

NORTH DAKOTA STATE AGENCY



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PUBLIC DOCUMENT

NUMBER 19

Sixth Biennial Report

OF THE

State Engineer

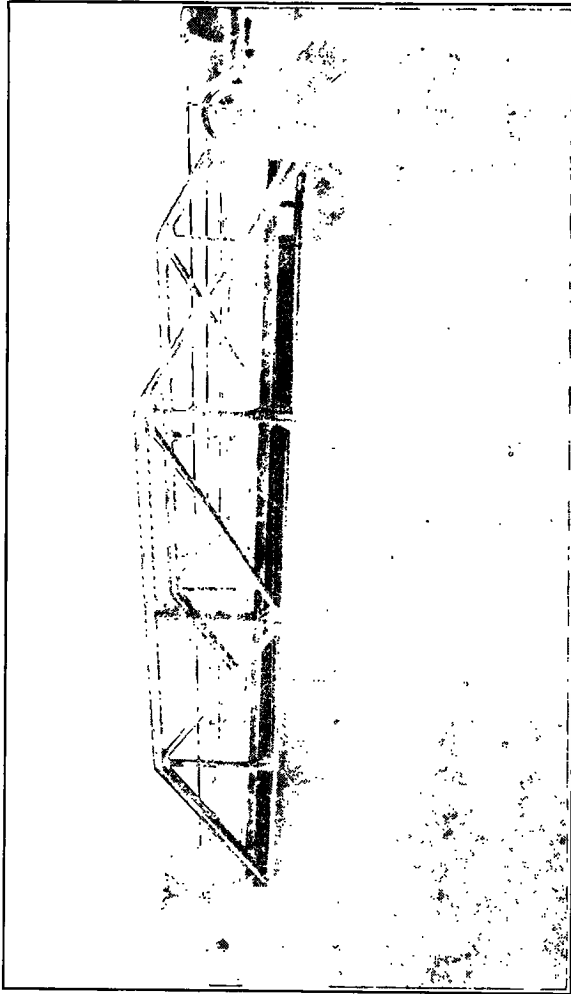
TO THE

Governor of
North Dakota

FOR THE

Years 1913-1914

JOURNAL PUBLISHING CO.
DEVILS LAKE, N. D.
STATE PRINTERS
1914



STEEL HIGHWAY BRIDGE ACROSS BEAVER CREEK, BILLINGS COUNTY,
DESIGNED BY THE STATE ENGINEER'S OFFICE; BUILT BY
GREAT NORTHERN BRIDGE COMPANY OF MINNEAPOLIS.

LETTER OF TRANSMITTAL

Bismarck, North Dakota, Sept. 1, 1914

HONORABLE L. B. HANNA, Governor.

Sir: As provided by our statutes I have the honor to transmit herewith report of the transactions of the department of the state engineer, from September 30, 1912 to June 30, 1914.

Very respectfully yours,

JAY W. BLISS,
State Engineer.

**LIST OF OFFICERS AND EMPLOYEES IN THE STATE ENGINEER'S
OFFICE DURING BIENNIAL PERIOD**

September 30, 1912 to April 7, 1913

T. R. Atkinson.....State Engineer
Jay W. Bliss.....Assistant State Engineer
J. M. Hansen.....Instrument Man
Donald McDonald.....Draughtsman
Ruby Schumann.....Stenographer

April 7, 1913 to August 1, 1913

Jay W. Bliss.....Assistant State Engineer
Kristian Senstad (June 10 to Aug. 1).....Bridge Engineer
J. A. Davenport (May 1 to Aug. 1).....Instrument Man
Donald McDonald (April 7 to 22).....Draughtsman
Roscoe Spalding (June 4 to July 14).....Draughtsman
Ernest G. Whipple (May 1 to July 31).....Draughtsman
A. Garben (June 14 to August 1).....Draughtsman
Ruby Schumann.....Stenographer

August 1, 1913 to June 30, 1914

Jay W. Bliss.....State Engineer
W. B. Stevenson (June 22-30).....Assistant State Engineer
A. J. Becker.....Consulting Bridge Engineer
Kristian Senstad (Aug. 1, 1913 to Sept. 30, 1913).....Bridge Engineer
W. H. Robinson (Jan. 20, 1914 to April 13, 1914).....Bridge Engineer
T. B. Wells (Dec. 3, 1913 to Jan. 31, 1914).....Bridge Engineer
J. A. Davenport (Aug. 1, 1913 to Sept. 8, 1913).....Instrument Man
Terence Quirke (Sept. 10-25, 1913).....Instrument Man
I. W. Ward (Nov. 18, 1913, to Jan. 8, 1914).....Instrument Man
Orville Patterson (Apr. 28 to June 30).....Instrument Man
Addison Falconer (June 1-30).....Instrument Man
Mabel Miller (Aug. 15-23, 1913).....Draughtsman
Myron Atkinson (Occasionally).....Draughtsman
Donald McDonald (Oct. 1, 1913 to April 9, 1914).....Draughtsman
E. N. Bliss (Dec. 15, 1913 to Feb. 15, 1914).....Stenographer
Ruby Schumann.....Stenographer

INTRODUCTION

Following the resignation of Mr. T. R. Atkinson as state engineer, on April 7th, 1913, the present state engineer, who at that time was employed as assistant state engineer, took charge of the department under executive direction, and on August 1st, 1913, was appointed state engineer by Governor L. B. Hanna, for Mr. Atkinson's unexpired term.

Mr. Atkinson was state engineer from July 1, 1907, until the date of his resignation. The present state engineer was employed as assistant state engineer from July 1, 1908, until his appointment.

The state engineer has endeavored to conduct the affairs of his department efficiently, and to that end has been pleased to co-operate with the United States Geological Survey, the State Geological Survey, the United States Office of Public Roads, the United States Reclamation Service, the United States Bureau of Mines and the College of Mining Engineering, University of North Dakota.

ACKNOWLEDGMENTS

The state engineer wishes to acknowledge the credit due to the various county auditors and county surveyors of whom he has frequently requested information, which has at all times been cheerfully given;

Also to extend his thanks to the various mine owners and operators for the usually prompt and complete mine statistics they have furnished on request, and the courtesies met with during the inspection of mines;

Also to give credit to the United States Office of Public Roads and the United States Reclamation Service for courtesies extended;

To acknowledge special credit due Dr. E. J. Babcock, Dean of the College of Mining Engineering, and E. F. Chandler, Assistant Engineer of the United States Geological Survey, each of whom has supplied a valuable unit of this report, and to A. J. Becker, Professor of Mechanical Engineering at the State University for assistance in bridge work.

The state engineer desires also to express his sincere appreciation to Mr. T. R. Atkinson, former state engineer, for valuable assistance, counsel, and his continued interest in the success of the office.

FINANCIAL STATEMENT.

| | |
|---|--------------|
| Balance in fund November 1, 1912..... | \$ 679.27 |
| Credit by appropriation..... | 12,000.00 |
| Credit by receipts for field notes..... | 1,208.25 |
| Credit by Williston Lake drainage warrant..... | 256.95 |
| Interest on same..... | 45.75 |
| Credit by refund—Eugene Dietzgen Company..... | 3.12 |
| | \$ 14,193.34 |
| Less expenditures | 10,558.53 |
| Balance in fund June 30, 1914..... | \$ 3,645.81 |
| Total receipts of office..... | \$ 2,197.11 |
| Less—Receipts for field notes..... | \$ 1,208.25 |
| Williston Lake Drainage Warrant.. | 302.70 |
| | \$ 1,510.95 |
| Total receipts deposited with state treasurer to be credited to General Fund..... | \$ 686.16 |

Fees received for field notes are credited to the fund for the Promotion of Irrigation.

STATEMENT OF SUCH SALARIES AND EXPENSES AS HAVE BEEN PAID TO EMPLOYEES OF THE STATE ENGINEER'S OFFICE BY STATE DEPARTMENTS, COUNTIES AND OTHER ORGANIZATIONS FOR WHOM WORK HAS BEEN DONE:

| Name. | Description of Work | Time | Rate | Salary | Expense |
|------------------|---|------------|---------|-----------|-----------|
| Donald McDonald | APRIL, 1913 R. R. Commission map..... | 5 1/2 days | \$ 2.50 | \$ 13.75 | \$ 38.05 |
| Jay W. Bliss | Examining Yellowstone Trail..... | | | | |
| Jay W. Bliss | MAY, 1913 Hillsboro Drain Examination..... | 5 days | | | 18.90 |
| Jay W. Bliss | Good Roads Talk—Lidgerwood..... | 6 1/4 days | | | 14.95 |
| Kristian Senstad | JUNE, 1913 R. R. Commission Map..... | 5 days | 3.00 | 15.00 | |
| Roscoe Spalding | R. R. Commission Map..... | 6 1/4 days | 4.00 | 25.00 | |
| Jay W. Bliss | Road Work at LaMoure..... | | | | 11.00 |
| Jay W. Bliss | Bridge Inspection—Pierce County..... | | | | 25.00 |
| J. A. Davenport | Yellowstone Trail Survey (Bowman County)..... | | | | 36.40 |
| J. A. Davenport | Yellowstone Trail Survey (Hettinger County)..... | | | | 28.60 |
| Kristian Senstad | JULY, 1913 Bridge Plans for Pierce County..... | 8 1/4 days | 4.00 | 34.00 | |
| Kristian Senstad | Bridge Plans for Billings County..... | 1 1/2 days | 5.00 | 60.00 | |
| J. A. Davenport | Bridge Plans for Pierce County..... | 4 days | 4.00 | 16.00 | |
| J. A. Davenport | Lost River Drainage Survey..... | | | | 20.15 |
| Kristian Senstad | AUGUST, 1913 R. R. Commission Map..... | 1 1/2 days | 3.23 | 4.85 | |
| J. A. Davenport | R. R. Commission Map..... | 6 days | 3.22 | 19.32 | |
| J. A. Davenport | Blue Printing for State Auditor..... | 1 day | 3.22 | 3.22 | |
| J. A. Davenport | Map for Commercial Club—Bismarck..... | 2 days | 4.00 | 8.00 | |
| Roscoe Spalding | R. R. Commission Map..... | 13 hours | .65 | 8.45 | |
| Forward | | | | \$ 207.59 | \$ 193.05 |

| Name. | Description of Work | Time | Rate | Salary | Expense |
|-----------------|--|-------------|------|-----------|-----------|
| Forward | | | | \$ 207.59 | \$ 193.05 |
| | NOVEMBER, 1913 | | | | \$ 20.30 |
| Jay W. Bliss | Examining Bowman Irrigation Project. | | | | 4.00 |
| Jay W. Bliss | Inspecting Mercer County Bridge. | | | | |
| | DECEMBER, 1913 | | | | |
| T. B. Wells | Bridge Plans for Dunn County. | 6 days | 2.42 | 14.52 | |
| T. B. Wells | Norway Centennial Commission Map. | 16 1/2 days | 2.42 | 39.38 | |
| | JANUARY, 1914 | | | | |
| T. B. Wells | Inspecting Bridges for Billings County. | 2 1/2 days | 5.00 | 12.50 | 32.35 |
| T. B. Wells | Expense in Connection with Same. | 3 1/2 days | 3.22 | 11.27 | |
| T. B. Wells | Norway Centennial Commission Map. | 10 1/2 days | 5.00 | 52.50 | |
| T. B. Wells | Bridge Plans for Pembina County. | 1 1/2 days | 5.00 | 7.50 | |
| T. B. Wells | Bridge Plans for Mercer County. | 3 1/2 days | 2.42 | 8.47 | |
| Donald McDonald | Map for Tax Commission. | 7 1/2 days | 2.42 | 17.54 | |
| Lorenzo Belk | Norway Centennial Commission Collecting Data for Norway Centennial Commission Map. | 2 days | 2.50 | 5.00 | 5.40 |
| Lorenzo Belk | Expense in Connection with Same. | 8 days | 6.00 | 48.00 | |
| W. H. Robinson | Bridge Plans for Pembina County. | 2 days | 6.00 | 12.00 | |
| W. H. Robinson | Inspecting Wells County Bridge. | | | | 17.75 |
| W. H. Robinson | Expense in Connection with Same. | | | | 6.00 |
| Jay W. Bliss | Good Roads Talk—Grafton. | | | | |
| | FEBRUARY, 1914 | | | | |
| W. H. Robinson | Bridge Plans for Mercer County. | 3 1/2 days | 5.00 | 18.75 | |
| W. H. Robinson | Bridge Plans for Pembina County. | 8 days | 6.00 | 48.00 | |
| W. H. Robinson | Bridge Plans for Wells County. | 6 days | 6.00 | 36.00 | |
| Donald McDonald | Norway Centennial Commission Map. | 3 days | 2.68 | 8.04 | |
| Jay W. Bliss | Good Roads Talk—Minot. | | | | 6.10 |
| Jay W. Bliss | Pembina County Bridge Inspection. | | | | 18.75 |
| Forward | | | | \$ 547.61 | \$ 303.70 |

| Name. | Description of Work | Time | Rate | Salary | Expense |
|-------------------|--|----------|------|-----------|-----------|
| Forward | | | | \$ 547.61 | \$ 303.70 |
| Donald McDonald | MARCH, 1914 | | | | |
| Jay W. Bliss | Maps for Land Commission | 9 days | 2.42 | 21.78 | 2.40 |
| Jay W. Bliss | Good Roads Talk—Cooperstown | | | | 7.50 |
| Jay W. Bliss | Good Roads Talk—Beniah | | | | |
| Donald McDonald | APRIL, 1914 | | | | |
| Orville Patterson | Maps for Land Commission | 9 days | 2.50 | 22.50 | |
| Orville Patterson | Maps for Land Commission | 2½ days | 2.50 | 6.25 | |
| Jay W. Bliss | Cavalier County Bridge Inspection | | | | 5.45 |
| Orville Patterson | MAY, 1914 | | | | |
| Orville Patterson | Maps for Land Commission | 19 days | 2.42 | 45.98 | |
| Orville Patterson | Steele County Road Survey | 11½ days | 2.42 | 27.83 | |
| Adison Falconer | Steele County Road Survey | 8½ days | 2.42 | 20.57 | |
| Jay W. Bliss | Steele County Road Survey—Expense of Party | | | | 146.05 |
| Orville Patterson | JUNE, 1914 | | | | |
| Orville Patterson | Steele County Road Work | 8 days | 2.50 | 20.00 | |
| Orville Patterson | Maps for Land Commission | 1½ days | 2.50 | 3.75 | |
| Orville Patterson | Wells County Bridge Inspection | 10½ days | 2.50 | 26.25 | |
| Orville Patterson | Expense in Connection with Same | | | | 8.10 |
| W. B. Stevenson | Maps for Land Commission | 1 day | 2.83 | 2.83 | |
| Total | | | | \$ 746.35 | \$ 473.20 |

NOTE: The employees of the office for the time given in foregoing table received no compensation from the State. No expense bills shown in this table have been presented to the State.

Summary of the State Engineer' Duties as Prescribed by Law

The state engineer's office was created by the 1905 Legislative Assembly by the adoption of the Irrigation Act. The important work of the office for several years was the making of preliminary investigations of water supply and of irrigable lands in the western part of the state.

Under Section 7666 of the Revised Codes of 1905, it is required of the state engineer to co-operate with such counties as may request engineering assistance in drainage work, since the state is so located that while irrigation is beneficially practiced in the western part, drainage is essential in many eastern counties.

Chapter 52 of the Session Laws of 1907 makes the state engineer ex-officio state coal mine inspector, and under his direction the inspection of lignite coal mines is made. At the request of the board of university and school lands he shall examine any lands belonging to the state by virtue of the Enabling Act and report as to whether they are coal bearing or not within the meaning of the constitution.

Chapter 218 of the 1909 Session Laws makes the state engineer custodian of the township plats, field notes and maps of the surveys of the public lands of the state and authorizes him to furnish such copies as may be required, charging such fees as may be prescribed by the governor, secretary of state and attorney general.

Chapter 145 of the Session Laws of 1911 requires that the state engineer shall furnish any county superintendent of highways, upon request, any information or bulletins on road construction or maintenance that he may have at his command, and it is his duty to attend road institutes in each county whenever possible.

The duties of the state engineer were considerably increased as a result of legislation passed by the 1913 session.

Chapter 179 of the 1913 Session Laws provided for a state highway commission consisting of the governor, the state engineer and one other member appointed by the governor, the state engineer to be secretary

of the commission. It is required of the state engineer that he shall have prepared maps of the various counties of the state, showing the location of all roads and of the various bridges and culverts.

Chapter 180 makes it the duty of the state engineer, whenever requested by any board of county commissioners or any board of township supervisors, to prepare plans for bridges or culverts or to examine and report on existing structures, and to charge for such work a fee of ten dollars per day and traveling expenses.

RECOMMENDATIONS

The state engineer submits the following recommendations as the result of his experience, both as assistant and as state engineer, in the belief that their adoption will enable the department to be of greater service.

Coal Mine Inspection

The state engineer is of the opinion that the coal mine inspection work is one of the most important duties of the department, and recommends that an annual inspection of mines be authorized. Biennial inspection necessitates getting information every other year by sending out blanks. This has not proven a satisfactory way to obtain accurate data, since many of the mines are under different management from year to year and many blanks sent out are not again heard from. Furthermore, it is important that the department keep in closer touch with the mining industry than is possible through biennial inspection. It is recommended that a separate fund be appropriated for this work.

Bridges and Culverts

Referring to the bridge and culvert work which is required of the state engineer's office under Chapter 180 of the Session Laws of 1913: the two seasons this law has been effective demonstrates that the state engineer's office is in a position to render valuable service to the various counties of the state in preparing plans and specifications for bridges and culverts and furnishing inspection during their construction. That this service might be more efficient the office should be in the possession of standard plans and specifications and should have at all times available the services of a competent bridge engineer. The work is of sufficient value to make the recommendation that a specified fund be provided for it worthy of attention.

Hydrography

The United States Geological Survey has been engaged in carrying out within the state of North Dakota quite a complete hydrographic survey, establishing stream gaging stations on most of the larger rivers. This work has cost approximately \$1,000 a year. However, beginning with July 1st, 1913, the Federal Government suspended appropriations for the state of North Dakota, confining its attention to those states in which state co-operation was offered. Finally a small appropriation of

\$300 was made to carry on the work if state co-operation in some form could be obtained, and the state engineer's office extended such co-operation, as the hydrographic surveys are of the greatest importance to the office.

At the time this report is written it is not known whether the Federal Government has made any further appropriations for North Dakota. The work is of direct value to the state engineer's office in connection with both irrigation and drainage and should not be discontinued. It is recommended that, in case the Federal support is withdrawn, the state engineer's appropriation be increased sufficiently to permit of his continuing the work.

Drainage

It is the duty of the state engineer to co-operate with counties in doing drainage work, as mentioned in the "Summary of the Duties of the State Engineer." There is no appropriation available for doing drainage engineering work, the state auditing board having refused to allow bills for work of this kind at its meeting of December 9th, 1912, and no similar bills having been presented to the board since that time. Previously expense bills had been allowed by the board for drainage engineering work for the various eastern counties, the office rendering bills to the drainage commissioners for the actual cost of the work, such collections reverting to the general fund. Owing to the fact that no funds have been available for work of this kind, it would have been necessary for the state engineer's office to discontinue drainage engineering work, had not the state engineer personally carried the immediate expense in connection therewith, until county funds were available.

Drainage in North Dakota is fully as important as irrigation, if not more so, and it is wholly proper and fitting that the state engineer should be in a position to render engineering aid to the various counties, the cost of such aid to be refunded to the state when moneys are available. Since under our drainage laws there are no funds out of which such expense may be paid until after assessments have been made and taxes levied, the state engineer recommends that a certain fund be set apart out of which drainage engineering expense may be paid, the bills for the actual cost of the work to be rendered to the drainage commissioners and to be paid by them on the earliest possible dates. The state is at all times amply protected, as either the petitioners for ditches or the owners of benefited lands are required to pay for the expense incurred.

With such a fund it would be possible for the state engineer's office to make such surveys as are requested by the various counties without personal inconvenience and on a much larger scale, as under present conditions he is limited by the extent of his personal resources available for such a purpose.

The importance of drainage work and the fact that the various counties have a right, under existing laws, to expect engineering assistance of the state engineer's department when requested makes it imperative that such a separate fund should be appropriated.

Appropriation

Referring to the duties of the state engineer's office as described heretofore, it will be noted that since the office has been established a large amount of additional work, not contemplated under the original irrigation code, has been required. All of the work thus far added properly belongs to the engineering department. However, the work now required of the office is in excess of what can be paid for out of the appropriation heretofore allowed this department. It is recommended that the appropriation made for the state engineer's office be sufficient to pay all salaries and expenses in connection with the work of the department, and that all bills for services rendered to state departments, counties or other organizations for work done be collected as fees, reverting to the general fund of the state.

IRRIGATION

Ten applications for permits to appropriate water for irrigation or other purposes have been received during the period from September 30, 1912 to June 30, 1914. Eight of these applications were received during 1913 and two during 1914, one of these being an application for water for railroad purposes. The decrease in the number of applications in 1914 was due to the unusual amount of rainfall during the spring and summer months of 1914. The favorable conditions through the growing season resulted also in a large decrease in irrigation by previous holders of permits.

Results in increased yields and what is more important, the certainty of crops, where water is consistently and intelligently applied to the land, mark irrigation as successful in western North Dakota.

The people who irrigate in North Dakota and with whom the state engineer comes more directly in contact are those who irrigate on a small scale and who have individual projects. They usually practice dry farming as well as irrigation. It is doubtful if small grains can be irrigated and grown for market with great success except where conditions are extremely favorable. The greater value of irrigation is to be found in applying it to the growing of feed and forage crops. A farmer is thus assured of a sufficient amount of feed to winter his stock, although the rainfall may be so light that everything else fails him. The man who is located so that he is in a position to practice both dry farming and irrigation has a decided advantage over the man who can only dry farm, and is in a position to increase the amount of stock on his place without the danger of having an insufficient amount of feed for winter use.

There are many places where irrigating can be done on almost any scale desired. Bottom lands along both branches of the Cannonball River, Heart River, Knife River and some places along the Little Missouri River, afford locations where irrigating can be done in a practical manner and to an extent limited only by the water available. The Missouri River bottoms furnish bench and bottom lands where irrigating

could be done on an extensive scale. The Mouse River bottom lands also furnish excellent locations for irrigation projects. There are also large numbers of locations on smaller streams and coulees where with little expense and labor spring flooding can be done.

Since the adoption of the irrigation code, applications for permits to appropriate water have been received, totaling 230.4 cubic feet of water per second, to be used on 18,437 acres of land.

The United States Reclamation Service projects in North Dakota total 47,500 acres of land.

INDIVIDUAL PROJECTS 1913-1914

77. Krogen Project

J. P. Krogen filed with the state engineer's office an application for a permit to appropriate 2.25 cubic feet of water per second, for irrigating lands lying in sections 27 and 28, Township 163 N., Range 76 W., the source of supply to be the excess water in a pond in the NW $\frac{1}{4}$ of section 22 of the same township. Affidavits were filed with the state engineer protesting against the granting of this permit, and the state engineer made a personal investigation of the situation, and as a result of his findings, issued the permit. Following the issuing of the permit a notice of appeal to the district court was filed with the state engineer, appealing from his decision. Further action has not been taken.

79. Brevig Project

L. Brevig has 40 acres of land which lies so that water can be applied by constructing a ditch and a small dam to retain spring floods. One hundred and twenty acres of land lies adjoining the Missouri River, and it is expected that a pumping plant may be installed which will furnish a sufficient amount of water from the Missouri River to irrigate it.

80. Carlson Pumping Project

John Carlson is putting a private irrigation project on the White Earth Creek in Mountrail County. He expects to irrigate 51 acres of bottom lands and to use a centrifugal pump and gasoline engine to lift the water. A very small rock dam will be put in to make a supply reservoir.

81. Aplin Pumping Project

The water for Charles Aplin's project is to be taken from Louse Creek, where a small dam will be built and the water pumped to the distributing ditches. The project is located near the town of Timmer, in Morton County.

82. Foot Irrigation Project

This project is located in Ward County on the bottom lands of the Mouse River and not far from Minot. Two portable pumping plants will be used to pump the water to the ditches. Eight hundred and three acres of the bottom lands owned by Mr. Foot are nicely located for irrigation.

84. Short Irrigation Project

H. C. Short has 65 acres of land lying along the bottom lands of the Little Missouri which are to be irrigated by pumping water from the Little Missouri River. A ditch a half mile in length has been constructed. The project is intended to insure winter feed for stock. The project is about 25 miles north of Medora.

85. Northern Pacific Railroad Reservoir

The Northern Pacific Railway Company have been granted a permit to use one-half second foot of water from the Green River for railroad purposes. There is a small permanent dam which creates a reservoir. From this water is pumped to a water tank at Gladstone.

86. Neal Pumping Project

The Neal Project is situated on the Douglas Creek bottom lands, from which creek the water supply is taken. A portable pumping plant will be used and moved from place to place along the side of the creek. Natural conditions make this project very practical. The project is located about 10 miles west of Garrison.

APPLICATIONS NOT COMPLETED

78. John A. Felver started to make application to appropriate water in section 3, Township 146, Range 68, Wells County, but did not complete it.

83. A. W. Hamilton of Ash, expected to do some irrigating in Township 129, Range 102, Bowman County, but finally did not perfect his permit.

WATER RIGHT DENIED

87. John H. Shields made application for permit to appropriate two second feet of water from the Little Muddy Creek in Section 15, Township 154, Range 104, Williams County, for the purpose of irrigating land in Montana. The state engineer held that he had not authority to grant permits for the appropriation of water originating within the state and to be diverted within the state, for use in another state, where the authority of the state engineer does not extend. The customary practice of the other states was adopted, and the application was placed on file so that Mr. Shields may be entitled to an appropriation according to the priority of his application should there at any time be an interstate adjudication of the stream.

BOWMAN PROJECT**at Haley, Bowman County**

The United States Reclamation Service made detail surveys of the Bowman Project on the North Fork of the Grand River and next to the state line in Bowman County in 1908, reporting the results obtained under date of January 7, 1909. They report that to convey the water from the reservoir, two canals would be necessary, one on each side of the river, and that 5,800 acres on the north side and 4,900 acres on the south side would be benefited, 2,300 acres of which is in South Dakota.

The Reclamation Service, however, could not get a sufficient number of the land owners to co-operate in forming a Water Users' Association and therefore the project has never materialized.

November 1st, 1913, the state engineer, on request, met with interested land owners at Haley and submitted to them the status of the project and outlined what would have to be done to attempt to get the United States Reclamation Service to proceed with the work. Considerable interest was shown and the state engineer was requested to furnish petitions to be circulated among the land owners.

Subsequent action has not been taken, the wet spring and summer of 1914 allaying further interest for a time.

REPORT OF THE STATE ENGINEER

FILINGS MADE IN ACCORDANCE WITH THE IRRIGATION CODE FROM SEPT. 30, 1912 TO JUNE 30, 1914.

| No. | Name of Applicant | Lands to be Irrigated | Source of Supply. | Amount of water claimed | Date of Claim |
|-----|------------------------------|--|---|-------------------------|---------------|
| 77. | John P. Krogan..... | 150 acres in sec. 27 & sec. 28, T. 163, R. 76..... | Spring Creek | 2.25 | 4-26-13 |
| 79. | L. Brevig..... | 40 acres in sec. 19, T. 153, R. 93..... | Springs in NE $\frac{1}{4}$ of SW $\frac{1}{4}$ of sec. 30, T. 153, R. 93 and drainage of coulee... | .5 | 6-14-13 |
| 80. | John Carlson..... | 51 acres in secs. 4 & 9, T. 156, R. 94..... | White Earth Creek..... | .65 | 7-26-13 |
| 81. | Charles Aplin..... | 100 acres in sec. 32, T. 134, R. 82 | Louse Creek | 1.25 | 7-28-13 |
| 82. | L. S. Foot..... | 753 acres in secs. 23, 23, 25, 26, 35 & 36, T. 156, R. 84 and 50 acres in sec. 1, T. 155, R. 84..... | Mouse River and Des Lacs | 10.0 | 12-26-13 |
| 84. | H. C. Short..... | 65 acres in secs. 1 & 2, T. 142, R. 102..... | Little Missouri River..... | .8 | 12- 8-13 |
| 85. | Northern Pacific Ry. Co..... | For railway purposes..... | Green River | .5 | 4- 1-14 |
| 86. | W. B. Neal..... | 220 acres in sec. 6, T. 147, R. 86 | Douglas Creek | 2.75 | 5- 8-14 |

Total acreage, 1,459. Total amount of water claimed, 18.70 second-feet.

Drainage

Drainage engineering work described as follows has been done by the state engineer's office during the biennial period:

NELSON COUNTY

Nelson County Drain No. 1

Nelson County Drain No. 1, referred to in the fifth biennial report as Ottify Drain, is located in Township 149, Range 60. Surveys were made in 1911 and the contract was let in the spring of 1914, to A. F. Turner of Grand Forks, at 16½ cents per cubic yard. About 500 acres of land will be benefited. On June 30th the contractor was at work, having started operations the last of May. Owing to unavoidable difficulties in connection with securing suitable right of way, and the nature of the ground through which the ditch is cut, the cost is unusually high.

Nelson County Drain No. 2

Nelson County Drain No. 2 is situated in Townships 151 and 152, Ranges 57, 58 and 59. This drain was surveyed in 1911 and the report of the department made to the board of drain commissioners of Nelson County, since which time nothing further has been done.

PEMBINA COUNTY

Drain No. 38

Drain No. 38, or Lost River Drain, as it is referred to in the fifth biennial report, was surveyed during October, 1912, and report duly made under date of November 16th. The contract was let and the work done during 1913. Approximately 2,000 acres of land is benefited. This contract was let for 14¼ cents per cubic yard.

Drain in Township 161, Ranges 50 and 51

Under date of June 3rd the state engineer received a request from the drainage commissioners of Pembina County to prepare plans and specifications for drainage work to be done in Township 161, Ranges 50 and 51. Accordingly the state engineer made arrangements to put a party in the field. No surveys were made prior to June 30th.

TRAILL COUNTY

In May, 1913, the state engineer was requested to make an investigation of Drains Nos. 17 and 18, for the purpose of determining whether it would be advantageous to change the proposed outlet from the North Branch of the Elm River to the Goose River, the complete surveys of the proposed work having been made by the county surveyor. After

making a thorough survey of the proposed change the report returned was in favor of adopting the plans of the county surveyor.

The survey was made at the request of Barnett & Richardson, representing Bloomfield Township, the officers of this township being of the opinion that the extra water delivered into the North Branch of the Elm River by Drains Nos. 17 and 18 would result in damage to their bridges and to some hay lands.

MOUSE RIVER DRAINAGE

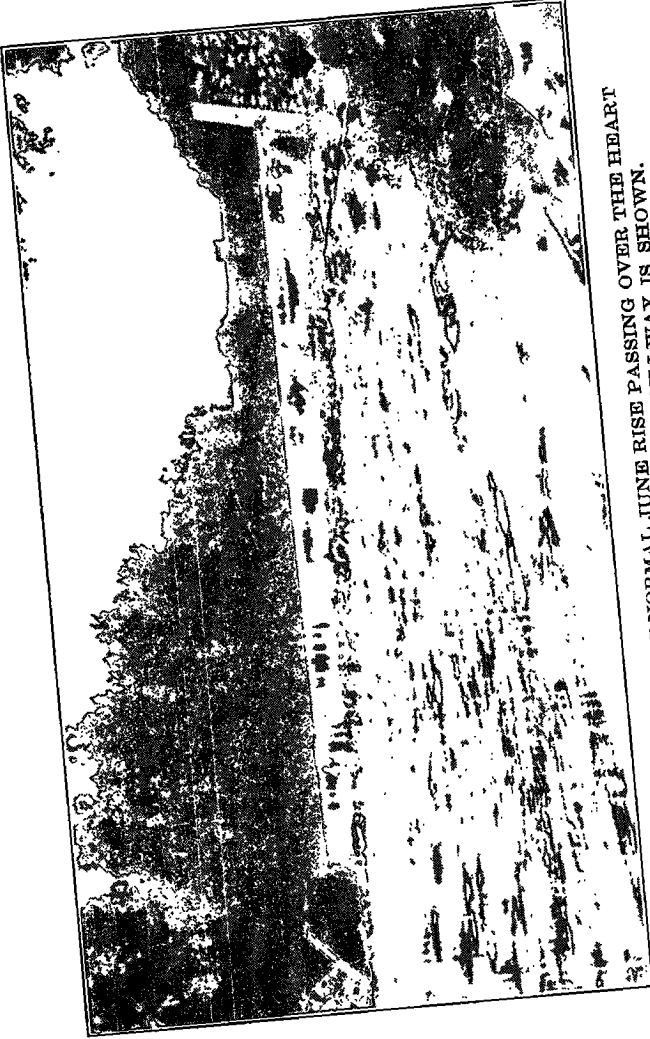
The original preliminary surveys for Mouse River Drain were made in 1907 and completed in 1909. The contract was let in July, 1911, the work being secured by the France Dredging & Construction Company of Toledo, Ohio, at 10 cents per cubic yard. The work was begun May 15, 1911 and was not completed at the time of the former state engineer's resignation. Owing to the fact that the former state engineer had personal supervision of this work since the preliminary surveys were begun, the drainage boards of Bottineau and McHenry Counties decided to retain his services until the completion of the work. The present state engineer, who at that time was assistant, authorized by the governor to take charge of the work of the office, offered no objection to this, inasmuch as the counties were not indebted to the state engineer's office, and as their desire to retain the services of the engineer who had charge of most of the work was reasonable, and as such procedure was not in any way contrary to law.

