... | 567.9 | 1,296.6 | 2,844.5 | ... | 4,709.0 |
| Miscellaneous small fields |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Carthage and Jornado del Muerto fields |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Socorro County | 19.7 | 14.3 | 4.7 | .... | 38.7 | ... | ... | ... | 19.7 | 14.3 | 4.7 | ... | 38.7 |
| Cerrillos field |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Santa Fe County | 6.6 | 14.6 | 26.3 | ... | 47.5 | 2.8 | 2.9 | 5.7 | 9.4 | 17.5 | 26.3 | ... | 53.2 |
| Datil Mountain field |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Catron County | ... | ... | ... | ... | .... | ... | ... | ... | ... | ... | ... | 267.4 | 267.4 |
| Socorro County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 109.9 | 109.9 |
| Valencia County | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 942.9 | 942.9 |
| Sierra Blanca field |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lincoln County | 3.3 | 8.0 | ... | 1,405.3 | 1,416.6 | ... | ... | ... | 3.3 | 8.0 | ... | 1,405.3 | 1,416.6 |
| Otero County | ... | ... | ... | 227.4 | 227.4 | ... | ... | ... | ... | ... | ... | 227.4 | 227.4 |
| Tijeras field |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Bernalillo County | 0.4 | 1.2 | ... | ... | 1.6 | ... | ... | ... | 0.4 | 1.2 | ... | ... | 1.6 |
| Una del Gato field |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sandoval County | 0.6 | 15.9 | 0.8 | ... | 17.3 | ... | ... | ... | 0.6 | 15.9 | 0.8 | ... | 17.3 |
| Total original reserves | 654.6 | 1,424.0 | 2,888.7 | 5,980.4 | 10.947.7 | 2.8 | 2.8 | 5.7 | 1,483.9 | 3,194.5 | 8,289.6 | 48,786.6 | 61,754.6 |

Table 15. - Coal production in New Mexico, 1882 to 1948*
(In short tons)

| County | 1948-1941 | 1940-1931 | 1930-1921 | 1920-1911 | 1910-1901 | 1900-1891 | 1890-1882 | Total |
|---|---|---|---|---|---|---|---|---|
| Colfax | 7,477,831 | 6,844,220 | 16,553,026 | 27,330,375 | 12,723,568 | -- | 1,215,107 | |
| McKinley | 2,860,274 | 5,044,577 | 7,730,857 | 7,515,867 | -- | -- | 787,284 | |
| Bernalillo | 16,964 | 3,211 | -- | -- | -- | -- | 526,136 | |
| Rio Arriba | 160,270 | 204,675 | -- | -- | -- | -- | 131,218 | |
| Sandoval | 36,950 | -- | -- | -- | -- | 7,760,933 | -- | |
| San Juan | 54,284 | -- | 2,584,193 | 1,867,184 | 7,413,753 | -- | 1,410 | |
| Santa Fe | 577,700 | 1,325,315 | -- | -- | -- | -- | 408,568 | |
| Socorro | 32,356 | -- | -- | -- | -- | -- | 187,883 | |
| Lincoln | -- | -- | -- | -- | -- | -- | 6,575 | |
| Small mines ** | -- | -- | -- | 14,964 | 15,563 | -- | 6,140 | |
| Total | 11,216,629 | 13,421,998 | 26,868,076 | 36,728,390 | 20,152,884 | 7,760,933 | 3,270,321 | 119,419,231 |

* Compiled from the reports on mineral resources of the United States and from reports of the New Mexico State Inspector of Mines.

** Not reported by county.

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## INDEX TO BIBLIOGRAPHY


| | Reference number in bibliography |
|---|---|
| General | 1, 17 |
| Alamosa Creek Valley (Socorro County) | 26 |
| Analyses: | 19, 21, 22, 33 |
| Bernalillo County | 16, 31 |
| Brilliant quadrangle (Colfax County) | 27 |
| Carthage field (Socorro County) | 14 |
| Cerrillos field (Santa Fe County) | 18, 36 |
| Chacra Mesa field (McKinley, Sandoval, and San Juan Counties) | 32 |
| Colfax County | 24, 27, 28 |
| Cuba field (McKinley and Sandoval Counties) | 15 |
| Datil Mountain field (Socorro County) | 26 |
| Durango field (McKinley, Rio Arriba, and San Juan Counties) | 5, 8, 9 |
| Engle field (Sierra County) | 4 |
| Fort Stanton field (Lincoln County) (See Sierra Blanca field) | 6 |
| Gallina field (McKinley and Sandoval Counties) | 10 |
| Gallup field (McKinley and San Juan Counties) | 5, 8, 11, 23, 29 |
| Hagan field (Sandoval County) (See Una del Gato field) | 2, 7 |
| Koehler quadrangle (Colfax County) | 27 |
| La Ventana field (McKinley, Sandoval, and San Juan Counties) | 32 |
| Lincoln County | 3, 6, 20 |
| McKinley County | 5, 8, 10, 11, 15, 23, 29, 30, 31, 32 |
| Monero field (Rio Arriba County) | 9 |
| Mount Taylor field (Bernalillo, McKinley, Sandoval, and Valencia Counties) | 31 |
| Omara field (Santa Fe County) | 13 |
| Otero County | 20 |
| Pecos River field (San Miguel County) | 13 |
| Raton field (Colfax County) | 24, 27, 28 |
| Raton quadrangle (Colfax County) | 27 |
| Raton Spring field (McKinley and Sandoval Counties) | 10 |
| Rio Arriba County | 9 |
| Sandoval County | 2, 7, 10, 15, 31, 32 |
| San Juan County | 5, 8, 25, 32 |
| San Juan River region (Bernalillo, McKinley, Rio Arriba, Sandoval, San Juan, and Valencia Counties) | 5, 8, 9, 10, 11, 15, 23, 25, 29, 30, 31, 32 |
| San Mateo field (McKinley, Sandoval, and Valencia Counties) | 11, 15 |
| San Miguel County | 12, 13 |
| Santa Fe County | 13, 18, 36 |
| Sierra Blanca field (Lincoln and Otero Counties) | 3, 6, 20 |
| Sierra County | 4 |
| Socorro County | 12, 14, 26 |
| Tijeras field (Bernalillo County) | 16 |
| Una del Gato field (Sandoval County) | 2, 7 |
| Valencia County | 11, 29, 31 |
| White Mountain field (Lincoln County) (See Sierra Blanca field) | 3 |
| Zuni Indian Reservation (McKinley and Valencia Counties) | 29 |




Interior—Duplicating Section, Washington, D. C. 84341