DRAINAGE IN NORTH DAKOTA

The state engineer has compiled the following information from reports sent him by the county auditors. Information was also requested of the auditors of Walsh and Pembina counties, but was not received.

| Name of County | No. of Miles of Drainage Ditches. | No. of Acres Benefited. | Average Cost per Acre. | Total Cost. |
|-----------------|-----------------------------------|-------------------------|------------------------|--------------|
| Cass | 180 | 362,040 | \$1.16 | \$420,237.30 |
| Grand Forks.... | 23 | 121,914 | 0.409 | 49,940.55 |
| Steele | 19½ | 10,687.98 | 1.82 | 19,500.00 |
| Cavalier | 11 | 4,000 | 2.02 | 8,082.00 |
| Richland | 100 | 255,995 | 1.13 | 289,806.52 |
| Trall | 63 | 140,000 | 1.07 | 150,000.00 |
| Total.... | 396½ | 894,636.98 | ..... | \$937,566.37 |

The Mouse River Drain has already benefited lands in McHenry and Bottineau Counties, but as the work is not entirely finished it is not included above.



JUNE 20, 1914. VIEW OF NORMAL JUNE RISE PASSING OVER THE HEART
RIVER DAM. ENTIRE LENGTH OF SPILLWAY IS SHOWN.

HEART RIVER DAM AT MANDAN

The damming of the Heart River has been under consideration since 1908, that year the state engineer having made surveys for contemplated irrigation of portions of the Reform School Farm. In 1909 the Reform School procured a permit to appropriate one second foot of water from the Heart River. No irrigation as yet has been done, as it was found, as was expected, that it would be necessary to dam the river. The state engineer made a detailed survey and submitted several reports in 1912 on several types of dams, at the request of the board of control of state institutions. The matter was dropped for a time, as the attorney general's office held that the board could not legally appropriate funds for this purpose without legislative authority. The following report was submitted under date of August 21, 1912, which closed the matter until 1913:

Hon. State Board of Control,
Bismarck, North Dakota.

Gentlemen:

I hand you herewith complete plans and specifications for the proposed Heart River Dam located at Mandan, for the use of the State Reform School, the Mandan Chautauqua Association and the Russell-Miller Milling Company.

You will note that this plan has been somewhat changed from the original plan handed you on July 23rd. These changes were made owing to the fact that the material which we found in making test borings is much better than we at first anticipated. I believe that a dam constructed after these plans and specifications, if properly constructed, will be sufficiently stable to withstand any flood that may occur. Of course it is highly important that thorough inspection of the work be carried on with the construction, to see that the specifications are carried out in detail.

As you will note, the plan provides for a spillway 80 feet long and three feet deep and an apron 12 feet wide, constructed after the best engineering practice in dams built on this material. I have also provided for good sheet piling on the up-stream side of the dam and sufficient rip-rap to make everything safe. The plans also provide for a sluice gate three feet in diameter, to be used for the purpose of emptying and cleaning the reservoir at any time.

In the specifications I have shown the approximate amount of material required in the construction of this dam, and have estimated the cost to be approximately \$5,000.

The Mandan Commercial Club will receive tentative bids on this proposition on September 5th, at which time I anticipate being present, and trust that it will be convenient for one of your members to be there also.

I am transmitting a copy of this letter to Mr. W. A. Lanterman of the Mandan Chautauqua Association.

Yours very truly,
T. R. ATKINSON,
State Engineer.

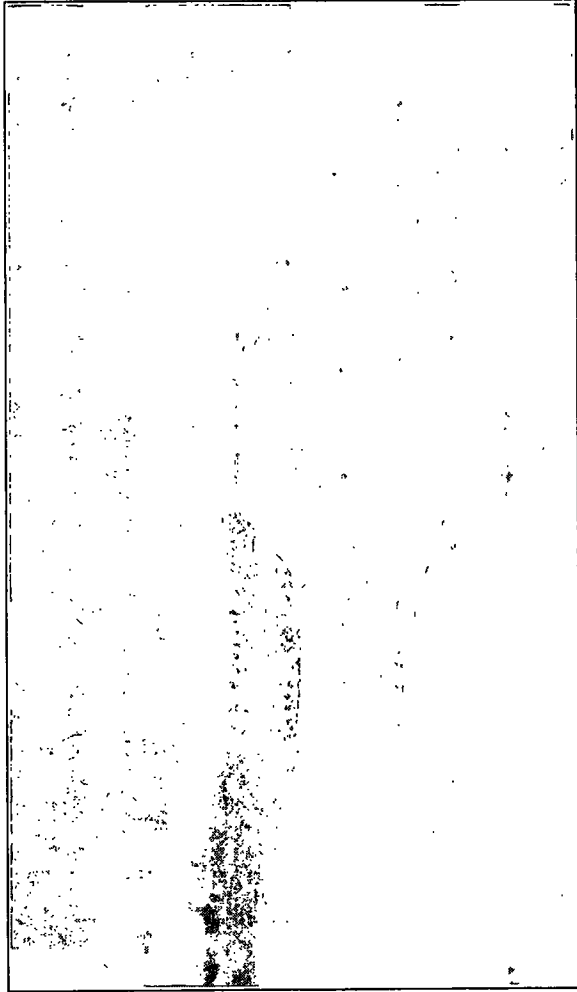
House bill No. 22 made a special appropriation of \$2,000 for the purpose of constructing the dam, provided sufficient additional funds were secured from other sources. The Mandan Commercial Club took charge of raising the extra funds.

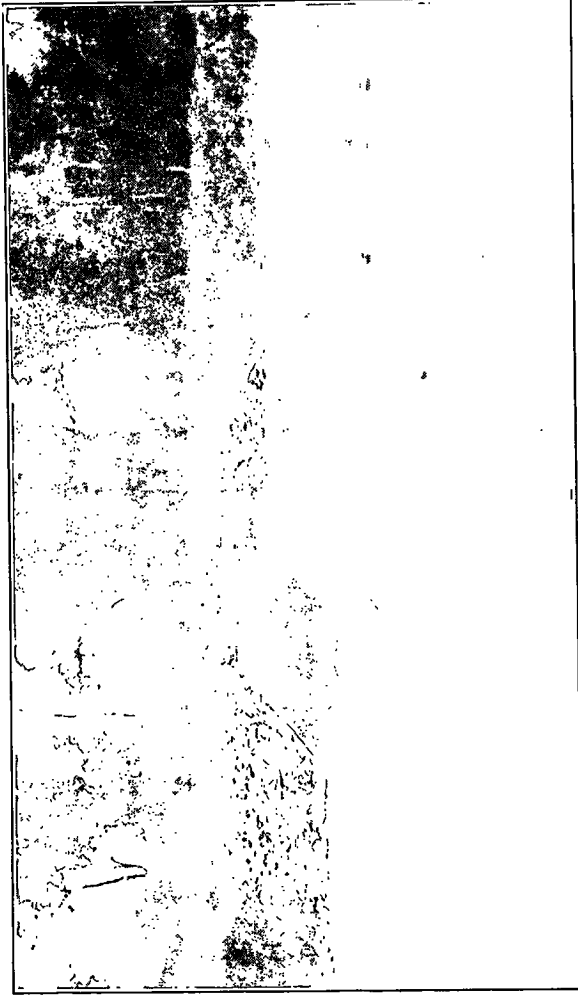
In the summer of 1913 an attempt was made to get a satisfactory bid for the construction of a concrete dam on the plans submitted with the foregoing report, but all bids were rejected as being excessive. Through one of the bidders it was learned that a quantity of heavy steel sheet piling could be secured at Minot, and the state engineer's office was requested by the Mandan Commercial Club to submit plans and specifications for a steel sheet pile dam.

On November 7th a contract was finally entered into between the Mandan Commercial Club and the Mandan Transfer Company for the construction of the dam. The contract price was \$4,000, the steel to be furnished by the Commercial Club. Work was begun on November 18th and the dam was accepted on January 8th, 1914. The total cost of the dam was \$5,670.97.

The total length of the dam is 160 feet, the spillway being seven feet lower than the rest of the structure and 90 feet in length. The dam was designed to raise the water surface approximately seven feet. This had the effect of backing the water surface up-stream for a distance of two and one-half to three miles. The sheet piling was reinforced with a concrete apron on the down-stream side and another on the up-stream side, in which reinforcement was placed, passing through every other steel pile. At the toe of the down-stream apron a concrete wall was built, the purpose of which was to create a pool of water and to protect the apron from the wearing effect of the water falling over the spillway. Below the down-stream apron and around both ends of the dam rip-rapping was done with suitable rock, for the purpose of preventing erosion. A 12-inch channel was placed along the lower side of the steel sheet piling one foot from the top and braced with buttresses placed at 10 foot intervals. A gate three feet square was installed for the purpose of emptying the reservoir and to be kept open during times of high water, as well as to provide a suitable fish way.

The dam was not severely tested when the ice went out in the spring, as the water did not rise very high and the ice rotted largely in place, the dam giving no indication of any weakness. The June rise in 1914 was unusually high, and one June 26th a cloudburst occurred which raised the Heart River higher than records show it to have ever been before. The largest previous discharge ever measured was 1,299 second feet, although a gage height on June 10, 1906 indicates a discharge of 6,100 second feet. The discharge on June 27th was 6,486 second feet. This unusually high water resulted in a current with a velocity of four miles per hour. During spring floods the water sometimes gets higher than it was in the Heart River on the 27th of June, but is due to back water from the Missouri River rather than to the flood waters of the Heart River, and the current is sluggish.





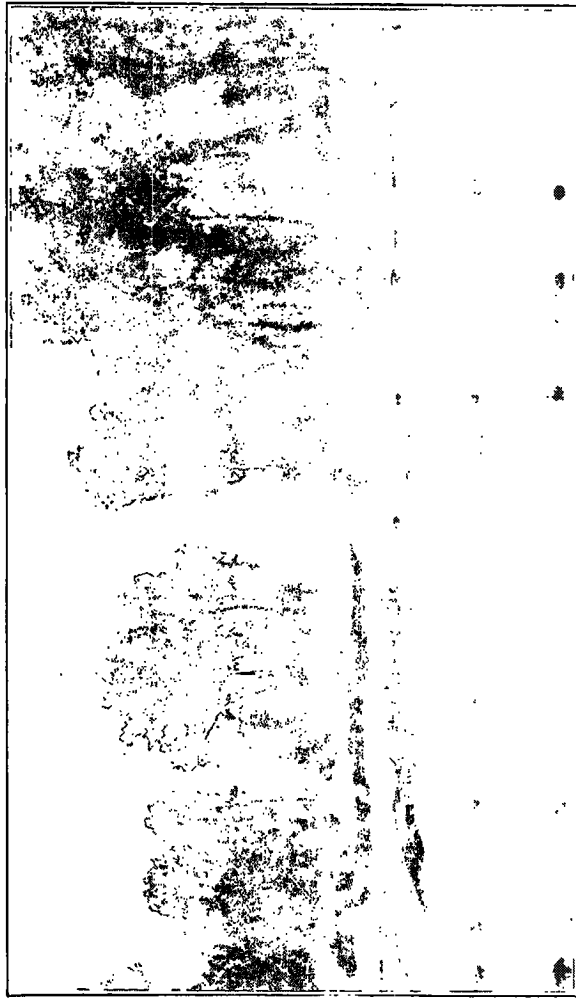
JUNE 20, 1914. TWO VIEWS OF NORMAL JUNE RISE PASSING OVER
SPILLWAY OF HEART RIVER DAM. FOUR FEET OF WATER
PASSING OVER THE SPILLWAY.



JUNE 29, 1914. HIGH WATER, DUE TO CLOUDBURST JUNE 26. WATER WAS NINE INCHES HIGHER ON JUNE 27 AND 28. ABOUT TEN FEET OF WATER PASSING OVER THE SPILLWAY.



JUNE 29, 1914. ANOTHER VIEW OF THE WATER PASSING OVER THE HEART RIVER DAM. ABOUT TEN FEET OF WATER OVER SPILLWAY. RAPIDS, SEEN IN THE BACKGROUND, SHOW WHERE CUTTING BEGAN AROUND SOUTH END OF THE DAM.



LATER VIEW, SHOWING BREAK AROUND SOUTH END OF DAM.

The dam suffered as follows: Cutting began at the south edge of the rip-rapping at the south end of the dam and proceeded to eat under the rip-rapping, dropping it rapidly, and a new channel was finally cut around the south end of the dam. The rip-rapping below the down-stream apron also was cut away and this permitted the sand at the toe of the dam to be washed away and cave some under the down-stream apron, which settled at the down-stream edge, pulling the buttresses away from the sheet piling and injuring the north wing wall. No damage was done to the steel sheet piling and the dam stands securely in place. Water 10 feet deep was flowing over the crest of the spillway on June 27th, 1914.

At this writing it is not possible to give an accurate estimate of the cost of making permanent repairs, but the state engineer submits as an approximate estimate that it will cost \$3,000 to repair the dam and do such additional work as would be required to insure the safety of the structure under conditions similar to those which prevailed the last of June, 1914. It is to be remembered that such a flood has not been known on the Heart River, with the possible exception of the June rise in 1906, which must have been nearly as severe as the one which did the damage this year.

The dam under no circumstances could have been made secure against the unusual conditions existing the last of June, 1914, at a cost that would have permitted of construction, unless the work of construction had been done by the state, in which case state penitentiary or state reform school labor might have been utilized.

The designing of this dam presented no difficult or unusual features, other than the fact that the foundation material was nothing but sand. At a depth of 14 feet below the river bed a strata of impervious clay was encountered, into which steel sheet piling was driven a foot.

ROCK ISLAND MILITARY RESERVATION GRAVEL PIT

The first surveys of the Rock Island Military Reservation gravel pit were made in October and November, 1911, at the request of the adjutant general's office, for the use of the attorney general. Additional data was required, and in April, 1913, a re-survey was made and a report furnished the adjutant general under date of April 21, 1913. The second survey established the fact that the Great Northern Railway Company had removed 61,351 cubic yards of gravel, more or less, from 8.13 acres of land belonging to the Rock Island Military Reservation, and to which the Great Northern Railway Company had never secured title. The information secured by the state engineer's office was for use in the damage suit brought by the adjutant general's department against the Great Northern Railway Company.

WORK FOR STATE DEPARTMENTS

A considerable amount of work has been done for the various state departments by the state engineer's office. Following is a short description of some of the work done:

Railroad Commissioners' Map

The state engineer's office prepared a state map for the railroad commissioners, showing the location of all the railroads and towns. The topography was compiled from the government township plats on file in this office, while the location of the railroads and the towns was secured from maps in the possession of the railroad commissioners.

Land Commissioners' Map

The state engineer is preparing a sectional map of the state for the state land commissioner's department, showing in color the unsold lands belonging to the common schools and to the various state institutions.

Indian Village Survey

The state engineer made a survey of what is known as the "Double Ditch Bourgois Indian Village Site," at the request of the State Historical Society. The village lies in Section 21, Township 140, Range 81, approximately 14 miles north of Bismarck, overlooking the Missouri. A plat showing the survey in detail was filed with the State Historical Society under date of November 29, 1913.

Norway Centennial Map

At the request of Mr. Alfred Gabrielsen, manager of the Norway Centennial Commission, the state engineer's office prepared a sectional map of the state showing in color all of the land in the state owned by Norwegians.

UNITED STATES SURVEYOR GENERAL'S RECORDS

The state engineer, being custodian of the records of the United States surveyor general's office for the state of North Dakota, is required to furnish certified copies to anyone ordering them. This has added considerably to the work of the office, and on an average has utilized the services of one employee about six months in each year. Having the plats filed in this department has proved of the greatest value, as frequent references to them is necessary in the course of the every day work of the office. The fees received for furnishing copies of these records are credited to the fund for the promotion of irrigation.

HIGHWAY BRIDGES AND CULVERTS

The state engineer's office has designed a number of highway bridges and culverts for various counties, and has made reports on existing structures, at the request of the county officials, in accordance with Chapter 180 of the 1913 Session Laws. Work has been done for 12 different counties, and is described as follows:

Billings County

During the summer of 1913 the state engineer prepared plans for one 65-foot span low truss bridge to be erected in Section 26, Township 133, Range 106, and for one 70-foot span low truss bridge to be erected in Section 25, Township 133, Range 106. The bridges were designed with a 16-foot roadway and for a maximum load of a 12-ton engine with three-fourths of the load on the rear wheels. The bridges were erected during the late fall of 1913 and were inspected in January, 1914.

Burke County

On May 2, 1914, a request was received from J. H. Clarke, county surveyor of Burke County, asking for plans for a culvert 4x4½ feet. Plans and specifications for a reinforced concrete culvert were furnished the county. The culvert was constructed in June, 1914.

Dunn County

Under date of November 19, 1913, the county commissioners of Dunn County requested plans for bridges from 16 to 100 feet in span, and the state engineer accordingly secured competent assistants and started to prepare such plans and specifications. Under date of December 22, 1913, the county commissioners notified the office that they desired to postpone getting these plans and the work was discontinued in the office. The county allowed all the expenses that the office had incurred.

Logan County

The state engineer has received a request from the county auditor of Logan County requesting plans and specifications for a couple of bridges. The plans and specifications are now being prepared.

Mercer County

In January, 1914, the state engineer received a request to prepare plans and specifications for two steel bridges for Mercer County. Accordingly plans were prepared for one 75-foot bridge with a 20-foot approach and for one 110-foot bridge with one 40-foot approach and one 20-foot approach. At this writing the contracts have been awarded, but the steel has not been shipped.

Oliver County

A request was received from Oliver County to prepare plans and specifications for a steel bridge. At this writing the field work has not been done.

Pembina County

Under date of January 12, 1914, the state engineer received a request from Pembina County, asking for standard plans and specifications for

bridges and culverts. Such plans and specifications were prepared for reinforced concrete culverts and for bridges up to a span of 100 feet in length and were submitted to the county in April, 1914.

Pierce County

In June, 1913, the state engineer's office received a request from Pierce County asking for plans and specifications for wooden, reinforced concrete and steel truss bridges. Such plans and specifications were prepared and furnished in July, 1913.

Traill County

Under date of June 24, 1914, the state engineer received a request from Traill County to inspect and report on a steel structure at Mayville, and accordingly made plans to do this work in July, 1914.

Wells County

Under date of January 12, 1914, the state engineer received a request to prepare plans and specifications for a bridge in Wells County. Necessary surveys were made and under date of February 23, 1914, plans and specifications for a 40-foot span bridge with gravity abutments and reinforced concrete floor were furnished the county. Construction on this bridge was begun the latter part of June, 1914. The state engineer's office furnished an engineer to inspect the construction of this bridge.

Williams County

A request was received from J. C. Field to check the plans of proposed bridges for Williams County.

HIGHWAYS

The state engineer has done considerable work in laying out roads in various parts of the state, the more important of which are described below:

Adams and Bowman Counties

During June, 1913, the office had charge of a survey of the Twin City-Aberdeen-Yellowstone Park Trail through Adams and Bowman Counties, the expense of which was jointly met by the Auxilliary Association in the two counties and the boards of county commissioners. Approximately 95 miles of this highway lies in the two counties. The work of construction is to be done largely by the townships through which the road passes, aided by appropriations from both the trail organizations and the counties.

Steele County

During May, 1914, the state engineer made surveys for a county road. The total length of this road as surveyed is 20.57 miles. Plans, estimates and specifications were furnished in connection with this work, report being made to the county under date of June 7, 1914.

Williams County

In July, 1913, the state engineer made a re-survey of grading work done in Williams County, and as a result of such re-survey, after giving the contractor all that was possibly due him, the county saved \$750.

STATE HIGHWAY COMMISSION

In accordance with the provisions of Chapter 179 of the Session Laws of 1913, Governor L. B. Hanna appointed Mr. C. A. Grow of Minot the third member of the commission. As no funds have been at the disposal of the commission, little could be done other than such work as the individual members might in the course of their regular duties be able to accomplish.

As set forth in Section 3, the state engineer has had rough maps of all the counties of the state prepared, and from these is having made detail maps, the purpose of which is to show the location of roads, bridges and culverts in so far as this is possible.

The state engineer has managed to collect a considerable amount of information relative to road matters in North Dakota, in the course of his regular work. He also has been appointed collaborator in North Dakota for the United States Office of Public Roads, and in this capacity is able to collect a great deal of information at no additional expense to the state engineer's office.

The state engineer has also addressed a number of good roads meetings, as follows:

- May 17, 1913—Lidgerwood.
- January, 29, 1914—Grafton.
- February 20, 1914—Minot.
- February 24, 1914—Walhalla.
- March 13, 1914—Cooperstown.
- March 28, 1914—Beulah.
- June 12, 1914—Ellendale.
- June 26, 1914—Sherwood.

The state engineer has noted in the course of his work that opposition to good roads is disappearing, although there are many varying opinions as how best to build and maintain them. Much less opposition to the county superintendent of highways is expressed, and it is believed that after the new highway law, Chapter 92 of the 1913 Session Laws, has been operative for a time that many counties will each appoint some qualified person to have supervision of the county highways.

Chapter 92 of the Session Laws of 1913, provides for the appointment of a township overseer of highways, who has charge of the roads, bridges and culverts within his township and who supersedes the road overseer, whose office is abolished. This law also provides for a cash payment of road taxes, provided that a property holder may work out his taxes by taking certain legal steps. This law has met with very little opposition and generally is expected to aid materially in solving locally the good roads question.

River Records

By

E. F. CHANDLER, *Assistant Engineer*

UNITED STATES HYDROGRAPHIC SURVEY

RIVER RECORDS

By the permission of the United States Geological Survey, the following tables of flow of the more important or typical streams in North Dakota and the Red River Valley have been selected and compiled from the records obtained under the direction of or by co-operation with the United States Geological Survey. The larger portion of the expense entailed in the continuous maintenance of these records has been provided for from Federal appropriations, but a part of the expense has from time to time been properly carried from state funds.

The methods followed in this work were described in detail in the First Report of the North Dakota State Engineer (1905), pages 49 to 62, and also in the Second Report (1907), pages 47 to 49. A discussion of the conclusions which can be drawn from these records in regard to the available surface water supply in different portions of the state appears in the Third Report (1909), pages 53 to 66, although some of the conclusions there stated might be a little modified on the basis of the six years of additional records now available. The methods used may be briefly stated thus:

At each "river station" or "gaging station" a gage is established and an observer appointed. Daily or several times each day the observer reads and records the height of the water-level of the river at the gage, these gage-heights being recorded in feet and tenths of a foot. The zero of the gage is usually below the lowest known low-water, and at some stations is many feet below the bottom of the channel, but the height of the floods is easily found by comparing the maximum gage-height readings recorded during floods with the minimum gage-heights recorded at times of low water.

At suitable intervals, an engineer or assistant (called in this work a "hydrographer") equipped with appropriate meters and other instruments makes measurements of the discharge (i. e. of the actual numbers of gallons of water per day flowing by the gage), and records the discharges and gage-height found at that time. It is thus known how much water will flow whenever the river happens to be at the same gage-height again, provided the river channel does not suffer change in the meantime.

When enough such measurements of discharge have been secured, at different heights of the river (low water, medium height and flood height), it becomes possible by interpolation to determine closely how much

water would flow by the gage daily at every possible foot and tenth of height from the lowest stage to highest water; by the use of this basis of fact, there is then computed from the record of daily gage-heights that has been made by the observer a record of actual daily quantity of water that has flowed by the station, and these quantities are tabulated in any form needed for reference. In the following pages these results have been arranged as tables of "Monthly Discharge," showing for each month the flow for that day of the month when the flow was the greatest or maximum, the flow for the minimum day and the mean flow or average for the whole month.

All figures of discharge given here are in "second-feet." One second-foot is a flow that carries one cubic foot of water past the observer each second; a rapid current in a small channel, or a slow current in a large channel can carry the same amount of water past the observer in a second. For example, a stream two feet deep and five feet wide flowing with a velocity of six feet per second, and a stream 20 feet wide and six feet deep flowing with a velocity of one foot per second, would each carry 60 second-feet of water.

One second-foot amounts to 646,317 gallons per day, and will cover almost two acres one foot deep in 24 hours.

As successive years vary considerably, an absolutely exact record of the quantity of flow of a river through one year would not tell how much might flow the next year; it sometimes happens that the flow of one year is 5, 10 or 20 times as great as the total entire flow of a previous year; nor could this record be applied without judgment to adjoining rivers, for no two records are precisely alike in their conditions and behaviour, so that records of as many streams as possible are needed if well-considered use is to be made of them. Therefore, rather than spend a large appropriation in making a precise record of a single stream for a single year, it is much more advantageous to extend the work to as many streams through as long a period of years as the available funds will possibly permit; provided, however, that care must be taken that the work and attention are not reduced so much as to result in a disproportionate loss of accuracy.

The column headed "accuracy" in the tables of monthly discharge applies to the mean flow for the month, but not always to the maximum or the minimum (which might have been affected by accidental error entering for only a single day, such as absence of the observer, for example). It depends on the reliability of the daily observer, upon the permanency of the stream channel and of the gage and other such conditions, and upon the number and consistency of the measurements of discharge; more discharge measurements ordinarily bring much greater accuracy to the computed results of the season, but in a region of rock-bound, absolutely permanent channels (no such streams being found in North Dakota), after a sufficient number of discharge measurements have once been secured, few or none are needed in following years.

The mean for any month marked "A" in these tables may safely be assumed as accurate within 5 per cent; of any month marked "B," within

10 per cent; "C" within 15 per cent; "D" within 25 per cent; "E" indicates a rough estimate which is presumably within 50 per cent of the truth, although in some of the cases of winter month estimates marked "E," it is possible that the flow is but a small fraction of the estimates, but it can be stated with reasonable assurance that in none of these cases could the flow possibly have been more than 50 per cent greater than the estimate.

The summaries from November 1, 1912, to September 1, 1914, of the records of these streams are included here.

Red River at Grand Forks, N. D.

Red River at Fargo, N. D.

Pembina River at Neche, N. D.

Red Lake River at Crookston, Minn.

Thief River near Thief River Falls, Minn.

Mouse River at Minot, N. D.

Grand River (North Branch), at Haley, N. D.

Cannon Ball River near Stevenson, N. D.

Heart River near Richardton, N. D.

Knife River near Broncho, N. D.

The portions of these summaries for the year 1914 have been extracted from the official records in advance of the completion of the computations of the season's work as made for publication by the United States Geological Survey and are, therefore, still subject to minor revision, and some other portions of the tables here included are also from the preliminary computations. But in no case is it expected that the final revision will introduce any large changes in the figures here given, and in most cases there will be no appreciable change.

Similar summaries of many of the river records in this region for previous years may be found in the following reports:

1903-1904, in Third Report of North Dakota Geological Survey.

1905-1906, in Second Report of North Dakota State Engineer.

1907-1908, in Third Report of North Dakota State Engineer.

1909-1910, in Fourth Report of North Dakota State Engineer.

1911-1912, in Fifth Report of North Dakota State Engineer.

Complete records are published from year to year in the Water Supply and Irrigation papers series, published by the United States Geological Survey, in which also all the methods are fully described.

These summaries and many other less important ones are on file in the office of the state engineer at Bismarck. All the original data of every kind on which these results and summaries have been based are kept in the Washington office of the United States Geological Survey, and copies of all the data are also on file in the office of the resident hydrographer of the survey, E. F. Chandler, whose post-office address is University, N. D. On request to any one of these offices full information can be obtained, if desired, by anyone who has reason for interest in any of these records or investigations.

RED RIVER AT GRAND FORKS, N. D.

Gagings of the flow of the Red River at Grand Forks, N. D., were begun by the United States Geological Survey in 1901, but a gage-height record was kept at the direction of the U. S. Corps of Engineers, (War Department) for about twenty years previously, and a few discharge measurements were made, so that fairly good run-off summaries begin with the year 1882. The gaging station is located below the confluence of the Red and Red Lake Rivers. The total drainage area is 25,000 square miles, of which 13,400 is in Minnesota.

The tables of discharge are based on the measurements in the list below and on sixty-seven measurements made during the twelve preceding years, and are fairly accurate through the entire year.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|------------|---------------------------------|--------------|------------|
| 11- 8-1912 | W. B. Stevenson..... | 5.12 | 923 |
| 11-12-1912 | W. B. Stevenson..... | 5.02 | 942 |
| 12-12-1912 | W. B. Stevenson..... | *5.00 | 473 |
| 1-25-1913 | E. J. Budge..... | *4.50 | 319 |
| 3- 8-1913 | W. B. Stevenson..... | *3.90 | 196 |
| 3-21-1913 | E. J. Budge..... | *4.80 | 326 |
| 4-17-1913 | E. J. Budge..... | 15.86 | 7,307 |
| 4-28-1913 | E. J. Budge..... | 10.47 | 3,624 |
| 5-12-1913 | E. J. Budge..... | 7.24 | 1,730 |
| 5-23-1913 | E. J. Budge..... | 6.84 | 1,617 |
| 7- 3-1913 | Chandler and Stevenson..... | 5.18 | 973 |
| 9- 8-1913 | Chandler and Stevenson..... | 4.09 | 568 |
| 10- 8-1913 | Stevenson and Powers..... | 4.77 | 819 |
| 11-29-1913 | A. S. Miller..... | 5.47 | 1,186 |
| 1- 8-1914 | A. S. Miller..... | *5.40 | 665 |
| 1-13-1914 | A. S. Miller..... | *5.55 | 530 |
| 1-15-1914 | A. S. Miller..... | *5.54 | 466 |
| 2-27-1914 | O. Christianson..... | *5.38 | 526 |
| 3- 9-1914 | Stevenson and Christianson..... | *5.54 | 530 |
| 3-24-1914 | O. Christianson..... | *8.48 | 1,404 |
| 4-25-1914 | Burdick and Powers..... | 8.30 | 2,102 |
| 6- 2-1914 | E. F. Chandler..... | 7.96 | 2,353 |
| 6-15-1914 | E. F. Chandler..... | 16.77 | 7,645 |
| 7- 6-1914 | E. F. Chandler..... | 13.04 | 5,132 |
| 8-29-1914 | E. F. Chandler..... | 5.74 | 1,230 |

MONTHLY DISCHARGE OF RED RIVER AT GRAND FORKS, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | B | 1,130 | 615 | 855 |
| December | C | ..... | ..... | 422 |
| 1913. January | D | ..... | ..... | 318 |
| February | D | ..... | ..... | 233 |
| March | D | ..... | ..... | 282 |
| April | C | 13,130 | 2,350 | 7,056 |
| May | A | 2,590 | 1,380 | 1,820 |
| June | A | 1,563 | 890 | 1,190 |
| July | A | 1,725 | 686 | 1,034 |
| August | A | 1,142 | 560 | 758 |
| September | A | 1,649 | 545 | 1,024 |
| October | A | 1,420 | 654 | 1,084 |
| November | B | 1,380 | 890 | 1,146 |
| December | C | ..... | ..... | 793 |
| 1914. January | C | ..... | ..... | 509 |
| February | C | ..... | ..... | 412 |
| March | C | ..... | ..... | 911 |
| April | C | 4,020 | 1,310 | 2,990 |
| May | A | 4,750 | 1,420 | 2,440 |
| June | A | 8,360 | 1,360 | 4,110 |
| July | A | 6,090 | 1,330 | 2,760 |
| August | B | 1,300 | 862 | 1,090 |

River closed November 30, 1912; opened April 14, 1913; closed December 6, 1913; opened April 17, 1914.

Maximum gage-heights, 26.6 feet April 8, 1913; 12.4 feet April 9, 1914; 17.2 feet June 17, 1914.

Minimum gage-heights, 4.0 feet November 18, 1912; 3.9 feet September 9, 1913.

*Frozen; mean thickness of ice from 0.76 foot to 1.69 feet.

RED RIVER AT FARGO, N. D.

The gaging station on the Red River at Fargo was established May 27, 1901. The drainage area above this point is 6,020 square miles, of which 1,750 square miles is in North Dakota, 500 square miles in South Dakota, and 3,770 square miles in Minnesota.

The tables of discharge are based on the measurements in the list below and fifty-three measurements made during the twelve preceding years, due allowance being made for the gradual slight changes in the channel.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|------------|-----------------------|--------------|------------|
| 6- 2-1913 | W. B. Stevenson..... | 8.31 | 336 |
| 8- 9-1913 | W. B. Stevenson..... | 7.28 | 172 |
| 8-23-1913 | W. B. Stevenson..... | 8.88 | 524 |
| 9-11-1913 | W. B. Stevenson..... | 8.91 | 568 |
| 10-24-1913 | W. B. Stevenson..... | 8.84 | 508 |
| 4-13-1914 | O. Christianson..... | 8.90 | 610 |
| 5-23-1914 | E. F. Chandler..... | 8.58 | 579 |
| 7-30-1914 | E. F. Chandler..... | 8.96 | 650 |

MONTHLY DISCHARGE OF RED RIVER AT FARGO, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | C | 306 | 118 | 213 |
| December | E | ..... | ..... | 105 |
| 1913. January | ..... | ..... | ..... | ..... |
| February | ..... | ..... | ..... | ..... |
| March | ..... | ..... | ..... | ..... |
| April | A | 870 | 290 | 461 |
| May | B | 455 | 290 | 361 |
| June | A | 382 | 290 | 339 |
| July | A | 1,459 | 290 | 638 |
| August | A | 536 | 142 | 270 |
| September | A | 839 | 190 | 421 |
| October | A | 685 | 290 | 494 |
| November | B | 625 | 335 | 436 |
| December | D | 481 | 268 | 352 |
| 1914. January | E | ..... | ..... | 200 |
| February | E | ..... | ..... | 140 |
| March | D | 610 | ..... | 327 |
| April | C | 1,330 | 550 | 666 |
| May | B | 2,220 | 550 | 877 |
| June | B | 3,060 | 580 | 1,550 |
| July | B | 2,330 | 550 | 1,010 |
| August | B | 550 | 433 | 509 |

Maximum gage-heights, 10.0 feet April 15, 1913; 11.9 feet July 8, 1913; 13.7 feet May 2, 1914; 15.9 feet June 13, 1914.

Minimum gage-heights, 6.9 feet November 27, 1913; 7.1 feet August 9, 1913.

PEMBINA RIVER AT NECHE, N. D.

The gaging station on the Pembina River was established April 29, 1903, and is located at Neche, sixteen miles from the mouth of the river. The drainage area above this point is 2,940 square miles, of which 920 square miles is in North Dakota and 2,020 square miles in Manitoba.

The tables of discharge are based on the measurements in the list below and on forty-two previous measurements, necessary allowances being made for changes that have several times occurred in the channel conditions determining the gage-height at lowest stages.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|-----------|-----------------------|--------------|------------|
| 4- 7-1913 | E. J. Budge..... | 21.50 | 3,871 |
| 4-22-1913 | E. F. Chandler..... | 10.05 | 1,318 |
| 9-24-1913 | E. F. Chandler..... | 2.83 | 67 |
| 4-22-1914 | L. T. Powers..... | 4.58 | 338 |
| 4-23-1914 | L. T. Powers..... | 4.60 | 349 |
| 7- 7-1914 | E. F. Chandler..... | 3.09 | 55 |
| 7- 7-1914 | E. F. Chandler..... | 3.11 | 63 |

MONTHLY DISCHARGE OF PEMBINA RIVER AT NECHE, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | D | 309 | ..... | 239 |
| 1913. April | B | 3,850 | ..... | 1,695 |
| May | A | 860 | 330 | 529 |
| June | A | 330 | 49 | 191 |
| July | A | 159 | 66 | 107 |
| August | A | 84 | 66 | 70 |
| September | A | 66 | 57 | 62 |
| October | A | 75 | 49 | 64 |
| 1914. April | D | 365 | ..... | 254 |
| May | B | 241 | 160 | 195 |
| June | B | 160 | 87 | 126 |
| July | B | 87 | 22 | 49 |
| August | C | 22 | 9 | 14 |

Maximum gage-heights, 21.4 feet April 8, 1913; 6.0 feet April 4, 1914.

Minimum gage-heights, 2.6 feet June 21, 1913; 2.6 feet November 29, 1913.

River closed November 23, 1912; opened April 9, 1913; closed November 8, 1913, opened April 18, 1914.

RED LAKE RIVER AT CROOKSTON, MINN.

The gaging station at Crookston, Minn., on the Red Lake River (which is the principal tributary of the Red River, bringing almost as much water as is usually contained in the Red River itself above Grand Forks) was established May 19, 1901. In September, 1911, an automatic gage was established at this point, by which a continuous record of the hourly variations in flow is secured, so that the records are unusually accurate. The drainage area above Crookston is 5,320 square miles, and as there are no considerable tributaries between this point and the mouth of the river at Grand Forks, almost the entire discharge is shown here.

The tables of discharge are based on the measurements in the list below and on seventy-one previous measurements. On account of the operation of the power plant above the gage, under some conditions for a single hour the gage-height does not indicate the true amount of flow, which causes the discrepancies appearing in some of the measurements.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|------------|-----------------------------|--------------|------------|
| 12-23-1912 | W. B. Stevenson..... | *4.57 | 449 |
| 1-18-1913 | E. J. Budge..... | *3.20 | 80 |
| 1-18-1913 | E. J. Budge..... | *3.43 | 93 |
| 2- 8-1913 | E. J. Budge..... | *4.26 | 249 |
| 4-12-1913 | Budge and Christianson..... | 9.50 | 4,597 |
| 4-14-1913 | Budge and Christianson..... | 9.00 | 4,070 |
| 5- 3-1913 | O. Christianson..... | 5.02 | 1,025 |
| 5- 5-1913 | O. Christianson..... | 6.16 | 1,830 |
| 5- 5-1913 | O. Christianson..... | 6.36 | 1,914 |
| 5-20-1913 | O. Christianson..... | 4.49 | 735 |
| 8-12-1913 | E. F. Chandler..... | 3.35 | 267 |
| 9- 6-1913 | W. B. Stevenson..... | 3.23 | 133 |
| 10-18-1913 | E. F. Chandler..... | 3.84 | 427 |
| 12-22-1913 | O. Christianson..... | 2.64 | 54 |
| 1- 5-1914 | O. Christianson..... | *3.62 | 147 |
| 2-10-1914 | O. Christianson..... | *3.38 | 77 |
| 4-26-1914 | O. Christianson..... | 4.32 | 684 |
| 5-16-1914 | O. Christianson..... | 5.28 | 1,203 |
| 6- 8-1914 | O. Christianson..... | 5.48 | 1,238 |
| 7-11-1914 | E. F. Chandler..... | 5.48 | 1,282 |
| 8-25-1914 | E. F. Chandler..... | 3.37 | 358 |

*Frozen; mean thickness of ice from 0.50 foot to 1.20 feet.

MONTHLY DISCHARGE OF RED LAKE RIVER AT CROOKSTON, MINN.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | A | 497 | 157 | 380 |
| December | C | ..... | ..... | 165 |
| 1913. January | D | ..... | ..... | 123 |
| February | D | ..... | ..... | 118 |
| March | D | ..... | ..... | 116 |
| April | C | 6,908 | 374 | 3,364 |
| May | A | 1,259 | 427 | 730 |
| June | A | 680 | 237 | 386 |
| July | A | 526 | 211 | 300 |
| August | B | 435 | 188 | 265 |
| September | A | 412 | 182 | 276 |
| October | B | 486 | 190 | 325 |
| November | B | 408 | 180 | 285 |
| December | C | 320 | 68 | 190 |
| 1914. January | C | ..... | ..... | 201 |
| February | D | ..... | ..... | 204 |
| March | C | ..... | ..... | 455 |
| April | B | 2,350 | 685 | 1,370 |
| May | A | 1,716 | 600 | 1,080 |
| June | A | 2,640 | 1,056 | 1,560 |
| July | A | 1,810 | 334 | 1,010 |
| August | A | 482 | 252 | 315 |

Maximum gage-heights, 15.5 feet April 6, 1913; 7.4 feet April 5, 1914.

Minimum gage-heights, 2.8 feet November 25, 1912; 2.7 feet December 28, 1913.

THIEF RIVER NEAR THIEF RIVER FALLS, MINN.

The gaging station on the Thief River was established July 1, 1909. It is located about six miles above the confluence of the Thief River with the Red Lake River at Thief River Falls, being one of the two most important tributaries of the Red Lake River and the source of spring floods in some years. The drainage area above the station is 1,010 square miles.

The tables of discharge are based on the measurements in the list below and fifteen measurements made in the preceding years.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|------------|-----------------------|--------------|------------|
| 12-21-1912 | W. B. Stevenson..... | 5.00 | 17 |
| 4-10-1913 | E. J. Budge..... | 7.71 | 904 |
| 8-14-1913 | E. F. Chandler..... | 4.10 | 12 |
| 9- 4-1913 | W. B. Stevenson..... | 4.00 | 7 |
| 4-22-1914 | L. W. Burdick..... | 5.41 | 204 |
| 6-13-1914 | W. B. Stevenson..... | 5.89 | 326 |
| 7-10-1914 | E. F. Chandler..... | 4.99 | 88 |
| 8-27-1914 | E. F. Chandler..... | 4.79 | 52 |

MONTHLY DISCHARGE OF THIEF RIVER NEAR THIEF RIVER FALLS,
MINN.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | B | 83 | 10 | 33 |
| December | D | ..... | ..... | 13 |
| 1913. January | E | ..... | ..... | 10 |
| February | E | ..... | ..... | 9 |
| March | E | ..... | ..... | 7 |
| April | C | 1,530 | 55 | 624 |
| May | A | 132 | 33 | 78 |
| June | A | 55 | 3 | 28 |
| July | A | 32 | 1.3 | 14 |
| August | A | 15 | 7 | 10 |
| September | A | 14 | 8 | 10 |
| October | A | 73 | 11 | 21 |
| November | C | 33 | 14 | 25 |
| December | E | ..... | ..... | 15 |
| 1914. January | E | ..... | ..... | 5 |
| February | E | ..... | ..... | 1 |
| March | E | ..... | ..... | 4 |
| April | C | 487 | ..... | 147 |
| May | A | 283 | 52 | 132 |
| June | A | 715 | 56 | 175 |
| July | A | 169 | 7 | 69 |
| August | A | 71 | 11 | 29 |

Maximum gage-heights, 14.0 feet April 7, 1913; 7.2 feet April 2, 1914.

Minimum gage-heights, 3.7 feet July 26, 1913; 3.8 feet July 29, 1914.

MOUSE RIVER AT MINOT, N. D.

The gaging station on the Mouse River at Minot was established May 5, 1903. The drainage area above this point is 8,400 square miles, of which three-fourths is in Canada and one-fourth in North Dakota.

The tables of discharge are based on the measurements in the list below and forty-seven measurements made in previous years.

The gage-heights relate to the water-level in the river at the point where it is crossed by the Great Northern Railway.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|-----------|-----------------------|--------------|------------|
| 4-14-1913 | W. B. Stevenson..... | 8.67 | 943 |
| 4-15-1913 | W. B. Stevenson..... | 8.59 | 928 |
| 9-12-1913 | E. F. Chandler..... | 4.68 | 9 |
| 4-18-1914 | E. F. Chandler..... | 9.12 | 1,004 |

MONTHLY DISCHARGE OF MOUSE RIVER AT MINOT, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | C | 69 | ..... | 42 |
| December | E | ..... | ..... | 13 |
| 1913. January | E | ..... | ..... | 3 |
| February | E | ..... | ..... | 0.1 |
| March | D | ..... | ..... | 59 |
| April | B | 1,080 | 266 | 794 |
| May | B | 266 | 90 | 144 |
| June | A | 90 | 23 | 50 |
| July | A | 174 | 17 | 75 |
| August | A | 125 | 68 | 87 |
| September | A | 79 | 6 | 21 |
| October | C | 6 | 2 | 3 |
| November | B | 47 | 3 | 24 |
| December | D | ..... | ..... | 21 |
| 1914. January | D | ..... | ..... | 4 |
| February | E | ..... | ..... | 0.4 |
| March | B | 665 | ..... | 186 |
| April | B | 1,080 | 266 | 646 |
| May | B | 293 | 150 | 224 |
| June | B | 482 | 137 | 265 |
| July | C | 200 | 9 | 48 |
| August | B | 9 | 2 | 5 |

Maximum gage-heights, 11.2 feet April 2, 1913; 9.5 feet April 20, 1914.
Minimum gage-heights, 3.9 feet October 12, 1913.

GRAND RIVER (NORTH BRANCH) AT HALEY, N. D.

The gaging station on the North Branch of the Grand River at Haley was established May 11, 1908. The drainage area above this point is 500 square miles. The tables of discharge are based on the measurements in the list below, thirty-seven measurements made in previous years being also taken into consideration. The discharge found at the first measurements each spring is affected by ice still in the channel, and is less than the normal open-channel discharge for such gage-heights.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|--------------------|-----------------------|--------------|------------|
| 3-31-1913- 8 A. M. | H. N. Lungwitz..... | 9.65 | 5,460 |
| 3-31-1913-12 M. | H. N. Lungwitz..... | 9.85 | 5,310 |
| 4- 1-1913- 9 A. M. | H. N. Lungwitz..... | 7.95 | 2,040 |
| 4- 1-1913-11 A. M. | H. N. Lungwitz..... | 7.65 | 1,760 |
| 4- 1-1913- 2 P. M. | H. N. Lungwitz..... | 7.35 | 1,550 |
| 4- 1-1913- 5 P. M. | H. N. Lungwitz..... | 7.25 | 1,460 |
| 4- 2-1913- 9 A. M. | H. N. Lungwitz..... | 5.55 | 620 |
| 4- 2-1913- 2 P. M. | H. N. Lungwitz..... | 5.35 | 562 |
| 4- 2-1913- 5 P. M. | H. N. Lungwitz..... | 5.65 | 506 |
| 4- 3-1913- 9 A. M. | H. N. Lungwitz..... | 4.05 | 292 |
| 4- 3-1913- 3 P. M. | H. N. Lungwitz..... | 3.85 | 270 |
| 4- 4-1913- 9 A. M. | H. N. Lungwitz..... | 3.15 | 218 |
| 4- 4-1913- 5 P. M. | H. N. Lungwitz..... | 2.75 | 215 |
| 4- 5-1913- 6 P. M. | H. N. Lungwitz..... | 2.55 | 144 |
| 8-15-1913 | W. B. Stevenson..... | 0.69 | 0.2 |
| 4- 3-1914- 6 A. M. | H. N. Lungwitz..... | 6.95 | 401 |
| 4- 3-1914- 8 A. M. | H. N. Lungwitz..... | 5.20 | 367 |
| 4- 3-1914-11 A. M. | H. N. Lungwitz..... | 5.95 | 465 |
| 4- 3-1914- 4 P. M. | H. N. Lungwitz..... | 5.45 | 663 |
| 4- 4-1914- 8 A. M. | H. N. Lungwitz..... | 3.75 | 279 |
| 4- 4-1914- 5 P. M. | H. N. Lungwitz..... | 4.15 | 304 |
| 4- 5-1914-11 A. M. | H. N. Lungwitz..... | 2.85 | 128 |
| 6-21-1914- 6 P. M. | H. N. Lungwitz..... | 10.52 | 5,001 |
| 6-21-1914- 8 P. M. | H. N. Lungwitz..... | 11.35 | 5,063 |
| 6-22-1914- 8 A. M. | H. N. Lungwitz..... | 9.90 | 2,361 |
| 6-22-1914- 3 P. M. | H. N. Lungwitz..... | 6.80 | 1,108 |
| 6-22-1914- 8 P. M. | H. N. Lungwitz..... | 6.10 | 836 |
| 8- 9-1914 | E. F. Chandler..... | 1.29 | 8.4 |

MONTHLY DISCHARGE OF NORTH BRANCH OF GRAND RIVER AT
HALEY, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | C | 3.5 | 0.1 | 2 |
| December | E | ..... | ..... | 0.1 |
| 1913. January | E | ..... | ..... | 0.1 |
| February | E | ..... | ..... | 0.1 |
| March | C | 4,800 | ..... | 158 |
| April | B | 2,040 | 3 | 123 |
| May | C | ..... | ..... | 1.6 |
| June | C | ..... | ..... | 1 |
| July | B | 81 | 1 | 6 |
| August | C | ..... | ..... | 1 |
| September | C | ..... | ..... | 0.6 |
| October | C | ..... | ..... | 0.8 |
| November | E | ..... | ..... | 0.3 |
| December | E | ..... | ..... | 0.2 |
| 1914. January | E | ..... | ..... | 0.2 |
| February | E | ..... | ..... | 0.4 |
| March | D | 49 | ..... | 11 |
| April | B | 530 | 1 | 43 |
| May | C | 5 | 0 | 1.3 |
| June | B | 1,940 | 0 | 141 |
| July | B | 213 | 2 | 26 |
| August | B | 310 | 2 | 49 |

Maximum gage-heights, 10.2 feet March 31, 1913; 6.0 feet April 3, 1914; 11.5 feet June 21, 1914.

Minimum gage-heights, 0.8 feet November 30, 1912; 0.8 feet October 15, 1913; 0.8 feet June 5, 1914.

CANNON BALL RIVER NEAR STEVENSON, N. D.

The gaging station on the Cannon Ball river was first established June 10, 1903, at the post-office of Stevenson, which was at that time about thirty miles above the mouth of the Cannon Ball River and four miles above the confluence of Dogtooth Creek, at a point four miles south of the present railroad station and postoffice Timmer. After two years discontinuance, the station was re-established August 9, 1911, about a mile upstream from its original location. The datum of the new gage is so related to the datum of the original gage as to add approximately 10 feet to all gage readings; thus a reading of 15 feet on the present gage indicates almost precisely the same height of water as a reading of 5 feet on the original gage. The drainage area above this point is 3,650 square miles.

The tables of discharge are based on the measurements in the list below and on forty-one measurements made in previous years.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|-----------|-----------------------|--------------|------------|
| 4-10-1913 | W. B. Stevenson..... | 15.33 | 648 |
| 6-19-1913 | W. B. Stevenson..... | 13.10 | 23 |
| 8-13-1913 | W. B. Stevenson..... | 12.50 | 1.4 |
| 8-14-1913 | W. B. Stevenson..... | 12.54 | 1.9 |
| 9-16-1913 | W. B. Stevenson..... | 12.41 | 0.4 |
| 4- 9-1914 | O. Christianson..... | 13.01 | 49 |
| 6-26-1914 | E. F. Chandler..... | 17.08 | 1,764 |
| 8-10-1914 | E. F. Chandler..... | 13.07 | 37 |

**MONTHLY DISCHARGE OF CANNON BALL RIVER NEAR STEVENSON,
N. D.**

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | B | 29 | 9 | 18 |
| December | E | ..... | ..... | 6 |
| 1913. January | E | ..... | ..... | 3 |
| February | E | ..... | ..... | 7 |
| March | D | 1,690 | ..... | 133 |
| April | A | 3,820 | 56 | 887 |
| May | A | 305 | 39 | 101 |
| June | A | 148 | 5 | 41 |
| July | A | 69 | 2 | 23 |
| August | A | 15 | 0.4 | 3 |
| September | B | 7 | 0.2 | 1 |
| October | B | 29 | 0.3 | 4 |
| November | B | 4 | 0.3 | 1.4 |
| December | D | ..... | ..... | 1.2 |
| 1914. January | E | ..... | ..... | 1 |
| February | E | ..... | ..... | 1 |
| March | D | 137 | ..... | 82 |
| April | C | 276 | 28 | 83 |
| May | C | 590 | 28 | 87 |
| June | B | 4,680 | 28 | 971 |
| July | B | 1,080 | 17 | 216 |
| August | A | 90 | 17 | 40 |

Maximum gage-heights, 18.9 feet April 4, 1913; 19.8 feet June 27, 1914; 18.6 feet July 29, 1914.

Minimum gage-heights, 12.3 feet September 26, 1913; 12.8 feet July 28, 1914.

HEART RIVER NEAR RICHARDTON, N. D.

The gaging station on the Heart River was established May 18, 1903, and was located at the steel highway bridge ten miles south of Richardton. On September 4, 1911, it was transferred one mile downstream, and the gage-datum was changed so as to add approximately 20 feet to all gage readings. Thus a reading of 25 feet on the present gage indicates almost exactly the same height of water as a reading of 5 feet on the original gage. The drainage area above this point is 1,250 square miles.

The tables of discharge are based on the measurements in the following list and on thirty-five measurements in previous years.

MEASUREMENTS OF DISCHARGE

| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|-----------|-----------------------|--------------|------------|
| 4-13-1913 | W. B. Stevenson..... | 25.44 | 145 |
| 5-30-1913 | W. B. Stevenson..... | 24.48 | 44 |
| 8-10-1913 | W. B. Stevenson..... | 23.89 | 2.1 |
| 9-12-1913 | W. B. Stevenson..... | 23.73 | 0.8 |
| 4-12-1914 | O. Christianson..... | 24.90 | 82 |
| 8-12-1914 | E. F. Chandler..... | 24.50 | 27 |

MONTHLY DISCHARGE OF HEART RIVER NEAR RICHARDTON, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | D | 180 | ..... | 42 |
| December | E | ..... | ..... | 4.4 |
| 1913. January | E | ..... | ..... | 2 |
| February | E | ..... | ..... | 0.5 |
| March | C | ..... | ..... | 91 |
| April | B | 4,700 | 44 | 725 |
| May | B | 62 | 36 | 43 |
| June | A | 36 | 18 | 24 |
| July | A | 21 | 4 | 13 |
| August | B | 28 | 3 | 12 |
| September | B | 6 | 1 | 3 |
| October | B | 15 | 6 | 12 |
| November | E | 15 | 15 | 15 |
| December | E | ..... | ..... | 10 |
| 1914. January | E | ..... | ..... | 3 |
| February | E | ..... | ..... | 0.4 |
| March | E | ..... | ..... | 2 |
| April | B | 1,890 | 20 | 131 |
| May | B | 456 | 20 | 75 |
| June | B | 1,550 | 14 | 382 |
| July | B | 1,480 | 0 | 184 |
| August | C | 390 | 11 | 68 |

Maximum gage-heights, 41.9 feet April 2, 1913; 31.2 feet April 5, 1914; 31.7 feet June 29, 1914; 31.5 feet July 30, 1914.

Minimum gage-heights, 24.1 feet December 1, 1912; 23.7 feet September 18, 1913; 23.4 feet July 26, 1914.

KNIFE RIVER NEAR BRONCHO, N. D.

The gaging station on the Knife River is about twenty miles north of Hebron, in Section 4, Township 142 North, Range 90 West, at the former location of Broncho postoffice. A station was first established on the river in this vicinity on May 29, 1903. The drainage area above this point is 1,260 square miles.

The tables of discharge are based on the measurements in the list below and thirty-one measurements made in previous years.

MEASUREMENTS OF DISCHARGE

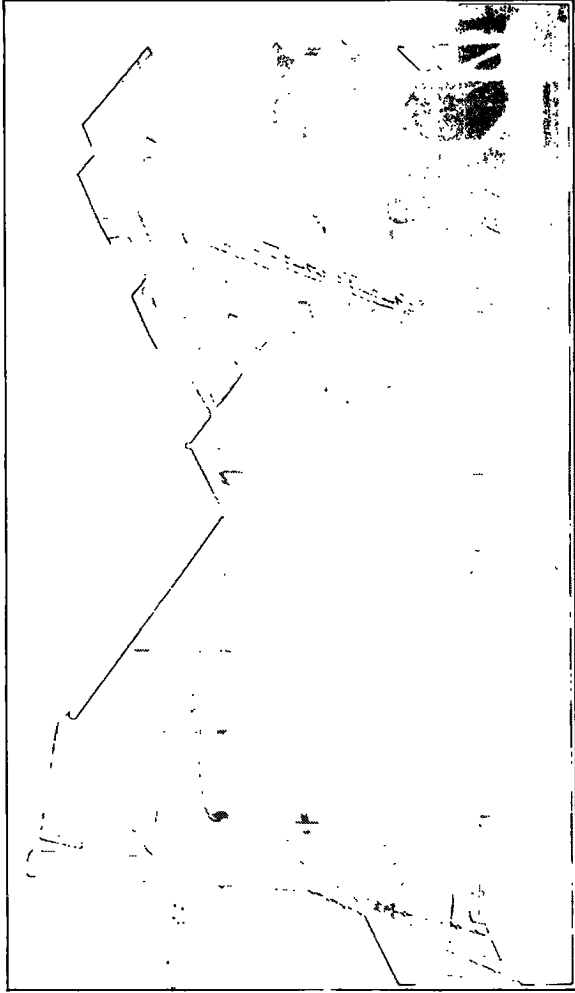
| Date. | Name of Hydrographer. | Gage-height. | Discharge. |
|-----------|-----------------------|--------------|------------|
| 4-12-1913 | W. B. Stevenson..... | 4.95 | 120 |
| 5-31-1913 | W. B. Stevenson..... | 4.13 | 40 |
| 8-11-1913 | W. B. Stevenson..... | 3.68 | 6.8 |
| 4-11-1914 | O. Christianson..... | 4.37 | 46 |
| 8-13-1914 | E. F. Chandler..... | 3.82 | 13.5 |

MONTHLY DISCHARGE OF KNIFE RIVER NEAR BRONCHO, N. D.

| Date. | Accuracy. | Maximum. | Minimum. | Mean. |
|----------------|-----------|----------|----------|-------|
| 1912. November | D | ..... | ..... | 52 |
| December | E | ..... | ..... | 10 |
| 1913. January | E | ..... | ..... | 6 |
| February | E | ..... | ..... | 4 |
| March | E | ..... | ..... | 138 |
| April | E | 5,990 | 27 | 642 |
| May | B | 40 | 22 | 27 |
| June | B | 27 | 17 | 19 |
| July | B | 13 | 6 | 12 |
| August | B | 22 | 6 | 14 |
| September | B | 17 | 6 | 9 |
| October | B | 13 | 9 | 12 |
| November | B | 17 | 13 | 14 |
| December | E | ..... | ..... | 9 |
| 1914. January | E | ..... | ..... | 5 |
| February | E | ..... | ..... | 4 |
| March | D | 33 | ..... | 16 |
| April | C | 1,174 | 14 | 108 |
| May | B | 244 | 10 | 75 |
| June | C | 7,700 | 7 | 1,190 |
| July | B | 525 | 10 | 80 |
| August | B | 161 | 17 | 29 |

Maximum gage-heights, 21.0 feet April 1, 1913; 9.2 feet April 5, 1914, 24.0 feet June 26, 1914.

Minimum gage-heights, 4.0 feet. December 1, 1912; 3.5 feet September 18, 1913; 3.6 feet June 3, 1914.



BRIQUETTING PLANT OF THE NORTHERN BRIQUETTING COMPANY
AT MINOT, N. D.

North Dakota Lignite Coal Mines
Biennial Period 1912-1913

BRIQUETTING OF LIGNITE COAL IN NORTH DAKOTA

A Brief Description of the Northern Briquetting Company's Plant at Minot

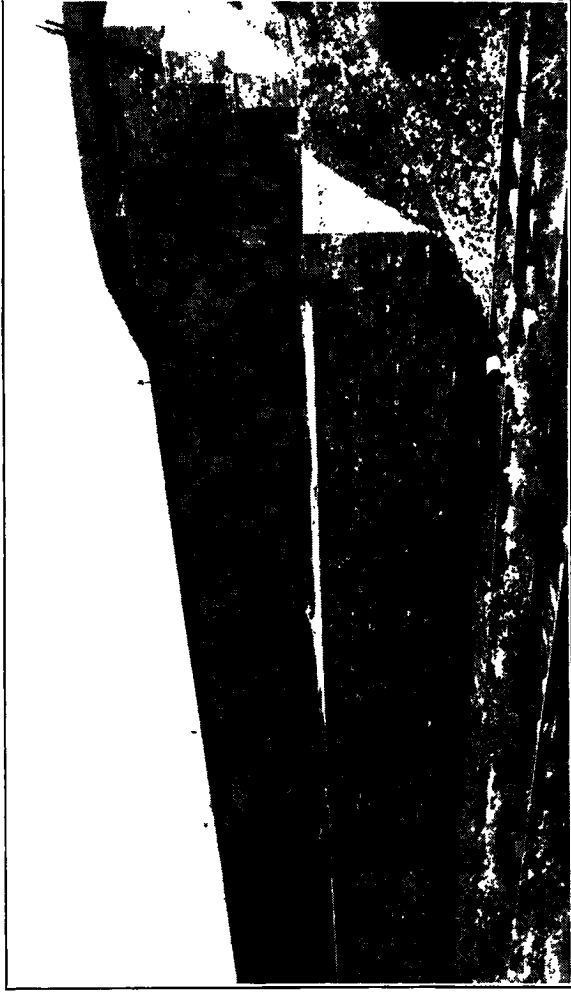
The 1907 Legislature, recognizing the importance of the lignite industry, established an experiment station at Hebron, where, under the direction of Dean E. J. Babcock of the College of Mining Engineering, a process of briquetting coal has finally been developed. This process has been adopted by the Northern Briquetting Company at Minot, where the first practical briquetting plant in North Dakota has been established. Briquetting being a subject having an important bearing on, and of direct interest to, the lignite industry, a short description of the plant and process is pertinent.

The plant, which is built at the crossing of the Soo and Great Northern railroads, has three stories, is operated by five men and has a capacity of 10 tons of briquets per hour. There are a number of by-products to the briquetting process, but none of these are saved.

The coking ovens, of which there are 10, having a capacity of 15 tons each, are located at Davis, at the Company mine. Lignite is used to do the cooking and seven men are required to operate the ovens. It requires 48 hours to fill, cake and discharge an oven. The coke is shipped from Davis to the plant at Minot, where it is first dumped into a large steel storage tank.

From the storage tank the coke is discharged into a conveyor and goes to the hammer crusher, from which it is elevated to the third story and passes through a steam heater, which discharges into a binder mixer in the second story, where the binder is added to the coke. The binder mixer discharges into a cooling mixer, where the right temperature for pressing is secured, from which the mix is discharged into the briquet press. From the press the briquets are elevated to a cooling table which moves slowly and drops them finally into one of a number of storage bins.

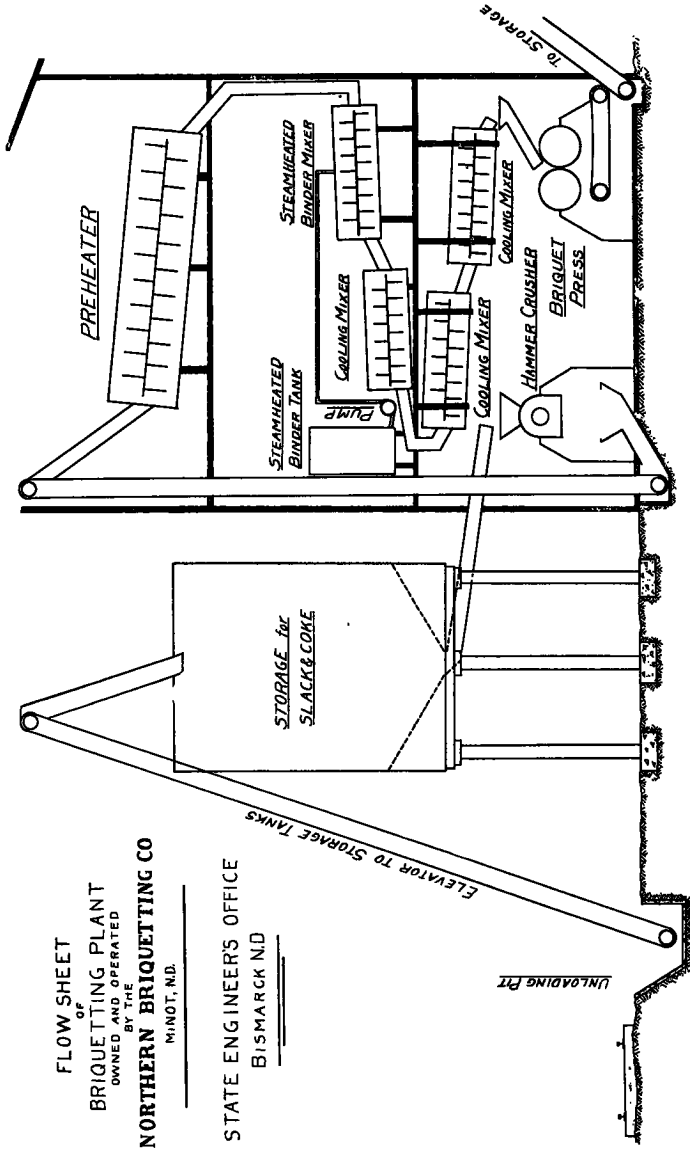
The president of the Northern Briquetting Company is C. F. Mudgett of Valley City, North Dakota.



COKING OVENS BELONGING TO NORTHERN BRIQUETTING COMPANY
OF MINOT.

FLOW SHEET
 of
 BRIQUETTING PLANT
 OWNED AND OPERATED
 BY THE
 NORTHERN BRIQUETTING CO
 MINOT, N.D.

STATE ENGINEER'S OFFICE
 BISMARCK N.D.



NORTH DAKOTA LIGNITE COAL MINE REPORT 1913-1914

The fourth biennial inspection of coal mines was made during the winter of 1913-14. The production of lignite for the past year according to the data collected by this department is shown by the following comparative table:

| Year | No. of Mines | Production | Difference |
|-------|--------------|------------|------------|
| 1908* | 65 | 320,742 | ..... |
| 1909 | 103 | 372,570 | 51,828 |
| 1910* | 84 | 416,580 | 44,010 |
| 1911 | 100 | 486,842 | 70,262 |
| 1912* | 82 | 501,827 | 14,985 |
| 1913 | 109 | 431,054 | 70,773 |

Slack production for 1913, 112,791 tons additional.

*Data collected by blanks sent to mine owners and operators.

1912

Reports from 82 mines were received by this office at the close of 1912. Seventeen of the 82 mines were surface mines, the remaining 65 being underground mines. The annual average number of men employed was 598, an average of 814 men being employed during the six winter months, 488 of whom were miners, the remaining 326 being employed about the mines in other capacities. The average number of men employed during the summer six months was 382, 197 of whom were classified as miners and 185 as being employed about the mines as helpers. The average daily output per man employed was 4.11 tons.

No fatal accidents were reported for 1912. There were 15 non-fatal accidents reported. The number of accidents per hundred thousand tons of coal produced was 2.99. The percentage of injured persons to the average number employed for the year is 2.51 per cent. The average annual selling price for the year was \$1.58 per ton.

1913

Records were secured of 109 coal mines operating in 1913. One hundred of these were inspected and the information concerning the remaining nine was obtained from reports made to the office. Twenty-one of the 109 mines were surface mines, the remaining 88 being underground mines. The average number of men employed during the year was 605, there being an average of 784 men employed during the winter six months, 456 being miners and 328 extra men; 427 men were employed during the summer months, 234 of whom were miners and 193 were extra men. The average daily output per man employed was 3.02 tons and the average daily production of slack per man employed was 1.78 tons.

Seven fatal accidents occurred during the year, making the rate of 1.62 deaths per 100,000 tons of coal mined. The percentage in terms of the average annual number of men employed is 1.15 per cent. Non-fatal accidents to the extent of 35 are recorded, making a rate of 8.12 per 100,000 tons of coal mined. The percentage, based on the average number of men employed is 5.78 per cent.

Two hundred and sixty-eight thousand five hundred and twenty-three tons of coal were shipped, the remaining 162,531 being sold to local trade. The average selling price per ton for the year was \$1.67.

The reduction in tonnage for 1913 as compared with that of 1912 is partly accounted for by the extremely moderate weather during the fall and early winter of 1913, which decreased the local demand, and is partly accounted for by the separate classification of slack. The effort of the office has been to obtain sufficient reliable data on the slack production to warrant listing it separately. Such information has not heretofore been available, and therefore slack sold was shown in the coal production figures. Sufficient data was obtained for 1913 to warrant listing the slack separately, slack, as the term is used here, covering the coal passing a six-inch screen. The production for 1913 was 112,791 tons, and the average estimated price per ton for which 83,578 tons were sold at the mine is \$1.00; 29,213 tons represent waste, that is, slack for which there is no market. Most of the waste is slack which will pass a two-inch screen. Based on the output of coal the slack production is approximately 25 per cent. The waste slack for which there is no demand represents 5.68 per cent of the combined output of coal and sold slack, which is 514,636 tons, and 6.78 per cent of the output of coal only.

FATALITIES

Referring to the table showing the list of fatal accidents, it will be noted that none were reported for the year 1912. Seven deaths are reported for the year 1913. Three of these fatalities occurred in mines of whose existence this department has not had previous knowledge. Although the department has listed these deaths, it is a question whether they should be charged against the mining industry of the state.

Charles Adkins and James Dahl met their death in a small surface mine near Reeder, in Adams County. The supply of coal that has been exposed by stripping earlier in the season was exhausted, and they attempted to undermine a little. Spring thaws had weakened the overhanging clay and they were crushed by a cave-in which caught them unawares.

Virgil Monroe, whose home is near Wilton, was killed in an accident at the Peterson Coal Mine. Monroe, with another miner, loaded a hole with dynamite and after lighting it went into an adjoining room to await the blast, supposing the pillar to be thick enough to afford protection. The pillar, however, proved to be very narrow and the shot blew through, burying them in coal and inflicting injuries from which Monroe died two days later.

Aleck Kanski was killed in the Wilton Coal Mine No. 1. He was found dead and apparently had fallen from a car of coal and had been run over.

Mike Cowley was killed in the Hill Mine near Garrison. He was employed as a miner, and a fall of roof caught him while at work, killing him instantly.

W. F. Hall, whose home a short time prior to his death was Ashton, South Dakota, was employed as a driver in the Low Level Mine. Apparently he lost his hold and fell, being caught between the side of the car and the wall of the entry, and was found in an unconscious condition, death resulting a short time later.

Wm. O'Brien was a recent arrival from Berkenhead, England, and was employed in a small mine near Golden Valley. His death was caused by a fall of roof. O'Brien had only been in this country a few weeks.

NON-FATAL ACCIDENTS

The table of non-fatal accidents shows that the larger number of the accidents recorded occurred at the Wilton Coal Mine No. 1. In order that the table may not be misleading, the state engineer wishes to say that the Washburn Coal Company keeps a very accurate record of every accident, no matter how slight and faithfully reports the same to this department, while a large proportion of the operators of other mines keep no record and make no reports of minor non-fatal accidents. The constant effort of the department is to secure complete and accurate data concerning all accidents, and the department furnishes the mine operators with blanks asking such information, and especially requests that these blanks be carefully filled out. Much more reliable information would be obtainable through an annual inspection of the mines.

The non-fatal accidents include such accidents as do not prove fatal within a year, as nearly as can be determined, and are not sub-classified, the serious and minor accidents being listed together.

EXPLANATORY

Coal mine information is presented in a tabulated form, with a short description of each mine. The mines are listed according to counties, both the counties and the names of the mines being arranged alphabetically.

The directory gives the name of the mine, owner, lessee, postoffice, location and the laboratory number referring to the number given the analyses by E. J. Babcock, Dean of the College of Mining Engineering, published elsewhere in this report.

Table No. 1 gives the name of the mine, superintendent, kind of opening, method of ventilation, the year operated and date of inspection.

Table No. 2 gives the name of the mine, the average number of days worked per month in winter and in summer, the average number of miners employed per month in winter and in summer, the average number of men other than miners employed per month in winter and in summer, the average daily wages and the average price per ton paid for mining in room and entry.

Table No. 3 gives the name of the mine, the depth of the coal bed, the thickness of the coal and the thickness of the coal mined, the system of mining, method of mining, explosive used and means of ignition.

Table No. 4 gives the name of the mine, dimensions of the main entry and dimensions of the rooms.

Table No. 5 gives the name of the mine, method of illumination, kind of roof, kind of floor, method of drainage, kind of timber used, and the average size and cost of timber.

Table No. 6 gives the name of mine, the method of delivering the coal at the surface, the kind of track used, number and capacity of mine cars, the distance from the shipping station and the railroad.

Table No. 7 gives the name of the mine, the output of the mines by the month for the years 1912 and 1913 and the slack production for 1913.

Table No. 8 gives the name of the mine, the average number of working days for the year, the average daily production based on the number of working days, the annual production, value at the mine and total value, for both 1912 and 1913, with a summary of coal production and value by counties for both 1912 and 1913.

Following the tables will be found in tabulated form the information listed below:

List of mines that ship coal.

List of changes in the names of mines between 1910-1911 and 1912-1913.

List of mines operating in 1910-1911 and closed in 1912-1913.

Fatal accidents in 1912-1913.

Non-fatal accidents in 1912-1913.

Individual descriptions of the mines are given following the casualty tables.

The table of analyses of the coal of most of the mines will be found at the close of this report.



A LIGNITE MINER DELIVERING COAL AT THE SURFACE.

Tabulated Coal Mine Data

DIRECTORY OF NORTH DAKOTA COAL MINES

ADAMS COUNTY

| Name of Mine | Owner | Lessee | Post Office | Subdivision | Location | | Lab. No |
|---|--------------------------------------|--------|-------------|-----------------------------------|----------|-----------|---------|
| | | | | | Sec. | Twp. Rge. | |
| 1. Clermont Coal Mine..... | Clermont Coal Co. | | Haynes..... | W $\frac{1}{2}$ NW $\frac{1}{4}$ | 8 | 129 | 94 |
| 2. Farmers Coal Mine..... | Haynes Coal Ass'n | | Haynes..... | NW $\frac{1}{4}$ SW $\frac{1}{4}$ | 9 | 129 | 94 |
| 3. Haynes Coal Mine..... | Wm. H. Brown & J. B. Slosson..... | | Haynes..... | NE $\frac{1}{4}$ SE $\frac{1}{4}$ | 8 | 129 | 94 |
| 4. Stevenson and Gundersen Coal Mine..... | Stevenson & Gundersen..... | | Haynes..... | N $\frac{1}{2}$ NW $\frac{1}{4}$ | 15 | 129 | 94 |

BILLINGS COUNTY

| | | | | | | | |
|------------------------------|--------------------------------|---------------|-------------|-----------------------------------|----|-----|-----|
| 5. De Mores Coal Mine..... | N. P. Refrigerator Car Co..... | H. G. Kinmark | Medora..... | NW $\frac{1}{4}$ | 26 | 140 | 102 |
| 6. High Grade Coal Mine..... | N. D. Nichols..... | | Medora..... | NE $\frac{1}{4}$ SW $\frac{1}{4}$ | 26 | 140 | 102 |
| 7. Jackson Coal Mine..... | O. Jackson..... | | Bowman..... | NW $\frac{1}{4}$ | 19 | 133 | 102 |

BOWMAN COUNTY

| | | | | | | | |
|----------------------------|-------------------|--|---------------|------------------|------|-------|------|
| 8. Scranton Coal Mine..... | Scranton Coal Co. | | Scranton..... | SW $\frac{1}{4}$ | 24 | 181 | 100 |
| | | | | | | | |
| | | | | | | | |

BURKE COUNTY

| Name of Mine | Owner | Ch. S. Post | Subdivision | Sec. | Location | | Lab. No |
|-----------------------------|------------------------------|-------------|---------------|---|-----------|-------|---------|
| | | | | | Twp. Rge. | | |
| 9. Domrese Coal Mine..... | H. J. Domrese..... | | Columbus..... | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 24 | 162 | 94 |
| 10. Fenster Coal Mine..... | Fenster Bros..... | | Larson..... | NE $\frac{1}{4}$ NW $\frac{1}{4}$ | 7 | 162 | 94 |
| 11. Gille Coal Mine..... | M. Sewald..... | | Stampede..... | SE $\frac{1}{4}$ | 20 | 162 | 93 |
| 12. Greenup Coal Mine..... | Zimdas Bros. & Kielhock..... | | Columbus..... | SW $\frac{1}{4}$ | 20 | 162 | 93 |
| 13. Hagen Coal Mine..... | E. L. Hagen..... | | Larson..... | NW $\frac{1}{4}$ | 7 | 162 | 94 |
| 14. Mackee Coal Mine..... | G. S. Ruffcorn..... | | Columbus..... | NW $\frac{1}{4}$ | 20 | 162 | 94 |
| 15. Southern Coal Mine..... | J. P. Souther..... | | Larson..... | N $\frac{1}{2}$ SW $\frac{1}{4}$ & S $\frac{1}{2}$ SE $\frac{1}{4}$ | 17 | 162 | 94 |
| 16. Olson Coal Mine..... | Anders Olson..... | | Larson..... | SW $\frac{1}{4}$ | 14 | 162 | 94 |
| 17. Vick Coal Mine..... | Herman Vick..... | | Larson..... | E $\frac{1}{2}$ SW $\frac{1}{4}$ | 19 | 162 | 93 |
| | | | | | | | |
| | | | | | | | |

BURLEIGH COUNTY

| | | | | | | | |
|-----------------------------|----------------------------------|----------------------|------------------|----|-----|----|-------|
| 18. Anderson Coal Mine..... | B. L. Anderson... | Wilton..... | SE $\frac{1}{4}$ | 23 | 142 | 79 | 3509 |
| 19. Asplund Coal Mine..... | Wm. Asplund..... | Asplund and Peterson | SW $\frac{1}{4}$ | 4 | 142 | 79 | ..... |
| 20. Backman Coal Mine..... | Emil Backman.... | Wilton..... | NE $\frac{1}{4}$ | 8 | 142 | 79 | ..... |
| 21. Johnson Coal Mine..... | A. M. Johnson.... | Wilton..... | SE $\frac{1}{4}$ | 1 | 142 | 78 | 3308 |
| 22. Lind Coal Mine..... | Anna Lind..... | Wilton..... | S $\frac{1}{2}$ | 6 | 142 | 79 | 3310 |
| 23. Peterson Coal Mine..... | C. J. Peterson.... | Wilton..... | NE $\frac{1}{4}$ | 9 | 142 | 79 | ..... |
| 24. Wilton Coal Mine No. 1. | Washburn Lignite Coal Company... | Wilton..... | SW $\frac{1}{4}$ | 1 | 142 | 80 | ..... |

DIVIDE COUNTY

| | | | | | | | |
|------------------------------|---------------------------------------|-------------|-----------------------------------|----|-----|----|------|
| 25. Dougherty Coal Mine..... | C. Dougherty..... | Noonan..... | NE $\frac{1}{4}$ NW $\frac{1}{4}$ | 10 | 162 | 95 | 3251 |
| 26. Houglet Coal Mine..... | Jos. Houglet..... | Noonan..... | S $\frac{1}{2}$ SE $\frac{1}{4}$ | 8 | 162 | 95 | 3252 |
| 27. Noonan Coal Co. Mine.... | Dr. C. H. McDon-ald & J. L. Lou-beski | Noonan..... | N $\frac{1}{2}$ SE $\frac{1}{4}$ | 3 | 162 | 95 | 3250 |
| 28. Truax Coal Mine..... | E. M. Truax..... | Noonan..... | E $\frac{1}{2}$ NE $\frac{1}{4}$ | 10 | 162 | 95 | 3260 |

GOLDEN VALLEY COUNTY

| | | | | | | | |
|----------------------------|--------------------|---------------------|-----------------------------------|----|-----|-----|-------|
| 29. Corliss Coal Mine..... | I. J. Corliss..... | Sentinel Butte..... | NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 25 | 139 | 105 | ..... |
| 30. Kussick Coal Mine..... | W. H. Porter..... | Sentinel Butte..... | SW $\frac{1}{4}$ | 8 | 139 | 104 | ..... |
| 31. Porter Coal Mine..... | | Beach..... | | 22 | 139 | 105 | ..... |

McLEAN COUNTY

| | | | | | | | |
|------------------------------|--------------------|----------------|-----------------------------------|----|-----|----|-------|
| 32. Bitumina Coal Mine..... | John Satterlund.. | Washburn..... | NE $\frac{1}{4}$ SE $\frac{1}{4}$ | 1 | 144 | 82 | 3289 |
| 33. Borchardt Coal Mine..... | El. G. Borchardt.. | Underwood..... | SE $\frac{1}{4}$ NE $\frac{1}{4}$ | 5 | 146 | 82 | 3292 |
| 34. Fredrich Coal Mine..... | Wm. Fredrich.... | Underwood..... | SW $\frac{1}{4}$ | 1 | 146 | 81 | 3283 |
| 35. Hansen Coal Mine..... | P. J. Hansen..... | Garrison..... | W $\frac{1}{2}$ | 18 | 146 | 81 | ..... |
| 36. Hill Coal Mine..... | P. A. Hill..... | Garrison..... | E $\frac{1}{2}$ NE $\frac{1}{4}$ | 25 | 148 | 86 | 3283 |
| 37. Johnson Coal Mine..... | S. A. Johnson.... | Garrison..... | SE $\frac{1}{4}$ | 18 | 148 | 83 | ..... |
| 38. Kunkel Coal Mine..... | J. A. Kunkel..... | Garrison..... | E $\frac{1}{2}$ | 18 | 148 | 84 | ..... |
| 39. Uirich Coal Mine..... | A. G. Anderson... | Garrison..... | W $\frac{1}{2}$ NW $\frac{1}{4}$ | 17 | 148 | 83 | 3322 |
| 40. Youngquist Coal Mine.... | Ed Youngquist.... | Washburn..... | SW $\frac{1}{4}$ NE $\frac{1}{4}$ | 10 | 144 | 83 | 3324 |

DIRECTORY—Cont.

MORTON COUNTY

| Name of Mine | Owner | Lessee | Post Office | Subdivision | Location | | Lab. No |
|-------------------------------------|-----------------------------------|---------------|----------------|-----------------------------------|----------|-------------|---------|
| | | | | | Sec. | Twp. \| Rge. | |
| 41. Feland Coal Mine..... | Theodore Feland. | | Sims..... | SW $\frac{1}{4}$ | 133 | 86 | 3268 |
| 42. Garfield Coal Mine..... | C. Lueder..... | | New Salem..... | S $\frac{1}{2}$ | 140 | 85 | |
| 43. Hebron Brick Co. Coal Mine..... | Hebron Brk. and Pressed Brick Co. | | Hebron..... | S $\frac{1}{2}$ SW $\frac{1}{4}$ | 140 | 90 | .... |
| 44. New Salem Coal Mine.... | Dakota Coal Products Co..... | M. Tausend... | New Salem..... | SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 139 | 85 | 3249 |
| 45. North Star Coal Mine.... | Moorem S. Haven | | Hebron..... | SE $\frac{1}{4}$ | 140 | 90 | 3261 |

MOUNTRAIL COUNTY

| | | | | | | | |
|-------------------------------|---|-----------------|------------------|-----------------------------------|-----|----|------|
| 46. Blicke Coal Mine..... | Joseph Barto..... | Andrew Blicke | White Earth..... | SW $\frac{1}{4}$ NW $\frac{1}{4}$ | 158 | 93 | 3278 |
| 47. Barto Coal Mine..... | C. H. Howman..... | J. E. Landaker | White Earth..... | SW $\frac{1}{4}$ | 156 | 94 | 3279 |
| 48. Elgers Coal Mine..... | F. L. Eiger..... | F. E. Blake.... | Epworth..... | SW $\frac{1}{4}$ | 153 | 89 | 3327 |
| 49. Bowman Coal Mine..... | | W. J. Blake.... | Stanley..... | SW $\frac{1}{4}$ | 155 | 92 | 3326 |
| 50. Hartman Coal Mine..... | | | Stanley..... | NE $\frac{1}{4}$ | 157 | 92 | .... |
| 51. Hette Coal Mine..... | Ole Hette..... | | White Earth..... | NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 157 | 83 | .... |
| 52. John Coal Mine..... | A. D. John..... | | Epworth..... | SE $\frac{1}{4}$ | 154 | 89 | 3325 |
| 53. North Star Coal Mine.... | Albert Roseno.... | Chris Rude.... | Amanda..... | NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 154 | 90 | 3330 |
| 54. Faida Coal Mine..... | Geo. S. Rogers.... | | Faerno..... | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 154 | 89 | .... |
| 55. Forger Coal Mine..... | Geo. Forger..... | | White Earth..... | SE $\frac{1}{4}$ NW $\frac{1}{4}$ | 156 | 94 | 3214 |
| 56. Rodgers Coal Mine..... | G. S. Rogers.... | | Faerno..... | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 154 | 89 | 3329 |
| 57. Sellar Coal Mine..... | W. L. Sellars.... | | Epworth..... | NE $\frac{1}{4}$ SE $\frac{1}{4}$ | 153 | 89 | .... |
| 58. Stacy Coal Mine..... | State Bank of Crary..... | G. W. Stacy... | Stanley..... | NE $\frac{1}{4}$ | 154 | 91 | .... |
| 59. Sunday Coal Mine..... | Albert Roseno.... | Herman Moerke | Epworth..... | NE $\frac{1}{4}$ | 158 | 90 | 3228 |
| 60. Williams Coal Mine..... | B. D. Williams.... | | White Earth..... | SW $\frac{1}{4}$ | 154 | 94 | 3313 |
| 61. White Earth Coal Mine.... | Corkhill-Ferguson Co., Rochester, N. Y. | | White Earth..... | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 156 | 94 | .... |

OLIVER COUNTY

| | | | | | | | |
|------------------------------------|-------------------|--|---------------|-----------------------------------|-----|----|------|
| 62. Flint Coal Mine..... | Henretta Flint. | | Hannover..... | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | 142 | 85 | 3266 |
| 63. Meyhoff Coal Mine..... | Dick Meyhoff.... | | Center..... | SE $\frac{1}{4}$ | 141 | 84 | .... |
| 64. Pleasant Valley Coal Mine..... | Victor Boerner... | | Center..... | SW $\frac{1}{4}$ | 142 | 84 | 3253 |
| 65. Spring Valley Coal Mine.... | N. O. Nelson..... | | Center..... | SW $\frac{1}{4}$ | 141 | 84 | 3267 |

RENVILLE COUNTY

| | | | | | | | |
|----------------------------|--------------------|--------------------------------|--|----|-----|----|------|
| 66. Tehelka Coal Mine..... | P. P. Tehelka..... | Hopkins & Bates..... | Carplo.....NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 33 | 158 | 86 | 3284 |
| 67. Wooster Coal Mine..... | Bert Wooster..... | Dan Danielson & John Akur..... | Carplo..... | 34 | 158 | 86 | 3285 |

STARK COUNTY

| | | | | | | | |
|------------------------------|--------------------------------|-------------------|--------------------------------|----|-----|---------|-------|
| 68. Gross Coal Mine..... | Paul Gross..... | Bert Collins..... | Belfield.....E $\frac{1}{2}$ | 34 | 140 | 99 | 3263 |
| 69. Lehigh Coal Mine..... | Consolidated Coal Company..... | | Dickinson.....S $\frac{1}{2}$ | 8 | 139 | 95 | 3264 |
| 70. Pittsburg Coal Mine..... | Dakota Fuel Co..... | | Dickinson.....SW $\frac{1}{4}$ | 7 | 139 | 90 | 3265 |
| 71. Willey Coal Mine..... | C. H. Willey..... | | Zenith.....SW $\frac{1}{4}$ | 28 | 140 | 98 | ..... |
| 72. Zenith Coal Mine..... | Zenith Coal Co..... | | Zenith.....SE $\frac{1}{4}$ | 6 | 139 | 98 & 99 | ..... |
| | | | | 1 | 139 | 99 | 3262 |

WARD COUNTY

| | | | | | | | |
|------------------------------------|--|------------------------------|--|----|-----|---------|-------|
| 73. Baden Coal Mine..... | Herb French..... | Gilbert Mahtun | Baden.....NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 26 | 159 | 88 | 3287 |
| 74. Bertelson Coal Mine No. 1 | Jonas Johnson..... | | Kenmare.....SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 29 | 161 | 88 | 3289 |
| 75. Bertelson Coal Mine No. 2 | B. J. Bertelson..... | | Kenmare.....NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 25 | 161 | 89 | 3288 |
| 76. Brick Yard Coal Mine..... | Kenmare Coal & Brick Company..... | | Kenmare.....NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 32 | 160 | 88 | 3303 |
| 77. Burlington City Coal Mine | P. J. Perlecheck..... | | Burlington.....NE $\frac{1}{4}$ | 2 | 155 | 84 | 3297 |
| 78. Carlisch Coal Mine..... | W. D. Carlisch..... | | Sawyer.....SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 29 | 152 | 81 | 3280 |
| 79. Christophson Coal Mine..... | U. Christophson..... | | Carplo.....NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 3 | 157 | 86 | ..... |
| 80. Colton Coal Mine..... | L. D. Colton..... | | Burlington.....NE $\frac{1}{4}$ NE $\frac{1}{4}$ | 1 | 155 | 84 & 83 | 3307 |
| 81. Conan Coal Mine..... | D. Conan..... | J. M. Cody..... | Burlington.....NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 6 | 155 | 83 | 3306 |
| 82. Crosby Coal Mine..... | John Crosby..... | | Burlington.....NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 18 | 155 | 83 | 3306 |
| 83. Davis Coal Mine..... | Northern Briquetting Company..... | | Kenmare.....NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 30 | 161 | 88 | 3298 |
| 84. Des Lacs Coal Mine..... | F. L. Simmons et al..... | | Minot.....NE $\frac{1}{4}$ SW $\frac{1}{4}$ | 12 | 155 | 84 | 3295 |
| 85. Diamond Coal Mine..... | E. H. Feck..... | Frank Terence | Foxholm.....SE $\frac{1}{4}$ NW $\frac{1}{4}$ | 2 | 156 | 85 | 3301 |
| 86. Farmers Lignite Coal Mine..... | Farmers Lignite Coal & Transportation Company..... | | Kenmare.....SE $\frac{1}{4}$ SE $\frac{1}{4}$ | 20 | 160 | 88 | ..... |
| 87. Fihelly Coal Mine..... | Pat Fihelly..... | Joe Murphy & Joe Harper..... | Bowbells.....SE $\frac{1}{4}$ NE $\frac{1}{4}$ | 20 | 161 | 88 | 3291 |
| 88. Foresythe Coal Mine..... | A. P. Foresythe..... | Peterson Bros..... | Carplo..... $\frac{1}{2}$ miles north of Carpio..... | 5 | 155 | 84 | 3294 |
| | | | Burlington.....Lots 3 and 4 | | | | |

DIRECTORY—Cont.

WARD COUNTY—Cont.

| Name of Mine | Owner | Lessee | Post Office | Subdivision | Sec. | Location | | Lab. No |
|---------------------------------|-------------------------------------|----------------|------------------------------|---------------|--------|----------|------|---------|
| | | | | | | Twp. | Rge. | |
| 89. Hot Blast Coal Mine..... | Rogers & Maynard | | Donnybrook, 3 miles north of | | 1 | | | 3331 |
| 90. Hunnewell Coal Mine..... | R. J. Hunnewell.. | Lloyd Spencer. | Burlington..... | Donnybrook | 31 | 156 | 84 | 3304 |
| 91. Klondike Coal Mine..... | Wm. Spencer..... | | Donnybrook..... | SW 1/4 NW 1/4 | 27 | 159 | 87 | 3382 |
| 92. Leeson Coal Mine No. 1..... | J. J. Leeson..... | | Velva..... | SE 1/4 NW 1/4 | 19 | 152 | 81 | 3383 |
| 93. Leeson Coal Mine No. 2..... | J. J. Leeson..... | | Velva..... | SE 1/4 NW 1/4 | 31 | 156 | 84 | 3386 |
| 94. Lloyd Coal Mine..... | Lloyd Coal Co. | | Burlington..... | SE 1/4 SE 1/4 | 33-30 | 156 | 85 | 3386 |
| 95. McClure Coal Mine..... | McClure Coal Co. | | Minot..... | SE 1/4 SE 1/4 | 33 | 160 | 85 | ..... |
| 96. Pierce Coal Mine..... | Mr. Fox..... | John Nordstrum | Kenmare..... | ..... | 31 | 152 | 81 | ..... |
| 97. Red Flag Coal Mine..... | Red Knowles..... | | Velva..... | ..... | 182 | 162 | 87 | 3290 |
| 98. Rich Coal Mine..... | R. W. Rich..... | | Powbells..... | ..... | 29 | 162 | 87 | ..... |
| 99. Smith Dry Coal Mine..... | National Briquet- ting Co..... | | 417 Plymouth Bldg. Mpls..... | ..... | 6,7,18 | 160 | 88 | 3300 |
| 100. Square Deal Coal Mine..... | Stephen Hodgson.. | | Donnybrook..... | SE 1/4 SW 1/4 | 26 | 159 | 88 | 3332 |
| 101. Strong Coal Mine..... | Joe Strong..... | | Velva..... | SE 1/4 SE 1/4 | 21 | 152 | 81 | 3281 |
| 102. Tree-Bausch Coal Mine.. | Jacob Bausch and Rufus Tree..... | | Velva..... | SE 1/4 SE 1/4 | 21 | 152 | 81 | ..... |
| 103. Vadnais Coal Mine..... | O. Adams..... | L. Marleme.... | Velva..... | NE 1/4 NE 1/4 | 30 | 152 | 81 | ..... |
| 104. Wallace Coal Mine..... | J. S. Wallace..... | W. D. Hall.... | Kenmare..... | NE 1/4 NE 1/4 | 29 | 160 | 88 | 3302 |
| | | | Burlington..... | SE 1/4 SE 1/4 | 2 | 165 | 84 | 3305 |

WILLIAMS COUNTY

| | | | | | | | | |
|---|------------------------------------|----------------|-----------------------|---------------|----|-----|-----|-------|
| 105. Black Diamond Coal Mine | Williston Coal & Power Company. | Aleck Thompson | Williston..... | SW 1/4 NE 1/4 | 33 | 154 | 100 | 3317 |
| 106. Bryn Coal Mine..... | Marlet Bryn..... | H. O. Hanson.. | Williston..... | SW 1/4 SE 1/4 | 33 | 154 | 100 | 3375 |
| 107. Brown Coal Mine..... | J. T. Brown..... | Erick Larson.. | Williston..... | SW 1/4 SE 1/4 | 7 | 154 | 100 | 3316 |
| 108. Cow Creek Coal Mine..... | H. H. Skogberg.. | | Bonetrail..... | NW 1/4 SW 1/4 | 14 | 156 | 102 | ..... |
| 109. Government Coal Mine.. | U. S. R. S..... | | Williston..... | NW 1/4 NE 1/4 | 7 | 154 | 100 | ..... |
| 110. Head Coal Mine..... | P. G. Head..... | | Williston..... | SE 1/4 NE 1/4 | 7 | 154 | 101 | 3376 |
| 111. Husebye & Ellithorpe Coal Mine..... | Husebye & Ell- thorpe..... | | Williston..... | W 1/4 SE 1/4 | 17 | 154 | 100 | 3272 |
| 112. Low Level Coal Mine..... | John Ruegger.... | | Avoca..... | SW 1/4 SE 1/4 | 3 | 154 | 100 | 3274 |
| 113. Miller Coal Mine..... | A. C. Miller..... | | Williston..... | NE 1/4 NW 1/4 | 24 | 156 | 101 | ..... |
| 114. Moorman Coal Mine..... | J. M. Moorman.. | | R. No. 1 Wheelock | SW 1/4 SW 1/4 | 23 | 155 | 97 | 3315 |
| 115. Powell Coal Mine..... | Mary L. Powell.. | | Williston..... | NW 1/4 SE 1/4 | 33 | 154 | 100 | ..... |
| 116. Sharpe Coal Mine..... | School Land..... | Wm. Penman.. | Williston No. 64..... | ..... | 16 | 154 | 100 | 3271 |

TABLE NO. 1

ADAMS COUNTY

| Name of Mine | Superintendent | Kind of Opening | Method of Ventilation | When Operated | Date of Inspection |
|---|----------------------|-----------------|-----------------------|---------------|-----------------------|
| 1. Clermont Coal Mine..... | A. W. Peterson..... | Slope | Air shaft |-1913 | Reported Jan. 1, 1914 |
| 2. Farmers Coal Mine..... | F. H. Due..... | Slope | Air shaft | 1912-1913 | Nov. 2, 1913 |
| 3. Haynes Coal Mine..... | G. H. Gantvoort..... | Drift | Air shafts | 1912-1913 | Nov. 2, 1913 |
| 4. Stevenson & Gunderson Coal Mine..... | Owners | Slope | Air shafts | 1912-1913 | Nov. 2, 1913 |

BILLINGS COUNTY

| | | | | | |
|------------------------------|--------------|----------------|-----------------|------------|---------------|
| 5. De Mores Coal Mine..... | Lessee | Drift | Air shaft | 1912-1913 | Nov. 7, 1913 |
| 6. High Grade Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Feb. 27, 1914 |
| 7. Jackson Coal Mine..... | Lessee | Strip pit..... | ..... | 1912-..... | Nov. 8, 1913 |

BOWMAN COUNTY

| | | | | | |
|----------------------------|-----------------------|-------------|------------------|-----------|--------------|
| 8. Scranton Coal Mine..... | Chas. A. Liddell..... | Slope | Air shafts | 1912-1913 | Nov. 1, 1913 |
|----------------------------|-----------------------|-------------|------------------|-----------|--------------|

BURKE COUNTY

| | | | | | |
|-----------------------------|--------------|--------------------------|-----------------|------------|---------------|
| 9. Domrese Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Mar. 11, 1914 |
| 10. Fenster Coal Mine..... | Owner | Slope (winter) | Air shaft | 1912-1913 | Mar. 11, 1914 |
| 11. Gille Coal Mine..... | Lessee | Strip pit (summer) ..... | ..... | 1912-1913 | Mar. 11, 1914 |
| 12. Greenup Coal Mine..... | Owner | Strip pit..... | Air shaft | 1912-1913 | Mar. 11, 1914 |
| 13. Hagen Coal Mine..... | Owner | Slope and strip pit..... | None..... | 1912-1913 | Mar. 11, 1914 |
| 14. Mackee Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Reported |
| 15. Southern Coal Mine..... | Owner | Strip | Air shaft |-1913 | Mar. 11, 1914 |
| 16. Olson Coal Mine..... | Owner | Strip pit..... | ..... | 1912-..... | Reported |
| 17. Vick Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Mar. 11, 1914 |

TABLE NO. 1—Cont.
BURLEIGH COUNTY

| Name of Mine | Superintendent | Kind of Opening | Method of Ventilation | When Operated | Date of Inspection |
|---------------------------------|---------------------|-----------------|-------------------------------|---------------|--------------------|
| 18. Anderson Coal Mine..... | Owner | Slope | None..... |-1913 | Mar. 23, 1914 |
| 19. Asplund Coal Mine..... | Lessee | Slope | Air shaft |-1913 | Mar. 23, 1914 |
| 20. Backman Coal Mine..... | Owner | Slope | Air shaft | 1912-1913 | Mar. 23, 1914 |
| 21. Johnson Coal Mine..... | Owner | Slope | None..... | 1912-1913 | Mar. 23, 1914 |
| 22. Lind Coal Mine..... | Lessee | Slope | Air shaft | 1912-1913 | Mar. 23, 1914 |
| 23. Peterson Coal Mine..... | Owner | Slope | Air shaft | 1912-1913 | Mar. 23, 1914 |
| 24. Wilton Coal Mine No. 1..... | F. J. Cahill..... | Shaft | Electric fan..... | 1912-1913 | Mar. 24, 1914 |
| DIVIDE COUNTY | | | | | |
| 25. Dougherty Coal Mine..... | Owner | Slope | Air shaft | 1912-1913 | Mar. 10, 1914 |
| 26. Houghter Coal Mine..... | Owner | Slope | Air shaft |-1913 | Mar. 10, 1914 |
| 27. Noonan Coal Co. Mine..... | J. L. Loubeski..... | Slope | Air shaft | 1912-1913 | Mar. 10, 1914 |
| 28. Truax Coal Mine..... | A. H. Traux..... | Slope | Air shaft | 1912-1913 | Mar. 10, 1914 |
| GOLDEN VALLEY COUNTY | | | | | |
| 29. Corliss Coal Mine..... | Owner | Strip pit..... | None..... |-1913 | Nov. 7, 1914 |
| 30. Kussick Coal Mine..... | Lessee | Drift | None..... |-1913 | Nov. 7, 1914 |
| 31. Porter Coal Mine..... | Owner | Strip pit..... | None..... | 1912-1913 | Nov. 7, 1914 |
| McLEAN COUNTY | | | | | |
| 32. Bitumina Coal Mine..... | Edw. Kugler..... | Drift | Air shaft and compressor..... | 1912-1913 | Mar. 23, 1914 |
| 33. Borchardt Coal Mine..... | Owner | Shaft | Air shaft | 1912-1913 | Mar. 23, 1914 |
| 34. Friedrich Coal Mine..... | Owner | Shaft | Air shaft |-1913 | Mar. 23, 1914 |

| | | | | | |
|-------------------------------|--------|----------------|-----------|-----------|---------------|
| 35. Hansen Coal Mine..... | Lessee | Slope | Air shaft | 1912-1913 | Mar. 23, 1914 |
| 36. Hill Coal Mine..... | Owner | Drift | None..... |-1913 | Mar. 20, 1914 |
| 37. Johnson Coal Mine..... | Owner | Slope | Air shaft |-1913 | Mar. 21, 1914 |
| 38. Kunkel Coal Mine..... | Lessee | Strip pit..... | Air shaft |-1913 | Mar. 21, 1914 |
| 39. Ulrich Coal Mine..... | Lessee | Slope | Air shaft |-1913 | Mar. 21, 1914 |
| 40. Youngquist Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Mar. 23, 1914 |

MORTON COUNTY

| | | | | | |
|-------------------------------------|-------------------|----------------|-----------------------|-----------|--------------|
| 41. Feland Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Reported |
| 42. Garfield Coal Mine..... | Owner | Strip pit..... | ..... | ....-1913 | Mar. 4, 1914 |
| 43. Hebron Brick Co. Coal Mine..... | Frank Beneke..... | Drift | Air shafts | 1912-1913 | Mar. 3, 1914 |
| 44. New Salem Coal Mine..... | A. J. Gray..... | Slope | Steam fan & air shaft | 1912-1913 | Mar. 4, 1914 |
| 45. North Star Coal Mine..... | Owner | Slope | Air shaft | 1912-1912 | Mar. 3, 1914 |

MOUNTRAIL COUNTY

| | | | | | |
|--------------------------------|--------|----------------|-----------|------------|---------------------|
| 46. Bhekre Coal Mine..... | Lessee | Strip pit..... | None..... | 1912-1913 | Dec. 12, 1913 |
| 47. Barto Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Dec. 11, 1913 |
| 48. Bowman Coal Mine..... | Lessee | Strip pit..... | ..... | 1912-1913 | Dec. 11, 1913 |
| 49. Eggers Coal Mine..... | Lessee | Strip pit..... | ..... | 1912-1913 | Jan. 19, 1914 |
| 50. Hartman Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Dec. 11, 1913 |
| 51. Herte Coal Mine..... | Owner | Drift | None..... | Reported | 1-2-1914 |
| 52. John Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Dec. 12, 1913 |
| 53. North Star Coal Mine..... | Owner | Slope | Air shaft | 1912-1913 | Dec. 11, 1913 |
| 54. Palda Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Reported 1-2-1913 |
| 55. Forger Coal Mine..... | Lessee | Strip pit..... | None..... |-1913 | Dec. 12, 1913 |
| 56. Rodgers Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Dec. 12, 1913 |
| 57. Sellar Coal Mine..... | Owner | Drift | None..... |-1913 | Reported 12-12-1913 |
| 58. Stacy Coal Mine..... | Lessee | Strip pit..... | None..... |-1913 | Dec. 17, 1913 |
| 59. Sunday Coal Mine..... | Owner | Drift | None..... |-1913 | Dec. 11, 1913 |
| 60. Williams Coal Mine..... | Owner | Strip pit..... | ..... | ....-1913 | Dec. 12, 1913 |
| 61. White Earth Coal Mine..... | Owner | Drift | Air shaft | 1912-..... | Dec. 12, 1913 |

OLIVER COUNTY

| | | | | | |
|------------------------------------|-------|----------------|-------|-----------|--------------|
| 62. Flint Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Mar. 5, 1914 |
| 63. Meyhoff Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Mar. 5, 1914 |
| 64. Pleasant Valley Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Mar. 5, 1914 |
| 65. Spring Valley Coal Mine..... | Owner | Strip pit..... | ..... | 1912-1913 | Mar. 5, 1914 |

TABLE NO. 1—Cont.
RENVILLE COUNTY

| Name of Mine | Superintendent | Kind of Opening | Method of Ventilation | When Operated | Date of Inspection |
|------------------------------------|-----------------------|----------------------|--------------------------------------|---------------|--------------------|
| 66. Tehelka Coal Mine..... | Lessee | Slope | None..... | 1912-1913 | Mar. 16, 1914 |
| 67. Wooster Coal Mine..... | Lessee | Drift | None..... | 1912-1913 | Mar. 16, 1914 |
| STARK COUNTY | | | | | |
| 68. Gross Coal Mine..... | Owner | Slope | Air shaft |-1913 | Feb. 28, 1914 |
| 69. Lough Coal Mine..... | Jos. H. ScheSTAR..... | Slope | Air shaft |-1913 | Feb. 28, 1914 |
| 70. Pittsburg Coal Mine..... | A. H. Felton..... | Slope | and elec- tric fan.. | 1912-1913 | Mar. 2, 1914 |
| 71. Wiley Coal Mine..... | Dane Wiley..... | Strip pit..... | Steam driven fan | 1912-1913 | Dec. 23, 1913 |
| 72. Zenith Coal Mine..... | Henry Truelson..... | Slope | Air shafts | 1912-1913 | Mar. 2, 1914 |
| WARD COUNTY | | | | | |
| 73. Baden Coal Mine..... | Lessee | Slope | None..... | 1912-1913 | Mar. 14, 1914 |
| 74. Bertelson Coal Mine No. 1..... | Owner | Slope and Shaft..... | None..... | 1912-1913 | Mar. 13, 1914 |
| 75. Bertelson Coal Mine No. 2..... | Owner | Shaft | Air shaft | 1912-1913 | Mar. 13, 1914 |
| 76. Brick Yard Coal Mine..... | R. F. Lewis..... | Slope | Air shaft |-1913 | Mar. 16, 1914 |
| 77. Burlington City Coal Mine..... | Owner | Slope | & furnace | 1912-1913 | Mar. 14, 1914 |
| 78. Carlisch Coal Mine..... | Owner | Drift | None..... | 1912-1913 | Mar. 17, 1914 |
| 79. Christopherson Coal Mine..... | Owner | Slope | Air shaft | 1912-1913 | Mar. 18, 1914 |
| 80. Colton Coal Mine..... | Owner | Shaft and slope..... | None..... |-1913 | Mar. 16, 1914 |
| 81. Conan Coal Mine..... | Lessee | Drift | Fan & air shaft.... | 1912-1913 | Mar. 18, 1914 |
| 82. Crosby Coal Mine..... | Owner | Drift | None..... | 1912-1913 | Mar. 18, 1914 |
| 83. Davis Coal Mine..... | W. H. Summers..... | Slope | Fan, fur- nace & air shaft.... | 1912-1913 | Mar. 13, 1914 |
| 84. Des Lacs Coal Mine..... | Owners | Slope | None..... | 1912-1913 | Mar. 18, 1914 |

WILLIAMS COUNTY

| | | | | | | |
|------|--------------------------------|---------------------|---------------------|-----------------------------------|-----------|---------------------|
| 85. | Diamond Coal Mine..... | Lessee | Drift | Air shaft | 1912-1913 | Mar. 14, 1914 |
| 86. | Farmers Lignite Coal Mine..... | O. P. Hanson..... | Slope | Air shaft | 1912-1913 | Mar. 13, 1914 |
| 87. | Fihelly Coal Mine..... | Lessee | Slope | None..... |-1913 | Mar. 16, 1914 |
| 88. | Foresythe Coal Mine..... | Lessee | Slope | Air shaft | 1912-1913 | Mar. 17, 1914 |
| 89. | Hot Blast Coal Mine..... | Owner | Slope | None..... |-1913 | Mar. 14, 1914 |
| 90. | Hunnewell Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Mar. 14, 1914 |
| 91. | Klondike Coal Mine..... | Lessee | Drift | Air shaft | 1912-1913 | Mar. 14, 1914 |
| 92. | Leeson Coal Mine No. 1..... | Owner | Drift | Air shaft | 1912-1913 | Mar. 16, 1914 |
| 93. | Leeson Coal Mine No. 2..... | Owner | Drift | 2 air shafts | 1912-1913 | Mar. 16, 1914 |
| 94. | Lloyd Coal Mine..... | H. M. Graves..... | Slope | Air shaft | 1912-1913 | Mar. 17, 1914 |
| 95. | McClure Coal Mine..... | Wack Hendricks..... | Slope | Air shaft | 1912-1913 | Mar. 17, 1914 |
| 96. | Pierce Coal Mine..... | Owner | Slope | Air shaft | 1912-1913 | Mar. 17, 1914 |
| 97. | Red Flag Coal Mine..... | Lessee | Strip pit and drift | None..... | 1912-1913 | Mar. 14, 1914 |
| 98. | Rich Coal Mine..... | Owner | Drift | Air shaft |-1913 | Mar. 13, 1914 |
| 99. | Smith Dry Coal Mine..... | Frank Hirst..... | Slope and drift | Electric fan..... | 1912-1913 | Mar. 18, 1914 |
| 100. | Square Deal Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Mar. 14, 1914 |
| 101. | Strong Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Mar. 19, 1914 |
| 102. | Tree-Bausch Coal Mine..... | Lessee | Strip pit..... | ..... | 1912-1913 | Mar. 19, 1914 |
| 103. | Vadnais Coal Mine..... | Lessee | Slope | Air shaft | 1912-1913 | Mar. 14, 1914 |
| 104. | Wallace Coal Mine..... | John Miller..... | Drift | Air shaft & furnace | 1912-1913 | Mar. 14, 1914 |
| 105. | Black Diamond Coal Mine..... | Aleck Thompson..... | Drift | Air shaft & furnace | 1912-1913 | Dec. 9, 1913 |
| 106. | Bryn Coal Mine..... | Lessee | Drift | None..... |-1913 | Dec. 9, 1913 |
| 107. | Brown Coal Mine..... | Lessee | Drift | Air shaft | 1912-1913 | Dec. 9, 1913 |
| 108. | Cow Creek Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Reported 1-2-1914 |
| 109. | Government Coal Mine..... | Wm. Hutchinson..... | Incline | 2 air shafts & electric fans..... | 1912-1913 | Reported 1-5-1914 |
| 110. | Head Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Jan. 2, 1914 |
| 111. | Husebye & Ellithorpe..... | J. A. Husebye..... | Shaft | Fan..... |-1913 | Dec. 9, 1913 |
| 112. | Low Level Coal Mine..... | John Bruegger..... | Slope | Air shaft | 1912-1913 | Reported 2-14-1913 |
| 113. | Miller Coal Mine..... | Owner | Drift | None..... |-1913 | Dec. 10, 1913 |
| 114. | Moorman Coal Mine..... | Owner | Drift | Air shaft | 1912-1913 | Reported 12-22-1913 |
| 115. | Fowell Coal Mine..... | N. Ingram..... | Drift | Air shaft | 1912-1913 | Dec. 9, 1913 |
| 116. | Sharpe Coal Mine..... | Lessee | Drift | Air shaft | 1912-1913 | Dec. 10, 1913 |

TABLE NO. 2

ADAMS COUNTY

| Name of Mine. | Year. | Average Days per Month. | | Average Number of Miners per Month. | | Average Number of Men Other Than Miners per Month. | | Average Day Wages. | Average Price per Ton. | |
|---|-------|-------------------------|---------|-------------------------------------|---------|--|---------|--------------------|------------------------|--------|
| | | Winter. | Summer. | Winter. | Summer. | Winter. | Summer. | | Entry. | Room. |
| 1. Clermont Coal Mine..... | 1912 | 25 | 25 | 2 | 1 | 1 | ..... | \$2.50-\$2.60 | \$0.75 | \$0.75 |
| | 1913 | 2 | ..... | 5 | ..... | ..... | ..... | ..... | ..... | ..... |
| 2. Farmers Coal Mine..... | 1912 | 19 | ..... | 1 | ..... | ..... | ..... | 2.00-2.50 | ..... | ..... |
| | 1913 | 18½ | ..... | 2 | ..... | ..... | ..... | 2.00-2.25 | ..... | ..... |
| 3. Haynes Coal Mine..... | 1912 | 25 | 25 | 4 | 1 | 1 | ..... | 2.50-3.00 | .75 | .75 |
| | 1913 | 26 | 25 | 3 | 1 | 1 | ..... | ..... | ..... | ..... |
| 4. Stevenson & Gunderson Coal Mine..... | 1912 | 16 | 8½ | 3 | 1 | 1 | ..... | 2.00-2.50 | ..... | ..... |
| | 1913 | 26 | 25 | 2 | 1 | 1 | ..... | 2.50-3.00 | ..... | ..... |

BILLINGS COUNTY

| | | | | | | | | | | |
|----------------------------|------|-------|-------|-------|-------|-------|-------|-----------|-------|-------|
| 5. De Mores Coal Mine..... | 1912 | 10 | ..... | 1 | ..... | ..... | ..... | ..... | 1.00 | 1.00 |
| | 1913 | 20 | ..... | 1 | ..... | ..... | ..... | 2.50 | ..... | ..... |
| 6. High Grade Coal Mine... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | 3.00-4.00 | ..... | ..... |
| | 1913 | 6½ | ..... | 2 | ..... | 4 | ..... | ..... | .75 | .60 |
| 7. Jackson Coal Mine..... | 1912 | 5 | 5 | ..... | ..... | 1 | ..... | 2.00-2.50 | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

BOWMAN COUNTY

| | | | | | | | | | | |
|----------------------------|------|----|----|----|---|---|-------|-----------|-----|-----|
| 8. Scranton Coal Mine..... | 1912 | 25 | 20 | 10 | 2 | 2 | ..... | 2.50-2.75 | .50 | .50 |
| | 1913 | 24 | 20 | 8 | 5 | 5 | ..... | 2.65 | .60 | .55 |

BURKE COUNTY

| | | | | | | | | | | |
|----------------------------|------|----|-------|-------|-------|-------|-------|-------|-------|-------|
| 9. Domrese Coal Mine..... | 1912 | 20 | 15 | ..... | ..... | 3 | ..... | 2.00 | ..... | ..... |
| | 1913 | 15 | 10 | ..... | ..... | 3 | ..... | 2.25 | ..... | ..... |
| 10. Fenster Coal Mine..... | 1912 | 15 | ..... | 2 | ..... | 1 | ..... | 2.00 | ..... | ..... |
| | 1913 | 6 | ..... | 2 | ..... | ..... | ..... | ..... | 1.00 | .75 |

| | | | | | | | | | | |
|----------------------------|------|-------|-------|-------|-------|-------|-------|-----------|-------|-------|
| 11. Gille Coal Mine..... | 1912 | 20 | 15 | ..... | ..... | 2 | 3 | 2.00 | ..... | ..... |
| | 1913 | 5 | 3 | ..... | ..... | 1 | 2 | 1.75 | ..... | ..... |
| 12. Greenup Coal Mine..... | 1912 | 20 | 5 | 4 | 1 | 1 | 2 | 2.50-3.00 | ..... | ..... |
| | 1913 | 22 | 5 | 4 | 4 | 1 | 2 | 2.00 | ..... | ..... |
| 13. Hagen Coal Mine..... | 1912 | 2 1/2 | 20 | 2 | 2 | ..... | ..... | 2.00 | ..... | ..... |
| | 1913 | 2 | ..... | 2 | ..... | ..... | ..... | 2.00 | ..... | ..... |
| 14. Mackee Coal Mine..... | 1912 | 7 1/2 | ..... | 2 | ..... | 1 | ..... | 2.00 | ..... | ..... |
| | 1913 | 2 | ..... | 3 | ..... | ..... | ..... | 1.10 | ..... | ..... |
| 15. Souther Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 4 | ..... | 2 | ..... | 2 | 3 | 2.00 | ..... | ..... |
| 16. Olson Coal Mine..... | 1912 | 13 | 10 | ..... | ..... | 2 | 3 | 2.00 | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | 2 | 5 | 2.00 | ..... | ..... |
| 17. Vick Coal Mine..... | 1912 | 15 | 10 | ..... | ..... | 2 | 3 | 2.00 | ..... | ..... |
| | 1913 | 15 | 3 | ..... | ..... | 2 | 3 | 1.50 | ..... | ..... |

BURLEIGH COUNTY

| | | | | | | | | | | |
|------------------------------|------|--------|-------|-------|-------|-------|-------|-----------|-------|-------|
| 18. Anderson Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 8 | ..... | 2 | ..... | ..... | ..... | 1.50 | ..... | ..... |
| 19. Asplund Coal Mine..... | 1912 | 13 | 4 | 4 | 2 | 1 | ..... | ..... | ..... | ..... |
| | 1913 | 24 | ..... | 2 | ..... | ..... | ..... | 1.50 | ..... | ..... |
| 20. Backman Coal Mine..... | 1912 | 20 | ..... | 2 | ..... | ..... | ..... | 1.50 | ..... | ..... |
| | 1913 | 5 | ..... | 2 | ..... | ..... | ..... | 1.50 | ..... | ..... |
| 21. Johnson Coal Mine..... | 1912 | 5 | ..... | 2 | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 6 | ..... | 2 | ..... | ..... | ..... | 1.50 | ..... | ..... |
| 22. Lind Coal Mine..... | 1912 | 22 | 15 | 4 | 1 | 1 | ..... | ..... | ..... | ..... |
| | 1913 | 20 | 20 | 3 | 1 | 2 | 1 | 1.50 | ..... | ..... |
| 23. Peterson Coal Mine..... | 1912 | 26 | 28 | 4 | 1 | 2 | 1 | 1.00-1.50 | ..... | ..... |
| | 1913 | 25 | 26 | 4 | 1 | 2 | 1 | 2.50-3.00 | ..... | ..... |
| 24. Wilton Coal Mine No. 1.. | 1912 | 25 | 18 | 101 | 49 | 104 | 66 | 2.00-3.00 | *.39 | ..... |
| | 1913 | 18 1/2 | 12 | 140 | 72 | 113 | 75 | 2.50 | .48 | ..... |

*Also 9 cents per lineal foot.

DIVIDE COUNTY

| | | | | | | | | | | |
|------------------------------|------|----|-------|-------|-------|-------|-------|-----------|-------|-------|
| 25. Dougherty Coal Mine..... | 1912 | 26 | 28 | 26 | 11 | 14 | 6 | 1.20 | 1.00 | 1.00 |
| | 1913 | 20 | 15 | 10 | 6 | 3 | 1 | 1.50 | .90 | .90 |
| 26. Houglet Coal Mine..... | 1912 | 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 11 | 3 | 2 | 2 | 1 | ..... | 1.70 | 1.00 | .70 |
| 27. *Noonan Coal Mine..... | 1912 | 19 | 3 | 4 | 4 | 4 | ..... | ..... | 1.00 | .70 |
| | 1913 | 11 | 4 | 4 | 1 | 1 | ..... | 2.50-3.00 | 1.00 | .70 |
| 28. Truax Coal Mine..... | 1912 | 26 | 26 | 23 | 8 | 26 | 10 | 1.75 | 1.00 | .70 |
| | 1913 | 25 | 25 | 50 | 8 | 15 | 5 | 1.50 | 1.00 | .70 |

*Operating as the Evanson Mine.

TABLE NO. 2—Cont.

GOLDEN VALLEY COUNTY

| Name of Mine. | Year. | Average Days per Month. | | Average Number of Miners per Month. | | Average Number of Men Other Than Miners per Month. | | Average Price per Ton. |
|----------------------------|-------|-------------------------|---------|-------------------------------------|---------|--|---------|------------------------|
| | | Winter. | Summer. | Winter. | Summer. | Winter. | Summer. | |
| 29. Corlies Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 10 | ..... | ..... | ..... | 3 | ..... | ..... |
| 30. Kussick Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 10 | ..... | 2 | ..... | ..... | ..... | 1.00 |
| 31. Porter Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 6 | ..... | ..... | ..... | 3 | ..... | ..... |

McLEAN COUNTY

| Name of Mine. | Year. | Average Days per Month. | | Average Number of Miners per Month. | | Average Number of Men Other Than Miners per Month. | | Average Price per Ton. |
|------------------------------|-------|-------------------------|---------|-------------------------------------|---------|--|---------|------------------------|
| | | Winter. | Summer. | Winter. | Summer. | Winter. | Summer. | |
| 32. Bitumina Coal Mine..... | 1912 | 20 | ..... | 8 | ..... | ..... | ..... | ..... |
| | 1913 | 25 | ..... | 5 | ..... | ..... | ..... | .60 |
| 33. Borchardt Coal Mine..... | 1912 | 20 | ..... | 2 | ..... | ..... | ..... | ..... |
| | 1913 | 25 | ..... | 2 | ..... | ..... | ..... | .45 |
| 34. Fredrich Coal Mine..... | 1912 | 25 | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 4 | ..... | 1 | ..... | ..... | ..... | .70 |
| 35. Hansen Coal Mine..... | 1912 | 10 | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 25 | ..... | 4 | ..... | 1 | ..... | .60 |
| 36. Hill Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 21 | ..... | 2 | ..... | 2 | ..... | .85 |
| 37. Johnson Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 21 | ..... | ..... | ..... | ..... | ..... | .85 |
| 38. Kunkel Coal Mine..... | 1912 | 17 | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 10 | ..... | ..... | ..... | ..... | ..... | .80 |
| 39. Ulrich Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 26 | ..... | 4 | ..... | ..... | ..... | .65 |
| 40. Youngquist Coal Mine... | 1912 | 21 | ..... | 3 | ..... | ..... | ..... | ..... |
| | 1913 | 10 | ..... | 1 | ..... | ..... | ..... | .70 |

MORTON COUNTY

| Name of Mine. | Year. | Average Days per Month. | | Average Number of Miners per Month. | | Average Number of Men Other Than Miners per Month. | | Average Price per Ton. |
|---------------------------|-------|-------------------------|---------|-------------------------------------|---------|--|---------|------------------------|
| | | Winter. | Summer. | Winter. | Summer. | Winter. | Summer. | |
| 41. Feland Coal Mine..... | 1912 | 20 | ..... | 4 | ..... | ..... | ..... | ..... |
| | 1913 | 16 | ..... | 3 | ..... | ..... | ..... | .75 |

TABLE NO. 2—Cont.

OLIVER COUNTY

| Name of Mine. | Year. | Average Days per Month. | | Average Number of Miners per Month. | | Average Number of Men Other Than Miners per Month. | | Average Day Wages. | Average Price per Ton. | |
|-------------------------------------|-------|-------------------------|---------|-------------------------------------|---------|--|---------|--------------------|------------------------|-------|
| | | Winter. | Summer. | Winter. | Summer. | Winter. | Summer. | | Entry. | Room. |
| | | | | | | | | | | |
| 62. Flint Coal Mine..... | 1912 | 12 | ..... | ..... | ..... | 3 | ..... | 2.00 | ..... | ..... |
| | 1913 | 2 | 3 | ..... | ..... | 1 | ..... | 2.00 | ..... | ..... |
| 63. Meyhoff Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | 2.00 | ..... | ..... |
| | 1913 | 3 | ..... | ..... | ..... | 2 | ..... | ..... | ..... | ..... |
| 64. Pleasant Valley Coal Mine | 1912 | 15 | ..... | ..... | ..... | 3 | ..... | 2.00 | ..... | ..... |
| | 1913 | 23 | 14 | ..... | ..... | 1 | ..... | 2.00 | ..... | ..... |
| | 1912 | 24 | 20 | ..... | ..... | 3 | ..... | 2.00 | ..... | ..... |
| | 1913 | 16 | 19 | ..... | ..... | 2 | ..... | 2.00 | ..... | ..... |

RENVILLE COUNTY

| | | | | | | | | | | |
|----------------------------|------|-------|-------|-------|-------|-------|-------|-----------|-------|-------|
| 66. Tehelka Coal Mine..... | 1912 | 13 | 8 | ..... | ..... | 1 | ..... | 1.50 | 1.00 | .75 |
| | 1913 | 7 | ..... | ..... | ..... | 1 | ..... | 2.00-3.50 | 1.50 | 1.10 |
| 67. Wooster Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 3 | ..... | ..... | ..... | ..... | ..... | 1.50 | ..... | ..... |

STARK COUNTY

| | | | | | | | | | | |
|-------------------------------|------|-------|-------|-------|-------|-------|-------|------------|-------|-------|
| 68. Gross Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 10 | 2 | ..... | ..... | ..... | ..... | 1.50 | ..... | ..... |
| 69. Lehigh Coal Mine..... | 1912 | 25 | 25 | 23 | 15 | 13 | ..... | 2.25-3.00 | .50 | .40 |
| | 1913 | 25 | 19 | 11 | ..... | ..... | ..... | *2.50-3.00 | .50 | .40 |
| 70. Pittsburgh Coal Mine..... | 1912 | 21 | 18 | 7 | 3 | ..... | ..... | 2.00-4.00 | .75 | .60 |
| | 1913 | 16 | 13 | 10 | 5 | 4 | ..... | 2.50-4.00 | .85 | .60 |
| 71. Wiley Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 13 | 15 | ..... | ..... | ..... | ..... | 2.00 | ..... | ..... |
| 72. Zenith Coal Mine..... | 1912 | 20 | 16 | ..... | ..... | ..... | ..... | 2.50-2.75 | .70 | .60 |
| | 1913 | 18 | 16 | 7 | 4 | 6 | ..... | 2.50-2.75 | .70 | .60 |

*Machine men, 8 cents per ton.

STATE OF NORTH DAKOTA

WARD COUNTY

| | | | | | | | |
|-------------------------------|------|----|----|---|-----------|-----------|----------|
| 73. Baden Coal Mine..... | 1912 | 26 | 2 | 1 | 2.00 | 1.25 | 1.00 |
| 74. Bertelson Coal Mine No. 1 | 1913 | 20 | 3 | 1 | 1.15 | .90 | |
| 75. Bertelson Coal Mine No. 2 | 1912 | 26 | 5 | 2 | 2.00-2.75 | 1.25 | .80 |
| 76. Bertelson Coal Mine..... | 1913 | 26 | 6 | 1 | 1.30 | .85 | |
| 77. Brick Yard Coal Mine..... | 1912 | 4 | 1 | 1 | 1.50 | 1.00 | |
| 78. Burlington City Coal Mine | 1913 | 13 | 7 | 4 | 2.25-2.50 | 1.25 | .90 |
| 79. Burlington City Coal Mine | 1913 | 17 | 8 | 4 | 2.25-2.50 | 1.25 | .90 |
| 80. Cafisch Coal Mine..... | 1912 | 2 | 1 | 1 | 1.00 | 1.00 | 1.00 |
| 81. Cafisch Coal Mine..... | 1913 | 26 | 3 | 1 | 1.00 | .70 | .70 |
| 82. Christophson Coal Mine. | 1913 | 25 | 4 | 1 | 1.00 | .70 | .70 |
| 83. Colton Coal Mine..... | 1912 | 15 | 2 | 1 | 1.00 | 1.00 | 1.00 |
| 84. Colton Coal Mine..... | 1913 | 26 | 6 | 4 | 2.50 | .95 | .75 |
| 85. Conan Coal Mine..... | 1912 | 1 | 2 | 1 | 2.50 | 1.00 | .75 |
| 86. Conan Coal Mine..... | 1913 | 5 | 2 | 2 | 1.00 | 1.00 | .80 |
| 87. Crosby Coal Mine..... | 1912 | 8 | 2 | 1 | 1.00 | 1.00 | .80 |
| 88. Crosby Coal Mine..... | 1913 | 22 | 7 | 2 | 2.00-2.50 | 1.00-1.50 | .80-1.00 |
| 89. Davis Coal Mine..... | 1912 | 14 | 5 | 2 | 1.10 | .80 | |
| 90. Davis Coal Mine..... | 1913 | 26 | 12 | 4 | 2.25-2.75 | .90 | .70 |
| 91. Des Lacs Coal Mine..... | 1912 | 20 | 4 | 4 | 2.00 | .90 | .70 |
| 92. Des Lacs Coal Mine..... | 1913 | 21 | 9 | 8 | 2.00 | .90 | .70 |
| 93. Diamond Coal Mine..... | 1912 | 11 | 1 | 2 | 2.00 | .80 | .70 |
| 94. Diamond Coal Mine..... | 1913 | 5 | 3 | 1 | 2.00 | .80 | .70 |
| 95. Farmers Lignite Coal Mine | 1913 | 11 | 5 | 6 | 2.50 | 1.00 | .85 |
| 96. Farmers Lignite Coal Mine | 1912 | 8 | 8 | 1 | 2.50-3.00 | 1.00 | 1.00 |
| 97. Farmers Lignite Coal Mine | 1913 | 23 | 9 | 2 | 2.50-3.00 | 1.00 | 1.00 |
| 98. Fihely Coal Mine..... | 1912 | 26 | 2 | 1 | 1.50 | .80 | .70 |
| 99. Fihely Coal Mine..... | 1913 | 4 | 1 | 1 | 1.50 | .80 | .70 |
| 100. Foresythe Coal Mine..... | 1912 | 7 | 7 | 3 | 2.25 | .80 | .70 |
| 101. Foresythe Coal Mine..... | 1913 | 24 | 6 | 1 | 2.50 | 1.00 | .70 |
| 102. Hot Blast Coal Mine..... | 1912 | 21 | 1 | 3 | 1.50 | .80 | .70 |
| 103. Hot Blast Coal Mine..... | 1913 | 25 | 6 | 1 | 1.50 | .80 | .70 |
| 104. Hunnewell Coal Mine..... | 1912 | 4 | 1 | 1 | 2.00 | .80 | .65 |
| 105. Hunnewell Coal Mine..... | 1913 | 18 | 4 | 1 | 2.50-2.75 | 1.00 | .80 |
| 106. Klondike Coal Mine..... | 1912 | 21 | 3 | 2 | 2.50 | 1.30 | 1.00 |
| 107. Klondike Coal Mine..... | 1913 | 14 | 2 | 1 | 2.50 | 1.30 | 1.00 |
| 108. Lesson Coal Mine No. 1. | 1912 | 6 | 2 | 1 | 2.50 | 1.00 | .70 |
| 109. Lesson Coal Mine No. 1. | 1913 | 4 | 2 | 1 | 2.50 | 1.00 | .70 |
| 110. Lesson Coal Mine No. 1. | 1912 | 25 | 2 | 2 | 2.00 | 1.00 | .70 |
| 111. Lesson Coal Mine No. 1. | 1913 | 25 | 4 | 1 | 2.50 | .75 | .75 |
| 112. Lesson Coal Mine No. 2. | 1912 | 25 | 4 | 2 | 2.00 | 1.00 | .75 |
| 113. Lesson Coal Mine No. 2. | 1913 | 25 | 4 | 2 | 2.00 | 1.00 | .75 |

TABLE NO. 2--Cont.
WARD COUNTY--Cont.

| Name of Mine. | Year. | Average Days per Month. | | Average Number of Miners per Month. | | Average Number of Men Other Than Miners per Month. | | Average Day Wages. | Average Price per Ton. | |
|-------------------------------|-------|-------------------------|---------|-------------------------------------|---------|--|---------|--------------------|------------------------|-------|
| | | Winter. | Summer. | Winter. | Summer. | Winter. | Summer. | | Entry. | Room. |
| 94. Lloyd Coal Mine..... | 1912 | 25 | 25 | 16 | 10 | 9 | 6 | 2.50-3.00 | 1.00 | .70 |
| | 1913 | 27 | 27 | 18 | 8 | 9 | 6 | 2.50-3.00 | 1.00 | .70 |
| 95. McClure Coal Mine..... | 1912 | 25 | 25 | 13 | 8 | 4 | 2 | 2.25-2.50 | 1.70 | .70 |
| | 1913 | 25 | 25 | 20 | 12 | 11 | 7 | 2.00-2.50 | 1.70 | .70 |
| 96. Pierce Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 4 | ..... | 1 | ..... | ..... | ..... | 2.00 | ..... | ..... |
| 97. Red Flag Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 14 | ..... | 2 | ..... | ..... | ..... | ..... | 1.00 | .70 |
| 98. Rich Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 5 | ..... | 2 | ..... | ..... | ..... | ..... | 1.50 | .80 |
| 99. Smith Dry Coal Mine.... | 1912 | 25 | 25 | 11 | 3 | 1 | 1 | 2.50-3.50 | 1.50 | .80 |
| | 1913 | 22 | 20 | 18 | 7 | 20 | 10 | 3.00 | 1.00 | .90 |
| 100. Square Deal Coal Mine... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 16 | 8 | 4 | 2 | 1 | 1 | 1.50 | 1.10 | 1.00 |
| 101. Strong Coal Mine..... | 1912 | 23 | 17 | 3 | 2 | 1 | 1 | 2.75 | 1.00 | .70 |
| | 1913 | 21 | 12 | 3 | 1 | 2 | 2 | 2.75 | 1.00 | .70 |
| 102. Tree-Bausch Coal Mine.. | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 5 | ..... | 1 | ..... | ..... | ..... | 2.50 | ..... | ..... |
| 103. Vadnals Coal Mine..... | 1912 | 8 | ..... | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 12 | ..... | 4 | ..... | ..... | ..... | ..... | 1.50 | .90 |
| 104. Wallace Coal Mine..... | 1912 | 24 | 21 | 9 | 4 | 11 | 8 | 1.50-3.00 | .80-.90 | .70 |
| | 1913 | 24 | 20 | 23 | 13 | ..... | ..... | 1.50-3.00 | .80-.90 | .70 |

*Estimated.
†Also 40 cents per foot.
‡And board.

WILLIAMS COUNTY

| | | | | | | | | | | |
|------------------------------|------|-------|-------|-------|-------|-------|-------|-----------|-----|-----|
| 105. Black Diamond Coal Mine | 1912 | 25 | 25 | 6 | 2 | 3 | ..... | 2.00-3.25 | .80 | .70 |
| | 1913 | 25 | 25 | 7 | 3 | ..... | ..... | 2.50 | .80 | .70 |
| 106. Bryn Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | 2.50 | .80 | .70 |
| | 1913 | 26 | 9 | 4 | 1 | ..... | ..... | 3.00 | .80 | .70 |
| 107. Brown Coal Mine..... | 1912 | 15 | 5 | 2 | 1 | ..... | ..... | 2.00-3.00 | .70 | .70 |
| | 1913 | 10 | 5 | 3 | 1 | ..... | ..... | 2.75 | .80 | .70 |

| | | | | | | | | | | | | |
|--|--------------|----------|----------|---------|---------|---------|---------|---------|---------|------------------------|--------------|-----------------|
| 108. Cow Creek Coal Mine..... | 1912 1913 | 10 4 | 2 17 | 1 3 | 1 2 | 1 3 | 1 1 | 1 7 | 1 2 | 2.75-3.00 2.65-2.85 | 1.00 .80 | 1.00 .55-.60 |
| 109. Government Coal Mine.... | 1912 1913 | 25 15 | 25 1 | 7 1 | 7 1 | 7 1 | 7 1 | 7 1 | 7 1 | 2.00 2.00 | .80 .80 | .80 .80 |
| 110. Head Coal Mine..... | 1912 1913 | 18 18 | 18 18 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 2.00 2.00 | .80 .80 | .80 .80 |
| 111. Husbye & Ellithorpe Coal Mine..... | 1912 1913 | 12 23 | 12 23 | 3 15 | 3 15 | 3 15 | 3 15 | 3 15 | 3 15 | 2.50-3.00 2.35-3.00 | .90 1.00 | .70 .75 |
| 112. Low Level Coal Mine..... | 1912 1913 | 16 16 | 16 16 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1 1 | 1.50 1.50 | 1.00 1.00 | .70 .80 |
| 113. Miller Coal Mine..... | 1912 1913 | 24 20 | 4 4 | 1 2 | 1 2 | 1 2 | 1 2 | 1 2 | 1 2 | 1.00 1.00 | 1.00 1.00 | 1.00 1.00 |
| 114. Moorman Coal Mine..... | 1912 1913 | 26 23 | 26 20 | 6 4 | 6 4 | 6 4 | 6 4 | 6 4 | 6 4 | 3.00 3.00 | .90 .75 | .70 .75 |
| 115. Powell Coal Mine..... | 1912 1913 | 23 8 | 23 8 | 2 2 | 2 2 | 2 2 | 2 2 | 2 2 | 2 2 | 2.00 2.00 | .75 .75 | .75 .75 |
| 116. Sharpe Coal Mine..... | 1912 1913 | 8 8 | 8 8 | 2 2 | 2 2 | 2 2 | 2 2 | 2 2 | 2 2 | 2.00 2.00 | .75 .75 | .75 .75 |

TABLE NO. 3

ADAMS COUNTY

| Name of Mine. | Depth of Coal Bed, Feet. | Thickness of Coal Coal Bed, Feet. | Thickness of Coal Mined, Feet. | System of Mining. | Method of Mining. | Explosive Used. | Means of Ignition. |
|---|--------------------------|-----------------------------------|--------------------------------|-------------------|-------------------|-----------------|--------------------|
| 1. Clermont Coal Mine..... | 25 | 16 | 10 | Double entry | Blast off solid | FFF | Fuse |
| 2. Farmers Coal Mine..... | 40 | 12½ | 9-10 | Single entry | Blast off solid | FFF | Fuse |
| 3. Haynes Coal Mine..... | 20-30 | 13 | 9-10 | Single entry | Blast off solid | FFF | Fuse |
| 4. Stevenson & Gunderson Coal Mine..... | 35-100 | 12½ | 9-10 | Single entry | Blast off solid | FFF | Fuse |

BILLINGS COUNTY

| | | | | | | | |
|----------------------------|-------|------|---|--------------|-----------------|----------|--------------|
| 5. De Mores Coal Mine..... | 300 | 8 | 6 | Single entry | Blast off solid | FFF | Fuse |
| 6. High Grade Coal Mine.. | 0-275 | 9-10 | 7 | Double entry | Blast off solid | FFF | Squibs |
| 7. Jackson Coal Mine..... | 4-5 | 6-7 | 6 | Surface | Blasting | Dynamite | Cap and fuse |

BOWMAN COUNTY

| | | | | | | | |
|----------------------------|----|----|----|--------------|-----------------|----------|--------------|
| 8. Scranton Coal Mine..... | 50 | 19 | 10 | Double entry | Blast off solid | FFF | Squibs |
| | | | | | | Dynamite | Cap and fuse |

BURKE COUNTY

| | | | | | | | |
|----------------------------|-------|------|------|--------------|-----------------|----------|--------------|
| 9. Domrese Coal Mine..... | 8-10 | 9-10 | 9-10 | Surface | Blasting | Dynamite | Cap and fuse |
| 10. Fenster Coal Mine..... | 18 | 6 | 5 | Single entry | Blast off solid | FFF | Squibs |
| 11. Gillie Coal Mine..... | 9-25 | 10 | 7 | Surface | Blasting | Dynamite | Cap and fuse |
| 12. Greenup Coal Mine..... | 6-30 | 9 | 7½ | Single entry | Blast off solid | FFF | Squibs |
| 13. Hagen Coal Mine..... | 25 | 4 | 4 | Single entry | Pick mining | ..... | ..... |
| 14. Mackee Coal Mine..... | 20 | 6 | 5 | Single entry | Blast off solid | FFF | Squibs |
| 15. Souther Coal Mine..... | 20 | 9 | 7-8 | Single entry | Blast off solid | FFF | Squibs |
| 16. Olsen Coal Mine..... | 10-20 | 7 | 7 | Surface | Blasting | Dynamite | Cap and fuse |
| 17. Vlack Coal Mine..... | 6-10 | 6 | 5 | Surface | Blasting | Dynamite | Cap and fuse |

BURLEIGH COUNTY

| | | | | | | |
|-----------------------------|----|----|---|--------------|-----------------|------------------------|
| 18. Anderson Coal Mine..... | 40 | 7 | 6 | Single entry | Blast off solid | Squibs |
| 19. Asplund Coal Mine..... | 40 | 11 | 8 | Single entry | Blast off solid | Squibs |
| 20. Backman Coal Mine..... | 35 | 10 | 7 | Surface | Blasting | Fuse |
| 21. Johnson Coal Mine..... | 30 | 5 | 4 | Single entry | Pick mining | ..... |
| 22. Lind Coal Mine..... | 40 | 11 | 8 | Single entry | Blast off solid | Squibs |
| 23. Peterson Coal Mine..... | 35 | 11 | 8 | Single entry | Blast off solid | Squibs |
| 24. Wilton Coal Mine No. 1 | 50 | 10 | 8 | Double entry | Machine mining | Electric detonators |

DIVIDE COUNTY

| | | | | | | |
|-------------------------------|-------|---|---|--------------|-----------------|--------|
| 25. Dougherty Coal Mine..... | 50-60 | 6 | 5 | Single entry | Blast off solid | Squibs |
| 26. Houlet Coal Mine..... | 50 | 6 | 5 | Double entry | Blast off solid | Squibs |
| 27. Noonan Coal Co. Mine..... | 30 | 7 | 6 | Double entry | Blast off solid | Fuse |
| 28. Truax Coal Mine..... | 35 | 8 | 6 | Double entry | Blast off solid | Fuse |

GOLDEN VALLEY COUNTY

| | | | | | | |
|----------------------------|--------|----|----|--------------|--------------------|----------|
| 29. Corliss Coal Mine..... | 5-15 | 20 | 10 | Surface | Blasting off solid | Dynamite |
| 30. Kussick Coal Mine..... | 50-300 | 14 | 8 | Single entry | Blast off solid | Dynamite |
| 31. Porter Coal Mine..... | 22 | 10 | 6 | Surface | Blasting | Dynamite |

McLEAN COUNTY

| | | | | | | |
|------------------------------|-------|----|----|--------------|----------------------------------|---------------|
| 32. Bitumina Coal Mine..... | 100 | 11 | 8 | Double entry | Undermining | Caps and fuse |
| 33. Borchardt Coal Mine..... | 38 | 12 | 8 | Single entry | Blast off solid | Caps and fuse |
| 34. Fredrich Coal Mine..... | 60 | 9 | 7 | Single entry | Blast off solid | Caps and fuse |
| 35. Hansen Coal Mine..... | 40-80 | 8 | 7 | Double entry | Blast off solid | Caps and fuse |
| 36. Hill Coal Mine..... | 100 | 7 | 6 | Single entry | Blast off solid | Caps and fuse |
| 37. Johnson Coal Mine..... | 35 | 6 | 4½ | Single entry | Blast off solid | Caps and fuse |
| 38. Kunkel Coal Mine..... | 3-40 | 5 | 5 | Surface | Blasting | Caps and fuse |
| 39. Ulrich Coal Mine..... | 50 | 4½ | 4½ | Double entry | Blast off solid & undermining | Caps and fuse |
| 40. Youngquist Coal Mine... | 60-80 | 8 | 6 | Single entry | Blast off solid | Caps and fuse |

TABLE NO. 3—Cont.
MORTON COUNTY

| Name of Mine. | Depth of Coal Bed, Feet. | Thickness of Coal, Feet. | Thickness of Coal Mined, Feet. | System of Mining. | Method of Mining. | Explosive Used. | Means of Ignition. |
|-------------------------------------|--------------------------|--------------------------|--------------------------------|----------------------|--------------------------|-----------------|--------------------|
| 41. Feland Coal Mine..... | 25—50 | 6—7 | 5—6 | Double entry Surface | Blast off solid Blasting | FFF FFF | Squibs Squibs |
| 42. Garfield Coal Mine..... | 6—40 | 6 | 6 | Double entry | Blast off solid | Dynamite | Caps and fuse |
| 43. Hebron Brick Co. Coal Mine..... | 80—120 | 6 | 6 | Double entry | Undermining | Dynamite | Caps and fuse |
| 44. New Salem Coal Mine..... | 50 | 6 | 7 | Single entry | Blast off solid | Dynamite | Caps and fuse |
| 45. North Star Coal Mine..... | 60 | 8—10 | 7—8 | | | | |

MOUNTRAIL COUNTY

| | | | | | | | |
|--------------------------------|---------|-----|-----|--------------|-----------------|--------------|---------------|
| 46. Bickre Coal Mine..... | 10—15 | 4—5 | 4—5 | Surface | Pick mining | FFF | Squibs |
| 47. Barto Coal Mine..... | 80 | 3 | 3 | Single entry | Blast off solid | FFF | Squibs |
| 48. Bowman Coal Mine..... | 50 | 8 | 6 | Single entry | Blast off solid | FFF | Caps and fuse |
| 49. Elgers Coal Mine..... | 8—15 | 6 | 4 | Surface | Blasting | Dynamite | Caps and fuse |
| 50. Hardman Coal Mine..... | 10—15 | 4 | 4 | Surface | Blasting | Dynamite | Caps and fuse |
| 51. Heite Coal Mine..... | 6—15 | 5½ | 5½ | Surface | Blasting | Dynamite | Caps and fuse |
| 52. John Coal Mine..... | 20—80 | 3 | 3 | Single entry | Pick mining | ..... | ..... |
| 53. North Star Coal Mine..... | 6—20 | 7 | 7 | Surface | Blasting | Dynamite | Caps and fuse |
| 54. Palda Coal Mine..... | 35—55 | 7 | 5—6 | Single entry | Blast off solid | FFF | Squibs |
| 55. Porger Coal Mine..... | 120 | 6—7 | 6—7 | Single entry | Blast off solid | FFF | Squibs |
| 56. Rodgers Coal Mine..... | 10—30 | 7 | 6 | Surface | Pick mining | ..... | ..... |
| 57. Sellar Coal Mine..... | 35—60 | 4 | 4 | Surface | Pick mining | ..... | ..... |
| 58. Stacy Coal Mine..... | 10—40 | 3 | 3 | Surface | Pick mining | ..... | ..... |
| 59. Sunday Coal Mine..... | 35—60 | 6 | 6 | Single entry | Pick mining | ..... | ..... |
| 60. Williams Coal Mine..... | 3—8 | 8 | 5 | Surface | Pick mining | ..... | ..... |
| 61. White Earth Coal Mine..... | 150—200 | 6—7 | 6—7 | Double entry | Blast off solid | FFF | Squibs |

OLIVER COUNTY

| | | | | | | | |
|------------------------------------|------|----|----|---------|-------------|----------|---------------|
| 62. Flint Coal Mine..... | 10 | 3 | 3 | Surface | Pick mining | ..... | Caps and fuse |
| 63. Meyhoff Coal Mine..... | 6—15 | 10 | 7 | Surface | Pick mining | ..... | Caps and fuse |
| 64. Pleasant Valley Coal Mine..... | 6—10 | 15 | 15 | Surface | Blasting | Dynamite | Caps and fuse |
| 65. Spring Valley Coal Mine..... | 12 | 6 | 6 | Surface | Pick mining | ..... | Caps and fuse |

RENVILLE COUNTY

| | | | | | | |
|----------------------------|----|----|----|--------------|-------------|-------|
| 66. Tehelka Coal Mine..... | 60 | 2½ | 2½ | Single entry | Pick mining | ..... |
| 67. Wooster Coal Mine..... | 60 | 2½ | 2½ | Single entry | Pick mining | ..... |

STARK COUNTY

| | | | | | | | |
|------------------------------|----|----|----|--------------|-----------------|----------|---------------|
| 68. Gross Coal Mine..... | 16 | 7 | 7 | Single entry | Blast off solid | Dynamite | Caps and fuse |
| 69. Leigh Coal Mine..... | 60 | 9 | 9 | Double entry | Blast off solid | Dynamite | Caps and fuse |
| 70. Pittsburg Coal Mine..... | 35 | 11 | 8 | Double entry | Blast off solid | Dynamite | Caps and fuse |
| 71. Wiley Coal Mine..... | 20 | 15 | 20 | Surface | Blasting | Dynamite | Caps and fuse |
| 72. Zenith Coal Mine..... | 70 | 20 | 22 | Double entry | Blast off solid | Dynamite | Caps and fuse |

WARD COUNTY

| | | | | | | | |
|------------------------------------|---------|----|----|--------------|-----------------|----------------|-----------------|
| 73. Baden Coal Mine..... | 150 | 2½ | 2½ | Single entry | Pick mining | ..... | ..... |
| 74. Bertelson Coal Mine No. 1..... | 130 | 5 | 5 | Single entry | Blast off solid | FFF | Squibs |
| 75. Bertelson Coal Mine No. 2..... | 180 | 5½ | 3½ | Double entry | Blast off solid | FFF | Squibs and fuse |
| 76. Brick Yard Coal Mine..... | 150 | 3½ | 4½ | Double entry | Undermining | FFF | Squibs |
| 77. Burlington City Coal Mine..... | 80 | 10 | 7 | Single entry | Blast off solid | FFF | Squibs |
| 78. Cafisch Coal Mine..... | 12 | 2 | 10 | Single entry | Blast off solid | Dynamite | Caps and fuse |
| 79. Christopherson Coal Mine..... | 80-90 | 2 | 2 | Single entry | Pick mining | ..... | ..... |
| 80. Colton Coal Mine..... | 100 | 2 | 3 | Single entry | Blast off solid | FFF | Squibs |
| 81. Conan Coal Mine..... | Varies | 10 | 7 | Double entry | Blast off solid | FFF | Squibs |
| 82. Crosby Coal Mine..... | 150 | 5½ | 8 | Single entry | Blast off solid | FFF | Squibs and fuse |
| 83. Davis Coal Mine..... | 150 | 8 | 10 | Single entry | Blast off solid | FFF | Squibs |
| 84. Dea Lacs Coal Mine..... | 80 | 7 | 6 | Double entry | Blast off solid | FFF | Squibs |
| 85. Diamond Coal Mine..... | 150 | 4 | 4½ | Single entry | Pick mining | ..... | ..... |
| 86. Farmers Lignite Coal Mine..... | 110-150 | 5½ | 5½ | Double entry | Pick mining | ..... | ..... |
| 87. Finelly Coal Mine..... | 60 | 4 | 4 | Single entry | Pick mining | ..... | ..... |
| 88. Forsythe Coal Mine..... | 160 | 8½ | 6 | Double entry | Undermining | FFF | Squibs |
| 89. Hot Blast Coal Mine..... | 70 | 2½ | 2½ | Single entry | Pick mining | ..... | ..... |
| 90. Hunnewell Coal Mine..... | 100-120 | 8 | 9 | Double entry | Blast off solid | Black powder | Fuse |
| 91. Klondike Coal Mine..... | 80 | 3 | 3 | Single entry | Pick mining | ..... | ..... |
| 92. Leeson Coal Mine No. 1..... | 40 | 12 | 8 | Single entry | Blast off solid | Dynamite & FFF | Caps and fuse |
| 93. Leeson Coal Mine No. 2..... | 40 | 12 | 12 | Single entry | Blast off solid | Dynamite & FFF | Caps and fuse |
| 94. Lloyd Coal Mine..... | 150 | 8 | 8 | Single entry | Blast off solid | FFF | Squibs |
| 95. McClure Coal Mine..... | 175 | 7½ | 7 | Single entry | Blast off solid | FFF | Squibs |

TABLE NO. 3—Cont.

WARD COUNTY—Cont.

| Name of Mine. | Depth of Coal Bed, Feet. | Thickness of Coal Bed, Feet. | Thickness of Coal Mined, Feet. | System of Mining. | Method of Mining. | Explosive Used. | Means of Ignition. |
|---------------------------------|--------------------------|------------------------------|--------------------------------|-------------------|-------------------|-----------------|--------------------|
| 96. Pierce Coal Mine..... | 220 | 4 | 4 | Single entry | Pick mining | ..... | ..... |
| 97. Red Flag Coal Mine..... | 15 | 11 | 7 | Single entry | Blast off solid | Dynamite | Caps and fuse |
| 98. Rich Coal Mine..... | 150 | 5 | 5 | Single entry | Center mining | FFF | Squibs |
| 99. Smith Dry Coal Mine..... | 175 | 6 | 7 | Double entry | Undermining | FFF | Fuse |
| 100. Square Deal Coal Mine..... | 30 | 3 | 3 | Single entry | Pick mining | ..... | ..... |
| 101. Strong Coal Mine..... | 28 | 11 | 7 | Single entry | Blast off solid | Dynamite | Caps and fuse |
| 102. Tree-Rausch Coal Mine..... | 14—16 | 14 | 14 | Surface | Pick mining | ..... | ..... |
| 103. Vadnais Coal Mine..... | 100 | 3½ | 3½ | Single entry | Blast off solid | FFF | Squibs |
| 104. Wallace Coal Mine..... | 100—125 | 9 | 7 | Double entry | Blast off solid | FFF | Squibs |

WILLIAMS COUNTY

| | | | | | | | |
|---|--------|-------|---|--------------|-----------------|-------------------|-----------------|
| 105. Black Diamond Coal Mine..... | 90—125 | 9 | 8 | Double entry | Blast off solid | FFF | Fuse |
| 106. Bryn Coal Mine..... | 80 | 10 | 7 | Single entry | Blast off solid | FFF | Squibs and fuse |
| 107. Brown Coal Mine..... | 78 | 9½—10 | 8 | Double entry | Blast off solid | FFF | Squibs |
| 108. Cow Creek Coal Mine..... | 50 | 7 | 6 | Single entry | Blast off solid | FFF | Squibs |
| 109. Government Coal Mine..... | 150 | 10 | 6 | Double entry | Blast off solid | U. S. Permissible | Caps and fuse |
| 110. Head Coal Mine..... | 30—45 | 9 | 8 | Single entry | Blast off solid | FFF | Squibs and fuse |
| 111. Husbye & Ellithorpe Coal Mine..... | 60 | 10 | 7 | Double entry | Blast off solid | FFF | Squibs |
| 112. Low Level Coal Mine..... | 150 | 9 | 8 | Double entry | Blast off solid | Dynamite | Caps and fuse |
| 113. Miller Coal Mine..... | 100 | 10 | 9 | Single entry | Pick mining | ..... | ..... |
| 114. Moorman Coal Mine..... | 45 | 9 | 7 | Double entry | Blast off solid | FFF | Fuse and squibs |
| 115. Powell Coal Mine..... | 91 | 8½—9½ | 7 | Double entry | Blast off solid | FFF | Fuse and squibs |
| 116. Sharpe Coal Mine..... | 75 | 9 | 8 | Single entry | Blast off solid | FFF | Fuse and squibs |

TABLE NO. 4
ADAMS COUNTY

| Name of Mine | Main Entry | | | | Rooms | | | | |
|---|----------------|-------------------------|----------------------------|----------------|----------------|---------------|----------------|----------------------------|--|
| | Length feet | Width at top feet | Width at bottom feet | Height feet | Length feet | Width feet | Height feet | Width of pillar feet | |
| 1. Clermont Coal Mine* | 150 | 7 | 7 | 7 | 200 | 18 | 5½ | 8 | |
| 2. Farmers Coal Mine..... | 300 | 6 | 5 | 6 | 50-100 | 12-14 | 7½ | 8-20 | |
| 3. Haynes Coal Mine..... | 300 | 6 | 6 | 7 | .. | 14 | 8½ | 11 | |
| 4. Stevenson & Gunderson Coal Mine | 110 | 7 | 7 | .. | .. | .. | .. | .. | |
| BILLINGS COUNTY | | | | | | | | | |
| 5. De Mores Coal Mine..... | 157 | 7 | 7 | 7 | 200 | 12 | 6 | 12 | |
| 6. High Grade Coal Mine..... | 174 | 8 | 8 | 7 | 200 | 24 | 7 | 10 | |
| 7. Jackson Coal Mine†..... | ... | .. | .. | .. | ... | .. | .. | .. | |
| BOWMAN COUNTY | | | | | | | | | |
| 8. Scranton Coal Mine..... | 200 | 11 | 11 | 8 | 125-200 | 20 | 8 | 8 | |
| BURKE COUNTY | | | | | | | | | |
| 6. Domrese Coal Mine†..... | 150 | 6 | 6 | 6 | 60-100 | 14 | 5½ | 10 | |
| 10. Fenster Coal Mine..... | ... | .. | .. | .. | ... | .. | .. | .. | |
| 11. Gille Coal Mine†..... | 250 | 5 | 5 | 6 | .. | 16 | 6 | 8 | |
| 12. Greenup Coal Mine..... | 75 | 6 | 6 | 5 | 20 | 12 | 6 | 8 | |
| 13. Hagen Coal Mine..... | 1,000 | 6 | 6 | 6 | 250 | 16 | 6 | 8 | |
| 14. Mackee Coal Mine..... | 300 | 5 | 6 | 7 | 60 | 12 | 7 | 12 | |
| 15. Sautter Coal Mine..... | ... | .. | .. | .. | ... | .. | .. | .. | |
| 16. Olson Coal Mine†..... | ... | .. | .. | .. | ... | .. | .. | .. | |
| 17. Vick Coal Mine†..... | ... | .. | .. | .. | ... | .. | .. | .. | |

†Strip Pit.

*No Rooms Turned.

TABLE NO. 4—Cont.
BURLEIGH COUNTY

| Name of Mine | Main Entry | | | | Rooms | | | |
|---------------------------------|----------------|-------------------------|----------------------------|----------------|----------------|---------------|----------------|----------------------------|
| | Length feet | Width at top feet | Width at bottom feet | Height feet | Length feet | Width feet | Height feet | Width of pillar feet |
| 18. Anderson Coal Mine..... | 200 | 6 | 6 | 6 | 60—100 | 15 | 6 | 10 |
| 19. Asplund Coal Mine..... | 200 | 7 | 7 | 7 | 150 | 18 | 7 | 16 |
| 20. Backman Coal Mine..... | 150 | 7 | 7 | 7 | 130 | 18 | 7 | 10 |
| 21. Johnson Coal Mine..... | 75 | 6 | 6 | 5 | 200 | 16 | 4½ | 14 |
| 22. Lind Coal Mine..... | 400 | 8 | 8 | 8 | 180 | 18 | 7½ | 10 |
| 23. Peterson Coal Mine..... | 300 | 6 | 7 | 8 | 200 | 18 | 8 | 14 |
| 24. Wilton Coal Mine No. 1..... | 5,100 | 10 | 10 | 8 | 200—300 | 18 | 8 | 8 |
| DIVIDE COUNTY | | | | | | | | |
| 25. Dougherty Coal Mine..... | 800 | 5 | 6 | 6 | 120 | 16 | 6 | 8 |
| 26. Houglet Coal Mine..... | 250 | 6 | 6 | 6 | 100—125 | 14 | 6 | 10 |
| 27. Noonan Coal Co. Mine..... | 800 | 6 | 6 | 6 | 150 | 12 | 6 | 10 |
| 28. Truax Coal Mine..... | 1,500 | 6 | 6 | 8 | 125 | 14 | 6 | 10 |
| GOLDEN VALLEY COUNTY | | | | | | | | |
| 29. Corliss Coal Mine..... | 100 | 8 | 8 | 8 | 100 | 18 | 8 | 12 |
| 30. Kussick Coal Mine..... | ... | .. | .. | .. | ... | .. | .. | .. |
| 31. Porter Coal Mine..... | ... | .. | .. | .. | ... | .. | .. | .. |
| McLEAN COUNTY | | | | | | | | |
| 32. Blumina Coal Mine..... | 450 | 8 | 8 | 6½ | 150 | 20 | 8 | 10 |
| 33. Borchardt Coal Mine..... | 250 | 6 | 6 | 7 | 120 | 12 | 7 | 15 |
| 34. Fredrich Coal Mine..... | 275 | 6 | 6 | 6 | 100 | 14 | 7 | 10 |
| 35. Hansen Coal Mine..... | 300 | 6 | 6 | 7 | 100 | 12 | 8 | 10 |
| 36. Hill Coal Mine..... | 130 | 5 | 6 | 6 | 100 | 12 | 6 | 10 |

| | | | | | | | | | |
|-------------------------------|-----|---|---|---|---|-----|----|-------|----|
| 37. Johnson Coal Mine..... | 300 | 6 | 6 | 6 | 6 | 100 | 13 | 6 | 13 |
| 38. Kunkel Coal Mine..... | 280 | 6 | 6 | 7 | 7 | 150 | 14 | 5 1/4 | 10 |
| 39. Ulrich Coal Mine..... | 300 | 7 | 7 | 6 | 6 | 75 | 16 | 6 | 8 |
| 40. Youngquist Coal Mine..... | | | | | | | | | |

MORTON COUNTY

| | | | | | | | | | |
|-------------------------------------|-------|---|---|---|---|---------|----|---|----|
| 41. Feland Coal Mine..... | 3,000 | 4 | 6 | 6 | 6 | 100 | 16 | 6 | 16 |
| 42. Garfield Coal Mine..... | 1,000 | 8 | 8 | 7 | 7 | 100-150 | 20 | 8 | 15 |
| 43. Hebron Brick Co. Coal Mine..... | 2,500 | 6 | 6 | 6 | 8 | 250 | 16 | 5 | 10 |
| 44. New Salem Coal Mine..... | 280 | 5 | 5 | 5 | 7 | 200 | 20 | 7 | 12 |
| 45. North Star Coal Mine..... | | | | | | | | | |

MOUNTRAIL COUNTY

| | | | | | | | | | |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 46. Blakre Coal Mine†..... | 300 | 7 | 7 | 7 | 7 | ... | ... | ... | ... |
| 47. Barto Coal Mine*..... | 150 | 6 | 6 | 6 | 6 | 100 | 12 | 6 | 12 |
| 48. Bowman Coal Mine..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 49. Eggers Coal Mine..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 50. Hardman Coal Mine†..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 51. Hette Coal Mine..... | 80 | 4 | 4 | 4 | 3 | ... | ... | ... | ... |
| 52. John Coal Mine*..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 53. North Star Coal Mine†..... | 700 | 4 | 5 | 5 | 5 | 120 | 14 | 5 | 18 |
| 54. Falda Coal Mine..... | 400 | 6 | 6 | 6 | 6 | 130 | 16 | 6 | 14 |
| 55. Forger Coal Mine..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 56. Rodgers Coal Mine..... | 200 | 4 | 5 | 5 | 4 | 80 | 12 | 4 | 10 |
| 57. Sellar Coal Mine..... | 50 | 4 | 6 | 6 | 6 | ... | ... | ... | ... |
| 58. Stacy Coal Mine..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 59. Sunday Coal Mine*..... | 700 | 7 | 8 | 8 | 6 | 200 | 20 | 6 | 14 |
| 60. Williams Coal Mine..... | | | | | | | | | |
| 61. White Earth Coal Mine..... | | | | | | | | | |

OLIVER COUNTY

| | | | | | | | | | |
|-------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 62. Flint Coal Mine†..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 63. Meyhoff Coal Mine..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 64. Pleasant Valley Coal Mine†..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 65. Spring Valley Coal Mine..... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 66. ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

†Strip Pit.

*No Rooms Turned.

TABLE NO. 4—Cont.
RENVILLE COUNTY

| Name of Mine | Main Entry | | Rooms | | | | Width of pillar feet | |
|-----------------------------|-------------|-------------------|----------------------|-------------|-------------|------------|----------------------|-------------|
| | Length feet | Width at top feet | Width at bottom feet | Height feet | Length feet | Width feet | | Height feet |
| 66. Tehelka. Coal Mine..... | 125 | 4 | 5 | 4 | 75 | 14 | 3 | 16 |
| 67. Wooster Coal Mine..... | 200 | 4 | 5 | 4 | 80 | 15 | 3 | 16 |

STARK COUNTY

| | | | | | | | | |
|------------------------------|-------|---|----|-----|---------|----|-----|-----|
| 68. Gross Coal Mine..... | 200 | 7 | 7 | 7 | 60-90 | 20 | 7 | 16 |
| 69. Lehigh Coal Mine..... | 4,200 | 8 | 10 | 8 | 250 | 22 | 8 | 16 |
| 70. Pittsburg Coal Mine..... | 300 | 7 | 7 | 6 | 200 | 20 | 6 | 20 |
| 71. Wiley Coal Mine..... | 3,000 | 9 | 9 | 7-8 | 150-300 | 25 | 7-8 | 6-8 |

WARD COUNTY

| | | | | | | | | |
|-------------------------------------|-------|---|---|-----|---------|-------|-------|-------|
| 73. Baden Coal Mine..... | 400 | 4 | 5 | 4-6 | 60 | 6 | 3 | 10 |
| 74. Bertelson Coal Mine No. 1..... | 700 | 5 | 6 | 5 | 150 | 14 | 5 | 10 |
| 75. Bertelson Coal Mine No. 2..... | 100 | 6 | 6 | 6 | 100 | 15 | 6 | 10 |
| 76. Brick Yard Coal Mine..... | 1,800 | 6 | 6 | 6 | 160-200 | 16-20 | 3½-4½ | 10-12 |
| 77. Burlington City Coal Mine*..... | 150 | 5 | 6 | 6 | 110 | 16 | 7 | 10 |
| 78. Caflisch Coal Mine..... | 600 | 4 | 5 | 5 | 100 | 14 | 7½ | 12 |
| 79. Christophson Coal Mine*..... | 100 | 5 | 6 | 6 | 100 | 12 | 6 | 12 |
| 80. Colton Coal Mine..... | 800 | 5 | 5 | 6 | 100 | 12 | 6 | 10 |
| 81. Conan Coal Mine..... | 250 | 6 | 6 | 6 | 60-100 | 14 | 6 | 16 |
| 82. Crosby Coal Mine..... | 200 | 6 | 7 | 7 | 100 | 16-18 | 7 | 14 |
| 83. Davis Coal Mine..... | 1,000 | 5 | 6 | 6 | 80 | 14 | 6 | 16 |
| 84. Des Lacs Coal Mine..... | 200 | 5 | 5 | 5 | 80 | 14 | 5 | 16 |
| 85. Diamond Coal Mine..... | 1,000 | 5 | 5 | 6 | 80 | 14 | 6 | 12 |
| 86. Farmers Lignite Coal Mine..... | 1,000 | 5 | 5 | 5 | 135 | 13 | 6 | 15 |
| 87. Fhelly Coal Mine*..... | 100 | 6 | 6 | 7 | 100 | 12 | 3 | 12 |
| 88. Foresythe Coal Mine..... | 400 | 6 | 6 | 4 | 100 | 12 | 3 | 12 |
| 89. Hot Blast Coal Mine..... | 300 | 4 | 4 | 4 | 120 | 14 | 8 | 14 |
| 90. Hunnewell Coal Mine..... | 400 | 6 | 6 | 7 | 120 | 14 | 8 | 14 |

| | | | | | | | | | |
|------|----------------------------|-------|----|----|---|---------|-------|-----|----|
| 91. | Klondike Coal Mine..... | 200 | 5 | 5 | 6 | 80 | 10 | 3 | 12 |
| 92. | Leeson Mine No. 1..... | 260 | 8 | 8 | 8 | 150 | 15 | 8 | 24 |
| 93. | Leeson Mine No. 2..... | 660 | 8 | 8 | 8 | 200 | 15 | 9 | 15 |
| 94. | Lloyd Coal Mine..... | 4,200 | 6½ | 6½ | 7 | 135-180 | 15 | 9 | 15 |
| 95. | McClure Coal Mine..... | 1,260 | 7 | 7 | 7 | 125 | 16 | 7 | 18 |
| 96. | Pierce Coal Mine..... | 300 | 4 | 4 | 5 | 125 | 10 | 4 | 19 |
| 97. | Red Flag Coal Mine..... | 150. | 7 | 7 | 7 | 150 | 12 | 7-8 | 7 |
| 98. | Rich Coal Mine..... | 1,250 | 5 | 5 | 6 | 100 | 15 | 5½ | 12 |
| 99. | Smith Dry Coal Mine..... | 1,200 | 7 | 7 | 6 | 160 | 10 | 3 | 12 |
| 100. | Square Deal Coal Mine..... | 385 | 5 | 5 | 5 | 65 | 16 | 7 | 6 |
| 101. | Tree-Bausch Coal Mine..... | 100 | 9 | 9 | 4 | 50 | 10 | 7 | 16 |
| 102. | Strong Coal Mine..... | 300 | 5 | 5 | 5 | 100 | 12-14 | 3½ | 14 |
| 103. | Vadnais Coal Mine..... | 300 | 7 | 7 | 7 | 100 | 14 | 7 | 14 |
| 104. | Wallace Coal Mine..... | 1,500 | 7 | 7 | 7 | 100 | 14 | 7 | 14 |

WILLIAMS COUNTY

| | | | | | | | | | |
|------|-------------------------------------|-------|----|----|----|---------|-------|------|-------|
| 105. | Black Diamond Coal Mine..... | 600 | 8 | 8 | 8 | 100-150 | 16-20 | 8-10 | 15-20 |
| 106. | Bryn Coal Mine..... | 300 | 8 | 8 | 8 | 200 | 16-18 | 7 | 16 |
| 107. | Brown Coal Mine..... | 550 | 7 | 7 | 8 | 100 | 16 | 7-8 | 14 |
| 108. | Cow Creek Coal Mine..... | 310 | 8 | 8 | 7 | 80 | 10 | 7 | 14 |
| 109. | Government Coal Mine..... | 1,149 | 6½ | 6½ | 6½ | 150 | 16 | 6 | 15 |
| 110. | Head Coal Mine..... | 400 | 8 | 8 | 8½ | 100 | 15 | 8½ | 10 |
| 111. | Husebye & Ellithorpe Coal Mine..... | 150 | 7 | 7 | 7 | 100 | 16 | 7 | 16 |
| 112. | Low Level Coal Mine..... | 1,540 | 7 | 7 | 7½ | 200 | 15 | 6-8 | 25 |
| 113. | Miller Coal Mine..... | 100 | 7 | 7 | 7 | 100 | 14 | 7 | 20 |
| 114. | Moorman Coal Mine..... | 300 | 7 | 7 | 7 | 100 | 15 | 7 | 12-14 |
| 115. | Powell Coal Mine..... | 950 | 6 | 6 | 8 | 150-400 | 18 | 7 | 18 |
| 116. | Sharpe Coal Mine..... | 200 | 7 | 7 | 7 | 100 | 8-10 | 7 | 10 |

†Strip Pit.
*No Rooms Turned.

| | | | | | | | |
|-----------------------------|---------------|-----|------|--------------------------|-------|---|-----|
| 14. Mackee Coal Mine..... | Carbide | | clay | gasoline engine and pump | Cedar | 6 | .25 |
| 15. Southern Coal Mine..... | Carbide | 2 — | coal | clay | | | |
| 16. Olson Coal Mine..... | Carbide | | | clay | | | |
| 17. Vick Coal Mine..... | Carbide | | | clay | | | |

BURLEIGH COUNTY

| | | | | | | | |
|-----------------------------|--------------------|---------|------|------|----------------------------|-----------|-----|
| 18. Anderson Coal Mine..... | Carbide | 1/2 — 1 | coal | clay | Dry | 6 | .30 |
| 19. Asplund Coal Mine..... | Sunshine Oil | 1/2 — 1 | coal | clay | Dry | 6 | .35 |
| 20. Beckman Coal Mine..... | Carbide | 2 — | coal | clay | Dry | 4 | .16 |
| 21. Johnson Coal Mine..... | Carbide | 3 — 4 | coal | clay | Dry | 6 | .30 |
| 22. Lind Coal Mine..... | Carbide | 3 — 4 | coal | clay | Dry | 6 | .30 |
| 23. Peterson Coal Mine..... | Carbide | 3 — 5 | coal | clay | 8 pumps | all sizes | |
| 24. Wilton Coal Mine..... | *Carbide | | | clay | Tamarack and sawed timbers | | |

DIVIDE COUNTY

| | | | | | | | |
|------------------------------|--------------------|-------|------|----------|-----|------|-----|
| 25. Dougherty Coal Mine..... | Sunshine Oil | 2 — 2 | coal | clay | dry | 5 | .18 |
| 26. Honglet Coal Mine..... | Carbide | 1 — 2 | coal | soft cl. | dry | 5 | .18 |
| 27. Nonan Coal Mine..... | Carbide | 1 — 2 | coal | clay | dry | 6— 8 | .22 |
| 28. Tuax Coal Mine..... | Carbide | 1 — 2 | coal | w. clay | dry | 5 | .15 |

GOLDEN VALLEY COUNTY

| | | | | | | | |
|----------------------------|--------------------|-------|------|------|-----------|--|--|
| 29. Corlies Coal Mine..... | Sunshine Oil | 2 — 4 | coal | clay | dry | | |
| 30. Kussick Coal Mine..... | | | | clay | tank pump | | |
| 31. Porter Coal Mine..... | | | | clay | dry | | |

McLEAN COUNTY

| | | | | | | | |
|------------------------------|---------------|-------|------|--------|-------------------------------|------|-----|
| 32. Bitumina Coal Mine..... | Carbide | 2 — 3 | coal | 1 coal | Smith-Valle Duplex steam pump | 5— 8 | .20 |
| 33. Borchardt Coal Mine..... | Carbide | 3 — 4 | coal | clay | dry | 8 | .20 |

*Electric lights at bottom of shaft and along haulage road.
 † Deming Triplex electric pumps, 1 Cameron Pump, 3 other electric pumps. Average capacity 10,000 gal. per hour per pump.

TABLE NO. 5—Cont.

McLEAN COUNTY—Cont.

| Name of Mine | How Lighted | Kind of Roof feet | floor Kind of | How drained | Kind of Timber | Aver. size inches | App. size at mine |
|-------------------------------|--------------------|----------------------|------------------|-----------------|----------------|----------------------|----------------------|
| 34. Fredrich Coal Mine..... | Sunshine Oil | 2 — | coal | dry | Cedar | 5 | .18 |
| 35. Hansen Coal Mine..... | Carbide | 1 — 2 | clay | ditch | Cottonwood | 6 | .20 |
| 36. Hill Coal Mine..... | Sunshine Oil | 1 — 1½ | coal | windmill and | Cottonwood | 5—6 | .20 |
| 37. Johnson Coal Mine..... | Carbide | 1 — | clay | pump | and Cedar | | |
| 38. Kunkel Coal Mine..... | Carbide | | clay | ditch | Cottonwood | | |
| 39. Ulrich Coal Mine..... | Carbide | | sand | gasoline engine | and Cedar | 4—6 | .20 |
| 40. Youngquist Coal Mine..... | Carbide | 1 — 2— | clay | and pump | Cottonwood | 6 | .15 |
| | | | clay | gasoline engine | | | |
| | | | coal | and pump | | | |

MORTON COUNTY

| | | | | | | | |
|-----------------------------------|--------------------|-------|------|--------------|----------|-----|-----|
| 41. Feland Coal Mine..... | Sunshine Oil | | clay | dry | Tamarack | 6—8 | .16 |
| 42. Garfield Coal Mine..... | Carbide | | clay | windmill and | | | |
| 43. Hebron Erick Co. Coal Mine... | Carbide | 1 — | clay | pump | Tamarack | 6—8 | .20 |
| 44. New Salem Coal Mine..... | Carbide | | clay | dry | Tamarack | 6 | .20 |
| 45. North Star Coal Mine..... | Carbide | 2 — 3 | clay | dry | Tamarack | 6—8 | .24 |

MOUNTRAIL COUNTY

| | | | | | | | |
|-------------------------------|--------------------|-----|------|-----------|----------|-----|-----|
| 46. Bilckre Coal Mine..... | Sunshine Oil | | clay | ditch | Cedar | 6—8 | .25 |
| 47. Barto Coal Mine..... | Carbide | | clay | dry | Cedar | 6—7 | .20 |
| 48. Bowman Coal Mine..... | Sunshine Oil | 2 — | coal | ditch | | | |
| 49. Elgers Coal Mine..... | Carbide | | clay | ditch | | | |
| 50. Hardman Coal Mine..... | Sunshine Oil | | clay | ditch | | | |
| 51. Hefte Coal Mine..... | Sunshine Oil | | clay | ditch | | | |
| 52. John Coal Mine..... | Sunshine Oil | | clay | dry | | | |
| 53. North Star Coal Mine..... | Sunshine Oil | | clay | dry | | | |
| 54. Palda Coal Mine..... | Sunshine Oil | 1 — | coal | water car | Tamarack | 4—5 | .18 |
| 55. Porger Coal Mine..... | Sunshine Oil | | clay | | Tamarack | 4—6 | .20 |
| 56. Rodgers Coal Mine..... | Sunshine Oil | | clay | ditch | Tamarack | 4 | .15 |
| 57. Sellar Coal Mine..... | Sunshine Oil | | clay | dry | | | |

| | | | | | | |
|--------------------------------|--------------------|------|-------|-------|---|-----|
| 58. Stacy Coal Mine..... | Carbide | clay | ditch | Cedar | 8 | .20 |
| 59. Sunday Coal Mine..... | Sunshine Oil | clay | ditch | Cedar | 8 | .20 |
| 60. Williams Coal Mine..... | | | | | | |
| 61. White Earth Coal Mine..... | | | | | | |

OLIVER COUNTY

| | | | | | | |
|------------------------------------|--|------|-------|--|--|--|
| 62. Flint Coal Mine..... | | clay | ditch | | | |
| 63. Meyhoff Coal Mine..... | | clay | ditch | | | |
| 64. Pleasant Valley Coal Mine..... | | clay | ditch | | | |
| 65. Spring Valley Coal Mine..... | | clay | ditch | | | |

RENVILLE COUNTY

| | | | | | | |
|----------------------------|--------------------|------|-----------|------------|-----|-----|
| 66. Tehelka Coal Mine..... | Sunshine Oil | clay | water car | R. R. ties | 6-8 | .20 |
| 67. Wooster Coal Mine..... | Carbide | clay | dry | Cedar | 6 | |

STARK COUNTY

| | | | | | | |
|------------------------------|--------------------------|------------|-----------------------|------------|-------|-----|
| 68. Gross Coal Mine..... | Carbide | 1 coal | dry | R. R. ties | 6-8 | |
| 69. Lenigh Coal Mine..... | *Carbide | 2 coal | American steam pump | Tamarack | 6-8 | .45 |
| 70. Pittsburg Coal Mine..... | Carbide | 2 - 4 coal | gas engine and pump | Tamarack | 6 1/2 | .23 |
| 71. Wiley Coal Mine..... | Carbide & Sunshine | 8 coal | ditch | Tamarack | 5 | .25 |
| 72. Zenith Coal Mine..... | Oil | | Fairbanks steam pumps | Tamarack | | |

WARD COUNTY

| | | | | | | |
|------------------------------------|--------------------------|------|-----------|------------|-----|-----|
| 73. Baden Coal Mine..... | Carbide | clay | water car | Cottonwood | 4-8 | .15 |
| 74. Bertelson Coal Mine No. 1..... | Carbide & Sunshine | clay | dry | Tamarack | 4-6 | .20 |
| | Oil | | | | | |

*The main entry is electrically lighted.
 **In entries 6 inches of coal is left.

TABLE NO. 5—Cont.
WARD COUNTY—Cont.

| Name of Mine | How Lighted | Kind of Roof feet | Kind of floor | How drained | Kind of Timber | Aver. size in inches | App. cost at mine |
|-------------------------------------|--------------------|-----------------------|---------------|---------------------|------------------------|----------------------|-------------------|
| 75. Bertelson Coal Mine No. 2..... | Carbide | Clay | Clay | Deane steam pump | Tamarack | 4—6 | .20 |
| 76. Brick Yard Coal Mine..... | Carbide | shale | clay | dry | Tamarack | 5 | .18 |
| 77. Burlington City Coal Mine..... | Sunshine Oil | coal | clay | water car | Tamarack | 6 | .20 |
| 78. Carlsch Coal Mine..... | Carbide | 2 — 5 coal | 1 coal | ditch | Tamarack | 5 | .18 |
| 79. Christopherson Coal Mine..... | Sunshine Oil | clay | clay | dry | Cedar | 4 | .16 |
| 80. Colton Coal Mine..... | Carbide | 2 — 3 coal | 1 coal | dry | Cottonwood | 4 | .18 |
| 81. Conan Coal Mine..... | Carbide | 2 — 3 coal | ½ coal | water car | Elm and Elm | 6 | .20 |
| 82. Crosby Coal Mine..... | Carbide | soft clay | clay | gas engine and pump | Elm and Ash | 6—8 | .22 |
| 83. Davis Coal Mine..... | Carbide | 3 — coal | clay | steam pump | Tamarack & Jack Pine | 4—5 | .18 |
| 84. Des Lacs Coal Mine..... | Sunshine Oil | 1 — 2 coal | clay | water car | Tamarack | 5 | .18 |
| 85. Diamond Coal Mine..... | Sunshine Oil | clay | clay | dry | Tamarack | 5 | .20 |
| 86. Farmers' Lignite Coal Mine..... | Carbide | sandy clay | clay | dry | Tamarack | 5—6 | .20 |
| 87. Fihelly Coal Mine..... | Sunshine Oil | clay | clay | dry | Cedar | 6 | .28 |
| 88. Foresythe Coal Mine..... | Carbide | 1 — ½ coal | clay | gas engine and pump | Cedar | 5 | .25 |
| 89. Hot Blast Coal Mine..... | Carbide | clay | clay | dry | Tamarack | 6 | .22 |
| 90. Hunnewell Coal Mine..... | Carbide | 1½— coal | ½ clay | Acme pump | Cedar | 4 | .20 |
| 91. Klondike Coal Mine..... | Sunshine Oil | 3 sand & clay | clay | water car | Cottonwood | 6—8 | .25 |
| 92. Leeson Coal Mine No. 1..... | Carbide | — 4 coal | clay | dry | Cedar | 6 | .25 |
| 93. Leeson Coal Mine No. 2..... | Carbide | 1 — 2 coal | clay | ditch | Oak and Elm | 10 | .30 |
| 94. Lloyd Coal Mine..... | Carbide | 4 — 2 coal | 2 coal | gas engine and pump | Oak and Elm | 10 | .30 |
| 95. McClure Coal Mine..... | Carbide | 1½— coal | clay | gas engine and pump | Tamarack and Jack Pine | 5—6 | .20 |
| 96. Pierce Coal Mine..... | Carbide | clay | clay | steam pump | Tamarack | 5 | .17 |
| 97. Red Flag Coal Mine..... | Carbide | 3 — 4 coal | 6 coal | steam ejector | Tamarack | 5 | .18 |
| 98. Rich Coal Mine..... | Carbide | sandy clay | clay | ditch | Tamarack | 6 | .17 |
| 99. Smith Dry Coal Mine..... | *Carbide | clay & soap stone | fire | Fairbanks elec- | Tamarack | 6 | .17 |
| 100. Square Deal Coal Mine..... | Sunshine Oil | sandstone & draw clay | clay | duplex pump | Tamarack | 6—7 | .25 |
| 101. Strong Coal Mine..... | Carbide | 3 — 4 coal | clay | windmill | Cottonwood | 8 | .20 |
| 102. Tree-Bausch Coal Mine..... | Carbide | Clay | 1 coal | gas engine and pump | Cedar and Elm | 10 | .30 |

| | Carbide | 2 | — | clay coal | dry clay | gas engine and Fairbanks-Morse pump | Old bridge timbers Tamarack | 8 | .22 |
|--|--------------------|-------|-----|-----------|------------------|-------------------------------------|---------------------------------|------|-----|
| 103. Vadnais Coal Mine..... | Carbide | 2 | — | clay coal | dry clay | gas engine and Fairbanks-Morse pump | Old bridge timbers Tamarack | 8 | .22 |
| 104. Wallace Coal Mine..... | Carbide | 2 | — | clay coal | dry clay | gas engine and Fairbanks-Morse pump | Old bridge timbers Tamarack | 8 | .22 |
| WILLIAMS COUNTY | | | | | | | | | |
| 105. Black Diamond Coal Mine..... | Carbide | 2 | — 3 | coal | clay | dry | Cottonwood and Elm | 6 | .25 |
| 106. Bryn Coal Mine..... | Carbide | 2 | — 3 | coal | clay | dry | Cottonwood | 6-10 | .30 |
| 107. Brown Coal Mine..... | Carbide | 2 | — 3 | coal | clay | dry | Cottonwood | 6-10 | .25 |
| 108. Cow Creek Coal Mine..... | Carbide | 1 | — | coal | clay | dry | Ash | 6-8 | .30 |
| 109. Government Coal Mine..... | Carbide | 2 | — | coal | soft sp. stone** | small pumps | Tamarack | 6-10 | .23 |
| 110. Head Coal Mine..... | Carbide | 2 | — 4 | coal | 1 clay | siphon | Cottonwood | 8 | .25 |
| 111. Husebye & Ellithorpe Coal Mine..... | Carbide | 2 | — 4 | coal | 1 clay | siphon | Cottonwood | 8 | .25 |
| 112. Low Level Coal Mine..... | Carbide | 4 | — 5 | coal | clay | steam pumps | Cottonwood and Ash | 8-12 | .25 |
| 113. Miller Coal Mine..... | Sunshine Oil | 2 | — 3 | coal | 1/2 clay | 6-inch tile | Tamarack | 8-8 | .22 |
| 114. Moorman Coal Mine..... | Carbide | 2 | — 7 | coal | clay | ditch | Cedar | 8-12 | .78 |
| 115. Powell Coal Mine..... | Carbide | 1 1/2 | — 2 | coal | clay | water car | Cottonwood | 6-10 | .20 |
| 116. Sharpe Coal Mine..... | Carbide | 2 | — | coal | clay | dry | Cottonwood Cedar and Cottonwood | 6-10 | .30 |
| | | | | | | | | 6-8 | .25 |

*Haulage ways are electrically lighted.

**Overlaid with strata of slippery soapstone.

*Haulage ways are electrically lighted.

BURLEIGH COUNTY

| | | | | | | |
|---------------------------------|-----------------|----------------------|-----|------------|---------------|-------------|
| 18. Anderson Coal Mine..... | Team and cable | 8 lb. steel & wood | 2 | 1,000 lbs. | 10 mi. Wilton | N. P. |
| 19. Asplund Coal Mine..... | Team and cable | 12 lb. steel..... | 4 | 1,000 lbs. | 5 mi. Wilton | Soo & N. P. |
| 20. Backman Coal Mine..... | Team and cable | 12 lb. steel..... | 4 | 1,000 lbs. | 3 mi. Wilton | Soo & N. P. |
| 21. Johnson Coal Mine..... | Horse and cable | Wood..... | 1 | 800 lbs. | 2 mi. Regan | N. P. |
| 22. Lind Coal Mine..... | Team and cable | 12 lb. steel..... | 6 | 1,000 lbs. | 4 mi. Wilton | Soo & N. P. |
| 23. Peterson Coal Mine..... | Team and cable | 12 lb. steel & wood | 6 | 1,000 lbs. | 5 mi. Wilton | Soo & N. P. |
| 24. Wilton Coal Mine No. 1..... | Steam hoist | 20 lb.-35 lb. steel. | 425 | 2,400 lbs. | At Wilton | Soo & N. P. |

DIVIDE COUNTY

| | | | | | | |
|-------------------------------|-----------------|-------------------|----|------------|--------------|-------|
| 25. Dougherty Coal Mine..... | Team and cable | 16 lb. steel..... | 15 | 1,500 lbs. | 1 mi. Noonan | G. N. |
| 26. Houglet Coal Mine..... | Horse and cable | Wood..... | 2 | 1,000 lbs. | 1 mi. Noonan | G. N. |
| 27. Noonan Coal Co. Mine..... | Horse and cable | 12 lb. steel..... | 20 | 1,000 lbs. | 1 mi. Noonan | G. N. |
| 28. Truex Coal Mine..... | Gas. eng. hoist | 12 lb. steel..... | 50 | 1,000 lbs. | 1 mi. Noonan | G. N. |

GOLDEN VALLEY COUNTY

| | | | | | | |
|----------------------------|-------|-------|-------|-------|----------------------|-------|
| 29. Corliss Coal Mine..... | ..... | ..... | ..... | ..... | 11 mi. Beach | N. P. |
| 30. Kussick Coal Mine..... | ..... | ..... | ..... | ..... | 6 mi. Sentinel Butte | N. P. |
| 31. Porter Coal Mine..... | ..... | ..... | ..... | ..... | 10 mi. Beach | N. P. |

McLEAN COUNTY

| | | | | | | |
|-------------------------------|-----------------|---------------------|-------|------------|---------------------|-----|
| 32. Bitumina Coal Mine..... | *Horses | 12 lb. steel..... | 9 | 2,000 lbs. | 4 mi. shipping spur | Soo |
| 33. Borchardt Coal Mine..... | Whim | 12 lb. steel..... | 3 | 1,000 lbs. | 3 1/2 mi. Underwood | Soo |
| 34. Fredrich Coal Mine..... | Steam hoist | Wood..... | 4 | 1,000 lbs. | 4 mi. Underwood | Soo |
| 35. Hansen Coal Mine..... | Horse | 12 lb. steel..... | 5 | 1,500 lbs. | 4 1/2 mi. Underwood | Soo |
| 36. Hill Coal Mine..... | Horse | Wood..... | 2 | 1,500 lbs. | 3 mi. Garrison | Soo |
| 37. Johnson Coal Mine..... | Horse and cable | Wood..... | 1 | 1,000 lbs. | 6 1/4 mi. Garrison | Soo |
| 38. Kunkel Coal Mine..... | ..... | ..... | ..... | ..... | 1/2 mi. Garrison | Soo |
| 39. Ulrich Coal Mine..... | Horse | 12 lb. steel..... | 4 | 1,000 lbs. | 6 mi. Garrison | Soo |
| 40. Youngquist Coal Mine..... | Horse | 12 lb. steel & wood | 5 | 2,000 lbs. | 10 mi. Underwood | Soo |

*Onto tippie by steam hoist.

TABLE NO. 6—Cont.
MORTON COUNTY

| Name of Mine | How delivered at surface | Kind of track | No. of mine cars | Capacity of mine cars | Distance | Railroad |
|------------------------------------|--------------------------|---------------------|------------------|-----------------------|-------------------|----------|
| 41. Feland Coal Mine..... | Horse | 12 lb. steel..... | 6 | 1,500 lbs. | 1 mi. Simus | N. P. |
| 42. Garfield Coal Mine..... | Horse | 12 lb. steel..... | 8 | 2,500 lbs. | 6 mi. New Salem | N. P. |
| 43. Hebron Brick Co. Mine..... | Horse | 20 lb. steel..... | 30 | 2,000 lbs. | 5 mi. Hebron | N. P. |
| 44. New Salem Coal Mine..... | Steam hoist | 12 & 16 lb. steel.. | 5 | 2,000 lbs. | 1 mi. New Salem | N. P. |
| 45. North Star Coal Mine..... | Horse | 12 & 16 lb. steel.. | 5 | 2,000 lbs. | 5 mi. Hebron | N. P. |
| MOUNTRAIL COUNTY | | | | | | |
| 46. Blickre Coal Mine..... | Horse | 12 lb. steel..... | 2 | 2,000 lbs. | 9 mi. White Earth | G. N. |
| 47. Barto Coal Mine..... | Whim | 8 & 12 lb. steel.. | 4 | 1,000 lbs. | 3 mi. White Earth | G. N. |
| 48. Bowman Coal Mine..... | Hand | ..... | ..... | ..... | 18 mi. Palermo | G. N. |
| 49. Elgers Coal Mine..... | Hand | ..... | ..... | ..... | 7 mi. Stanley | G. N. |
| 50. Hardman Coal Mine..... | Hand | ..... | ..... | ..... | 6 mi. Stanley | G. N. |
| 51. Hefie Coal Mine..... | Hand | ..... | ..... | ..... | 6 mi. White Earth | G. N. |
| 52. John Coal Mine..... | Hand | ..... | ..... | ..... | 20 mi. Palermo | G. N. |
| 53. North Star Coal Mine..... | Horse | 12 lb. steel..... | 10 | 1,500 lbs. | 23 mi. Stanley | G. N. |
| 54. Palda Coal Mine..... | Horse | 12 lb. steel..... | 3 | 1,500 lbs. | 16 mi. Palermo | G. N. |
| 55. Ponger Coal Mine..... | Horse | 12 lb. steel..... | 3 | 1,500 lbs. | 4 mi. White Earth | G. N. |
| 56. Rogers Coal Mine..... | Hand | 8 lb. steel..... | 2 | 800 lbs. | 16 mi. Palermo | G. N. |
| 57. Sellar Coal Mine..... | Hand | ..... | ..... | ..... | 20 mi. Palermo | G. N. |
| 58. Stacy Coal Mine..... | Sunday Coal Mine. | ..... | ..... | ..... | 8 mi. Stanley | G. N. |
| 59. Sunday Coal Mine..... | Horse | 12 & 16 lb. steel.. | 10 | 2,000 lbs. | 23 mi. Stanley | G. N. |
| 60. Williams Coal Mine..... | Horse | ..... | ..... | ..... | 8 mi. White Earth | G. N. |
| 61. White Earth Coal Mine..... | Horse | ..... | ..... | ..... | 6 mi. White Earth | G. N. |
| OLIVER COUNTY | | | | | | |
| 62. Flint Coal Mine..... | ..... | ..... | ..... | ..... | 24 mi. New Salem | N. P. |
| 63. Meyhoff Coal Mine..... | ..... | ..... | ..... | ..... | 20 mi. Judson | N. P. |
| 64. Pleasant Valley Coal Mine..... | ..... | ..... | ..... | ..... | 14 mi. Ft. Clarke | N. P. |
| 65. Spring Valley Coal Mine..... | ..... | ..... | ..... | ..... | 14 mi. Judson | N. P. |

RENVILLE COUNTY

| | | | | | | |
|----------------------------|-------|------------------|---|------------|---------------|-----|
| 66. Tehelka Coal Mine..... | Horse | 8 lb. steel..... | 4 | 1,000 lbs. | 3½ mi. Carpio | Soo |
| 67. Wooster Coal Mine..... | Hand | Pipe | 1 | 1,000 lbs. | 3½ mi. Carpio | Soo |

STARK COUNTY

| | | | | | | |
|------------------------------|------------------|----------------------|-------|------------|-------------------|-------|
| 68. Gross Coal Mine..... | Horse | Wood | 2 | 1,000 lbs. | 2½ mi. Belfield | N. P. |
| 69. Lehigh Coal Mine..... | Electric haulage | 26 lb. steel..... | 34 | 4,000 lbs. | At Lehigh | N. P. |
| 70. Pittsburg Coal Mine..... | Steam hoist | 16-20 lb. steel..... | 31 | 2,000 lbs. | At Lehigh | N. P. |
| 71. Witley Coal Mine..... | ..... | 12, 18, 24 lb steel | ..... | ..... | 3 mi. South Heart | N. P. |
| 72. Zenith Coal Mine..... | Steam hoist | ..... | 23 | 2,000 lbs. | At Zenith | N. P. |

WARD COUNTY

| | | | | | | |
|------------------------------------|-------------|----------------------|-------|------------|---------------------------------|-----|
| 73. Baden Coal Mine..... | Horse | Wood | 8 | 1,000 lbs. | 1 mi. Baden | Soo |
| 74. Bertelson Coal Mine No. 1..... | Steam hoist | Wood | 20 | 1,000 lbs. | 1 mi. Kenmare | Soo |
| 75. Bertelson Coal Mine No. 2..... | Steam hoist | 12 lb. steel..... | 23 | 1,400 lbs. | At Spur 14 mi. north of Kenmare | Soo |
| 76. Brick Yard Coal Mine..... | Mules | 12 lb. steel..... | 20 | 2,000 lbs. | 3 mi. Kenmare | Soo |
| 77. Burlington City Coal Mine..... | Horse | Wood | 2 | 1,000 lbs. | At Burlington | Soo |
| 78. Carlisch Coal Mine..... | Horse | 12 lb. steel..... | 3 | 1,600 lbs. | 8 mi. Sawyer | Soo |
| 79. Christophson Coal Mine..... | Hand | Wood | 2 | 800 lbs. | 1½ mi. Carpio | Soo |
| 80. Colton Coal Mine..... | Steam hoist | 12 lb. steel..... | 26 | 1,000 lbs. | 4 mi. Burlington | Soo |
| 81. Conan Coal Mine..... | Horse | 12 lb. steel..... | 4 | 1,000 lbs. | 1 mi. Burlington | Soo |
| 82. Crosby Coal Mine..... | Mule | 12 lb. steel..... | 14 | 2,000 lbs. | 6 mi. Kenmare | Soo |
| 83. Davs Coal Mine..... | Steam hoist | 12 lb.-16 lb. steel. | 60 | 2,600 lbs. | At Davis | Soo |
| 84. Des Laes Coal Mine..... | Horse | Wood | 3 | 1,000 lbs. | At Foxholm | Soo |
| 85. Diamond Coal Mine..... | Mule | 12 lb. steel..... | 10 | 1,000 lbs. | 1 mi. Kenmare | Soo |
| 86. Farmers Lignite Coal Mine..... | Hand | Steel faced wood. | 7 | 1,000 lbs. | 8 mi. Bowbells | Soo |
| 87. Fishely Coal Mine..... | Hand | Wood | 1 | 1,000 lbs. | 1 mi. Paradise | Soo |
| 88. Foresythe Coal Mine..... | Horse | 16 lb. steel..... | 10 | 2,000 lbs. | 1 mi. Carpio | Soo |
| 89. Hot Blast Coal Mine..... | Hand | 8 lb. steel..... | 2 | 2,000 lbs. | 3 mi. Donnybrook | Soo |
| 90. Hunnewell Coal Mine..... | Horse | 12 lb. steel..... | 6 | 2,000 lbs. | 2 mi. Burlington | Soo |
| 91. Klondike Coal Mine..... | Hand | Wood | 1 | 1,000 lbs. | 5 mi. Donnybrook | Soo |
| 92. Leeson Coal Mine No. 1..... | Horse | sleds, | ..... | ..... | 10 mi. Velva | Soo |
| 93. Leeson Coal Mine No. 2..... | Hand | 16 lb. steel..... | 4 | 1,500 lbs. | 8 mi. Velva | Soo |
| 94. Lloyd Coal Mine..... | Horse | 16 lb.-20 lb. steel. | 40 | 2,000 lbs. | ¾ mi. Paradise | Soo |
| 95. McClure Coal Mine..... | Mules | 16 lb.-20 lb. steel. | 65 | 2,400 lbs. | At Tasker | Soo |
| 96. Pierce Coal Mine..... | Steam Hoist | 12 lb. steel..... | 10 | 1,000 lbs. | 2 mi. Kenmare | Soo |
| 97. Red Flag Coal Mine..... | Horse | stone boat | ..... | ..... | 11 mi. Velva | Soo |

TABLE NO. 6—Cont.
WARD COUNTY—Cont.

| Name of Mine | How delivered at surface | Kind of track | No. of mine cars | Capacity of mine cars | Distance from shipping station | Railroad |
|-------------------------------------|--------------------------|--------------------------|------------------|-----------------------|--------------------------------|----------|
| 98. Rich Coal Mine..... | Horse | 12 lb. steel..... | 8 | 1,000 lbs. | 8 mi. Bowbells | Soo |
| 99. Smith Dry Coal Mine..... | Electric hoist | 16 lb.-40 lb. steel..... | 48 | 2,000 lbs. | 1 mi. Kenmare | Soo |
| 100. Square Deal Coal Mine..... | Horse | 12 lb. steel..... | 4 | 800 lbs. | 4 mi. Baden | Soo |
| 101. Strong Coal Mine..... | Horse | 12 lb. steel..... | 4 | 2,000 lbs. | 7 mi. Velya | Soo |
| 102. Tree-Bausch Coal Mine..... | ..... | 12 lb. steel..... | 11 | 1,000 lbs. | 12 mi. Velya | Soo |
| 103. Vadnais Coal Mine..... | Horse | 12 lb. steel..... | 11 | 1,000 lbs. | 2½ mi. Kenmare | Soo |
| 104. Wallace Coal Mine..... | Horse | 16 lb. steel..... | 22 | 3,000 lbs. | At Burlington | Soo |
| WILLIAMS COUNTY | | | | | | |
| 105. Black Diamond Coal Mine..... | Mules | 12 lb. steel..... | 10 | 3,000 lbs. | 2 mi. Miller Spur | N. |
| 106. Bryn Coal Mine..... | Horse | 12 lb. steel..... | 5 | 3,000 lbs. | 3 mi. Miller Spur | G. |
| 107. Brown Coal Mine..... | Horse | 12 lb. steel..... | 6 | 3,000 lbs. | 3 mi. Miller Spur | G. |
| 108. Cow Creek Coal Mine..... | Horse | 12 lb. steel..... | 2 | 2,000 lbs. | 22 mi. Williston | G. |
| 109. Government Coal Mine..... | Mules | 16 lb.-30 lb. steel..... | 20 | 2,000 lbs. | 4¼ mi. Williston | G. |
| 110. Head Coal Mine..... | Horse | Wood..... | 5 | 1,500 lbs. | 6 mi. Williston | N. |
| 111. Husebye & Ellithorpe Coal Mine | Steam hoist | 12 lb.-20 lb. steel..... | 12 | 2,500 lbs. | 3 mi. Williston | G. |
| 112. Low Level Coal Mine..... | Steam hoist | 12 lb.-16 lb. steel..... | 30 | 1,500 lbs. | At Avoca | N. |
| 113. Miller Coal Mine..... | Horse | 12 lb. steel..... | 1 | 1,500 lbs. | 12 mi. Wheelock | G. |
| 114. Moorman Coal Mine..... | Hand | Wood..... | 2 | 1,000 lbs. | 7 mi. Miller Spur | N. |
| 115. Fowell Coal Mine..... | Horse | 12 lb. steel..... | 7 | 3,000 lbs. | 2¼ mi. Miller Spur | G. |
| 116. Sharpe Coal Mine..... | Horse | 12 lb. steel..... | 3 | 2,000 lbs. | 5 mi. Williston | G. |

TABLE NO. 7—PRODUCTION

ADAMS COUNTY

| Name of Mine | Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. Clermont Coal Mine | 1912 | 57 | 63 | 142 | 54 | 48 | 44 | 51 | 99 | 148 | 328 | 447 | 466 | 1,947 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 200 | 200 | 400 |
| 2. Farmers Coal Mine | 1912 | 296 | 205 | 204 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 50 | 50 | 1,009 |
| | Slack | 104 | 76 | 57 | ..... | ..... | ..... | ..... | ..... | ..... | 268 | 512 | 385 | 1,852 |
| 3. Haynes Coal Mine. | 1912 | 17 | 16 | 352 | 166 | 161 | 201 | 106 | 166 | 154 | 144 | 85 | 86 | 2,324 |
| | Slack | 407 | 217 | 281 | 307 | 322 | 293 | 81 | 210 | 194 | 196 | 348 | 520 | 2,894 |
| 4. Stevenson & Gerson Coal Mine | 1912 | 580 | 241 | 281 | 307 | 322 | 293 | 81 | 210 | 194 | 196 | 348 | 520 | 4,086 |
| | Slack | 258 | 126 | 135 | 30 | 33 | 121 | 8 | 21 | 19 | 88 | 56 | 84 | 4,077 |
| Total | 1912 | 253 | 126 | 135 | 81 | 89 | 140 | 56 | 170 | 312 | 151 | 339 | 229 | 1,628 |
| | Slack | 402 | 351 | 257 | 18 | 19 | 16 | 28 | 17 | 31 | 64 | 60 | 44 | 3,942 |
| Total | 1912 | 1,013 | 611 | 853 | 311 | 308 | 385 | 212 | 285 | 322 | 675 | 1,204 | 1,449 | 7,578 |
| | Slack | 1,086 | 668 | 565 | 485 | 522 | 371 | 309 | 380 | 506 | 1,485 | 1,838 | 2,04 | 9,780 |
| Total | 1913 | 115 | 72 | 59 | 48 | 52 | 37 | 31 | 38 | 50 | 1,168 | 251 | 204 | 1,123 |

BILLINGS COUNTY

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5. De Mores Coal Mine | 1912 | 100 | 50 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 50 | 100 | 300 |
| | Slack | 150 | 150 | 7 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 75 | 150 | 600 |
| 6. High Grade Coal Mine | 1912 | 15 | 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8 | 15 | 60 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 7. Jackson Coal Mine. | 1912 | 50 | 50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 750 | 750 | 1,500 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | 1912 | 150 | 100 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 100 | 150 | 500 |
| | Slack | 150 | 150 | 7 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 825 | 900 | 2,100 |
| Total | 1913 | 15 | 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 68 | 75 | 180 |

Note: No slack production figures available for 1912.

TABLE NO. 7—Cont.
BOWMAN COUNTY

| Name of Mine | Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|-----------------------|-------|-------|------|------|------|-----|------|------|------|-------|-------|-------|-------|-------|
| 8. Scranton Coal Mine | 1912 | 687 | 427 | 257 | 143 | 280 | 250 | 200 | 400 | 700 | 850 | 1,700 | 2,000 | 7,984 |
| | 1913 | 1,295 | 810 | 256 | 233 | 331 | 325 | 256 | 223 | 587 | 1,598 | 1,692 | 628 | 8,889 |
| | Slack | 74 | 42 | 153 | 40 | 48 | 180 | 88 | 103 | 87 | 176 | 92 | 146 | 1,173 |

BURKE COUNTY

| | | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 9. Domrese Coal Mine | 1912 | 345 | 302 | 270 | 216 | 132 | 90 | 171 | 216 | 242 | 285 | 310 | 399 | 2,978 |
| | 1913 | 184 | 161 | 144 | 116 | 71 | 48 | 91 | 113 | 129 | 152 | 163 | 232 | 1,539 |
| | Slack | 15 | 12 | 12 | 9 | 6 | 4 | 7 | 9 | 9 | 9 | 12 | 15 | 112 |
| 10. Fenster Coal Mine. | 1912 | 156 | 110 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | 90 | 150 | 173 | 754 |
| | 1913 | 75 | 60 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 30 | 60 | 297 |
| | Slack | 5 | 4 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 207 |
| 11. Gille Coal Mine.... | 1912 | 314 | 300 | 150 | 80 | 60 | 70 | 80 | 75 | 200 | 320 | 450 | 425 | 2,554 |
| | 1913 | 250 | 200 | 80 | 40 | 20 | ..... | ..... | ..... | ..... | 60 | 150 | 200 | 1,900 |
| | Slack | 30 | 18 | 67 | 3 | 1 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 69 |
| 12. Greenup Coal Mine. | 1912 | 230 | 232 | 150 | 144 | 88 | 60 | 114 | 144 | 162 | 190 | 210 | 16 | 1,283 |
| | 1913 | ..... | 50 | 450 | 400 | 380 | 370 | 350 | 390 | 410 | 1,300 | 1,300 | 264 | 6,700 |
| | Slack | ..... | 5 | 45 | 40 | 38 | 37 | 35 | 39 | 41 | 120 | 120 | 120 | 640 |
| 13. Hagen Coal Mine.. | 1912 | 20 | 24 | 36 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 20 | 70 | 80 |
| | 1913 | 60 | 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 165 |
| | Slack | 10 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 27 |
| 14. Mackee Coal Mine. | 1912 | 150 | 100 | 50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 300 |
| | 1913 | 120 | 100 | 50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 300 |
| | Slack | 75 | 50 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 150 |
| 15. Souther Coal Mine. | 1912 | 55 | 60 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 80 | 100 | 350 |
| | 1913 | ..... | 5 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 16. Olson Coal Mine... | 1912 | 210 | 140 | 100 | ..... | ..... | ..... | ..... | ..... | ..... | 120 | 200 | 230 | 1,000 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 17. Vick Coal Mine.... | 1912 | 410 | 370 | 200 | 150 | 80 | 50 | 50 | 60 | 50 | 320 | 400 | 360 | 2,500 |
| | 1913 | 200 | 175 | 75 | 50 | 40 | 10 | ..... | ..... | ..... | 85 | 150 | 190 | 1,025 |
| | Slack | 13 | 11 | 5 | 3 | 3 | 1 | ..... | ..... | ..... | 57 | 10 | 13 | 119 |
| Total..... | 1912 | 1,835 | 1,548 | 1,061 | 590 | 360 | 270 | 415 | 495 | 654 | 1,335 | 1,720 | 1,851 | 12,134 |
| Total..... | 1913 | 1,004 | 821 | 849 | 605 | 511 | 438 | 441 | 503 | 589 | 1,597 | 1,898 | 2,142 | 11,388 |
| Total..... | Slack | 145 | 107 | 158 | 55 | 48 | 42 | 42 | 48 | 53 | 194 | 168 | 190 | 1,250 |

BURLEIGH COUNTY

| | | | | | | | | | | | | | |
|-------------------------|--------|--------|--------|--------|-------|-------|-------|-------|-------|--------|--------|--------|---------|
| 18. Anderson Coal Mine | 1912 | 84 | 56 | 40 | ..... | ..... | ..... | ..... | ..... | 48 | 80 | 92 | 400 |
| | 1913 | 6 | 4 | 3 | ..... | ..... | ..... | ..... | ..... | 3 | 6 | 7 | 29 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 19. Asplund Coal Mine. | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 430 | 751 | 306 | 1,687 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 43 | 30 | 86 | 157 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 94 | 248 | 86 | 762 |
| 20. Eackman Coal Mine | 1912 | 122 | 77 | 135 | ..... | ..... | ..... | ..... | ..... | 95 | 200 | 170 | 793 |
| | 1913 | 125 | 63 | 140 | ..... | ..... | ..... | ..... | ..... | 8 | 17 | 14 | 67 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 25 | 40 | 50 | 250 |
| 21. Johnson Coal Mine. | 1912 | 30 | 20 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | 20 | 30 | 100 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 22. Lind Coal Mine..... | 1912 | 355 | 352 | 278 | ..... | ..... | ..... | ..... | ..... | 294 | 300 | 415 | 3,090 |
| | 1913 | 300 | 250 | 240 | ..... | ..... | ..... | ..... | ..... | 205 | 280 | 300 | 2,000 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 17 | 23 | 25 | 166 |
| 23. Peterson Coal Mine | 1912 | 25 | 21 | 20 | ..... | ..... | ..... | ..... | ..... | 6 | 6 | 6 | 1990 |
| | 1913 | 175 | 150 | 140 | ..... | ..... | ..... | ..... | ..... | 200 | 400 | 370 | 1,990 |
| | 1912 | 172 | 180 | 165 | ..... | ..... | ..... | ..... | ..... | 430 | 450 | 502 | 2,411 |
| | 1913 | 17 | 18 | 16 | ..... | ..... | ..... | ..... | ..... | 43 | 45 | 50 | 239 |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 24. Wilton Coal Mine | 1912 | 27,909 | 15,654 | 13,952 | 8,097 | 7,193 | 6,495 | 5,687 | 9,031 | 12,736 | 19,576 | 30,513 | 181,918 |
| | 1913 | 15,197 | 11,972 | 9,620 | 4,918 | 4,370 | 2,865 | 4,361 | 6,703 | 9,962 | 17,055 | 12,257 | 119,117 |
| | *Slack | 7,063 | 5,788 | 5,625 | 2,359 | 3,674 | 2,655 | 3,898 | 4,319 | 6,371 | 8,179 | 9,007 | 69,574 |
| Total..... | 1912 | 28,021 | 15,238 | 14,530 | 8,414 | 7,419 | 6,667 | 5,933 | 9,957 | 13,106 | 20,189 | 31,434 | 188,010 |
| Total..... | 1913 | 15,908 | 12,541 | 10,205 | 5,128 | 4,525 | 3,995 | 4,437 | 6,350 | 10,227 | 18,536 | 15,957 | 126,408 |
| Total..... | Slack | 7,121 | 5,833 | 5,675 | 2,378 | 3,689 | 2,668 | 3,909 | 4,332 | 6,366 | 8,345 | 9,133 | 70,232 |

*Slack includes all coal passing a 6-inch screen.

DIVIDE COUNTY

| | | | | | | | | | | | | | |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| 25. Dougherty Coal Mine | 1912 | 2,600 | 2,980 | 1,850 | 1,100 | 1,100 | 800 | 400 | 1,080 | 1,800 | 2,800 | 4,150 | 24,860 |
| | 1913 | 1,180 | 1,030 | 920 | 740 | 450 | 340 | 570 | 740 | 830 | 370 | 1,350 | 10,160 |
| | Slack | 100 | 95 | 90 | 70 | 40 | 30 | 50 | 70 | 80 | 90 | 110 | 925 |
| 26. Houglet Coal Mine | 1912 | 70 | 60 | 35 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | 7 | 6 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 27. Ngoman Coal Mine. | 1912 | 250 | 200 | 210 | 100 | ..... | ..... | ..... | ..... | 100 | 150 | 225 | 1,435 |
| | 1913 | 350 | 250 | 125 | 75 | ..... | ..... | ..... | ..... | 355 | 738 | 694 | 2,571 |
| | 1912 | 50 | 34 | 20 | 10 | ..... | ..... | ..... | ..... | 53 | 110 | 116 | 300 |
| 28. Truxax Coal Mine... | 1912 | 1,200 | 1,000 | 800 | 500 | 500 | 400 | 400 | 600 | 1,200 | 1,500 | 6,500 | 15,500 |
| | 1913 | 3,595 | 2,525 | 1,330 | 920 | 1,035 | 1,055 | 1,030 | 1,105 | 1,340 | 2,185 | 2,570 | 23,020 |
| | Slack | 350 | 250 | 138 | 92 | 103 | 105 | 103 | 100 | 134 | 218 | 269 | 2,290 |
| Total..... | 1912 | 4,050 | 4,180 | 2,860 | 1,700 | 1,600 | 1,200 | 800 | 1,680 | 3,000 | 4,450 | 10,375 | 44,945 |
| Total..... | 1913 | 5,195 | 3,865 | 2,480 | 1,735 | 1,435 | 1,185 | 1,600 | 1,845 | 3,025 | 3,893 | 6,714 | 36,151 |
| Total..... | Slack | 517 | 385 | 251 | 172 | 143 | 135 | 153 | 170 | 317 | 418 | 596 | 3,643 |

Note: No slack production figures available for 1912.

TABLE NO. 7.—Cont.
GOLDEN VALLEY COUNTY

| Name of Mine | Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|-------------------------|-------|------|------|------|------|-----|------|------|------|-------|------|------|------|-------|
| 29. Corliss Coal Mine.. | 1912 | 50 | .. | .. | .. | .. | .. | .. | .. | .. | 45 | 80 | 200 | 375 |
| | Slack | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | 1913 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 30. Kussick Coal Mine. | 1912 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50 | 100 | 150 | 300 |
| | Slack | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | 1913 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 31. Porter Coal Mine... | 1912 | 25 | 25 | 25 | .. | .. | .. | .. | .. | .. | 25 | 25 | 25 | 150 |
| | Slack | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | 1913 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Total..... | 1912 | 75 | 25 | 25 | .. | .. | .. | .. | .. | .. | 120 | 205 | 375 | 825 |
| Total..... | 1913 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| Total..... | Slack | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |

MCLEAN COUNTY

| | | | | | | | | | | | | | | |
|-------------------------------|-------|-----|-----|-----|-----|----|----|----|----|-----|-----|-----|-----|-------|
| 32. Bitumina Coal Mine | 1912 | 449 | 220 | 193 | 8 | 6 | 27 | 37 | 51 | 280 | 391 | 580 | 914 | 3,156 |
| | Slack | 650 | 463 | 425 | 59 | 34 | 62 | 99 | 56 | 337 | 860 | 957 | 670 | 4,672 |
| | 1913 | 108 | 77 | 71 | 9 | 6 | 10 | 16 | 9 | 56 | 142 | 159 | 111 | 774 |
| 33. Borchardt Coal Mine | 1912 | 17 | 174 | 191 | 34 | .. | 24 | .. | 17 | 53 | 104 | 191 | 103 | 1,000 |
| | Slack | 184 | 152 | 280 | 10 | .. | 2 | .. | .. | 56 | 162 | 147 | 108 | 1,111 |
| | 1913 | 18 | 15 | 28 | 1 | .. | .. | .. | .. | 5 | 16 | 14 | 10 | 108 |
| 34. Fredrich Coal Mine | 1912 | 100 | 50 | 30 | 20 | .. | .. | .. | .. | .. | 30 | 50 | 100 | 400 |
| | Slack | 10 | 5 | 3 | 2 | .. | .. | .. | .. | 2 | 3 | 5 | 10 | 40 |
| | 1913 | 450 | 400 | 300 | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1,150 |
| 35. Hansen Coal Mine. | 1912 | 585 | 420 | 258 | 147 | 58 | 65 | 37 | 64 | 78 | 268 | 322 | 621 | 2,916 |
| | Slack | 87 | 63 | 38 | 22 | 7 | 9 | 5 | 9 | 13 | 40 | 48 | 93 | 434 |
| | 1913 | 142 | 140 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 36. Hill Coal Mine..... | 1912 | 10 | 10 | .. | .. | .. | .. | .. | .. | .. | 150 | 210 | 300 | 1,013 |
| | Slack | 200 | 205 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| | 1913 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. |
| 37. Johnson Coal Mine | 1912 | 300 | 232 | 121 | 64 | .. | 38 | .. | .. | .. | 350 | 400 | 300 | 1,350 |
| | Slack | 380 | 232 | 121 | 51 | .. | .. | .. | .. | .. | 285 | 326 | 433 | 2,100 |
| | 1913 | 38 | 23 | 12 | 6 | .. | 4 | .. | 5 | 7 | 28 | 32 | 43 | 207 |

| | | | | | | | | | | | |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 39. Ulrich Coal Mine.. | 1912 | 350 | 200 | 11 | 48 | 39 | 103 | 503 | 683 | 289 | 2,626 |
| | 1913 | 30 | 30 | 2 | 2 | 2 | 9 | 42 | 57 | 24 | 221 |
| | Slack | 108 | 163 | 16 | 25 | 15 | 120 | 114 | 206 | 280 | 1,200 |
| 40. Youngquist Coal Mine | 1912 | 100 | 30 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 130 |
| | 1913 | 10 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 410 |
| | Slack | 10 | 2 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 41 |
| Total..... | 1912 | 1,324 | 847 | 51 | 62 | 83 | 453 | 959 | 1,377 | 1,639 | 7,856 |
| Total..... | 1913 | 2,691 | 1,342 | 178 | 226 | 211 | 743 | 2,428 | 2,975 | 2,867 | 16,363 |
| Total..... | Slack | 311 | 178 | 24 | 29 | 26 | 98 | 283 | 338 | 327 | 1,904 |

MORTON COUNTY

| | | | | | | | | | | | |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 41. Feland Coal Mine.. | 1912 | 350 | 272 | 133 | 171 | 200 | 243 | 295 | 330 | 400 | 3,012 |
| | 1913 | 200 | 130 | 74 | 85 | 133 | 145 | 200 | 314 | 260 | 1,826 |
| | Slack | 18 | 10 | 6 | 7 | 11 | 12 | 18 | 25 | 22 | 153 |
| 42. Garfield Coal Mine. | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 43. Hebron Brick Co. Coal Mine..... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 44. New Salem Coal Mine | 1912 | 2,791 | 1,277 | 360 | 562 | 1,174 | 1,641 | 2,330 | 2,459 | 1,598 | 19,499 |
| | 1913 | 2,215 | 1,919 | 643 | 47 | 98 | 1,137 | 2,335 | 2,707 | 1,616 | 11,670 |
| | Slack | 230 | 160 | 45 | 54 | 400 | 300 | 400 | 200 | 700 | 2,450 |
| 45. North Star Coal Mine | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total..... | 1912 | 2,354 | 1,549 | 1,734 | 1,812 | 3,122 | 3,762 | 4,639 | 4,751 | 5,091 | 33,711 |
| Total..... | 1913 | 3,495 | 2,281 | 1,942 | 2,416 | 2,865 | 3,533 | 6,200 | 4,986 | 5,657 | 31,805 |
| Total..... | Slack | 288 | 193 | 196 | 189 | 241 | 314 | 443 | 427 | 304 | 3,293 |

MOUNTRAIL COUNTY

| | | | | | | | | | | | |
|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 46. Blicre Coal Mine.. | 1912 | 45 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 47. Barto Coal Mine... | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total..... | 1912 | 30 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total..... | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total..... | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

Note: No slack production figures available for 1912.

| | | | | | | | | | | | | | | |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|-------------------------|
| 61. White Earth Coal Mine | 1912 1913 Slack | 550 | 300 | 110 | 90 | 60 | 70 | 55 | 65 | 40 | 150 | 450 | 550 | 2,490 |
| Total | 1912 1913 Slack | 1,679 541 48 | 1,501 401 35 | 1,105 69 14 | 790 65 9 | 410 66 6 | 270 100 9 | 155 72 6 | 240 111 10 | 265 176 16 | 632 737 55 | 1,660 1,447 116 | 1,908 1,294 117 | 10,615 6,125 437 |

OLIVER COUNTY

| | | | | | | | | | | | | | | |
|------------------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 62. Flint Coal Mine... | 1912 1913 Slack | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| 63. Meyhoff Coal Mine. | 1912 1913 Slack | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| 64. Pleasant Valley Coal Mine..... | 1912 1913 Slack | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| 65. Spring Valley Coal Mine | 1912 1913 Slack | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| Total | 1912 1913 Slack | 530 344 41 | 390 310 37 | 266 205 24 | 204 96 12 | 206 76 9 | 185 395 40 | 248 144 16 | 187 148 16 | 438 297 31 | 675 663 72 | 1,057 740 53 | 948 130 16 | 5,424 2,563 403 |

RENVILLE COUNTY

| | | | | | | | | | | | | | | |
|------------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 66. Tehelka Coal Mine. | 1912 1913 Slack | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| 67. Wooster Coal Mine. | 1912 1913 Slack | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| Total | 1912 1913 Slack | 160 | 100 | 100 | 40 | 40 ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |
| Total | 1912 1913 Slack | 160 | 100 | 100 | 40 | 40 ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... | ..... ..... ..... |

Note: No slack production figures available for 1912.

STATE OF NORTH DAKOTA

| | | | | | | | | | | |
|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 78. Caflisch Coal Mine. | Slack | 200 | 100 | 100 | 100 | 200 | 200 | 8 | 5 | 10 |
| 1913 | 1913 | 230 | 80 | 30 | 40 | 75 | 125 | 11 | 300 | 2,100 |
| Slack | 1913 | 14 | 4 | 2 | 2 | 4 | 6 | 10 | 200 | 1,500 |
| 79. Christophson Coal Mine | Slack | 50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1913 | 1913 | 12 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack | 1913 | 8 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 80. Colton Coal Mine.. | Slack | 450 | 350 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1913 | 1913 | 308 | 317 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack | 1913 | 77 | 40 | 36 | ..... | ..... | ..... | ..... | ..... | ..... |
| 81. Conan Coal Mine... | Slack | 125 | 100 | 70 | 50 | 50 | 175 | 100 | 100 | 1,000 |
| 1912 | 1913 | 100 | 50 | 25 | 25 | 50 | 100 | 50 | 100 | 700 |
| Slack | 1913 | 10 | 5 | 3 | 3 | 3 | 5 | 10 | 10 | 72 |
| 82. Crosby Coal Mine.. | Slack | 370 | 322 | 102 | 75 | 94 | 135 | 48 | 365 | 2,579 |
| 1912 | 1913 | 614 | 452 | 40 | 40 | 40 | 180 | 40 | 460 | 2,399 |
| Slack | 1913 | 424 | 414 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 83. Davis Coal Mine... | Slack | 71 | 2,000 | 200 | 150 | 100 | 1,800 | 70 | 2,000 | 11,660 |
| 1912 | 1913 | 1,380 | 870 | 80 | 440 | 430 | 780 | 90 | 1,800 | 6,850 |
| Slack | 1913 | 138 | 87 | 8 | 44 | 43 | 90 | 90 | 95 | 681 |
| 84. Des Lacs Coal Mine | Slack | 300 | 175 | 50 | 35 | 45 | 65 | 65 | 400 | 1,500 |
| 1912 | 1913 | 100 | 75 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack | 1913 | 17 | 12 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 85. Diamond Coal Mine | Slack | 275 | 200 | 60 | 50 | 100 | 175 | 100 | 400 | 2,000 |
| 1912 | 1913 | ..... | 120 | 80 | 65 | 180 | 227 | 352 | 167 | 1,891 |
| Slack | 1913 | ..... | 24 | 12 | 13 | 36 | 45 | 70 | 33 | 277 |
| 86. Farmers Lignite Coal Mine..... | Slack | 723 | 395 | 50 | 45 | 110 | 283 | 115 | 551 | 3,237 |
| 1913 | 1913 | 568 | 443 | 107 | 78 | 78 | 80 | 80 | 655 | 2,984 |
| Slack | 1913 | 142 | 111 | 27 | 25 | 19 | 20 | 20 | 25 | 744 |
| 87. Fihely Coal Mine... | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1913 | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 88. Foresythe Coal Mine | Slack | 625 | 450 | 70 | 75 | 450 | 600 | 700 | 725 | 4,500 |
| 1913 | 1913 | 630 | 350 | 85 | 85 | 260 | 450 | 600 | 650 | 4,000 |
| Slack | 1913 | 105 | 60 | 14 | 14 | 43 | 75 | 100 | 108 | 667 |
| 89. Hof Blast Coal Mine | Slack | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1913 | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 90. Hunnewell Coal Mine | Slack | 150 | 100 | 50 | 35 | 40 | 125 | 200 | 250 | 1,200 |
| 1912 | 1913 | 80 | 60 | 10 | ..... | ..... | 60 | 240 | 300 | 800 |
| Slack | 1913 | 8 | 5 | 1 | ..... | ..... | 6 | 24 | 30 | 80 |
| 91. Klondike Coal Mine | Slack | ..... | 83 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 1913 | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Slack | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| 92. Leeson Coal Mine No. 1..... | Slack | 440 | 420 | 50 | 50 | 50 | 100 | 400 | 440 | 2,500 |
| 1912 | 1913 | 300 | 250 | 47 | 30 | 30 | 178 | 320 | 200 | 1,500 |
| Slack | 1913 | 30 | 25 | 4 | 3 | 3 | 8 | 32 | 20 | 151 |
| 93. Leeson Coal Mine No. 2..... | Slack | 500 | 450 | 75 | 40 | 50 | 250 | 350 | 500 | 3,000 |
| 1912 | 1913 | 522 | 436 | 60 | 40 | 34 | 175 | 500 | 400 | 2,503 |
| Slack | 1913 | 25 | 22 | 1 | 0 | 0 | 34 | 25 | 20 | 134 |

Note: No slack production figures available for 1912.

TABLE NO. 7—Cont.

WARD COUNTY—Cont.

| Name of Mine | Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|----------------------------|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| 94. Lloyd Coal Mine... | 1912 | 975 | 750 | 1,000 | 1,050 | 500 | 350 | 500 | 700 | 875 | 800 | 1,100 | 1,400 | 10,000 |
| | 1913 | 1,050 | 700 | 1,480 | 1,230 | 620 | 650 | 680 | 680 | 980 | 1,270 | 1,580 | 1,560 | 11,730 |
| 95. McClure Coal Mine | Slack | 1,175 | 117 | 1,247 | 203 | 108 | 108 | 108 | 113 | 163 | 212 | 265 | 260 | 1,856 |
| | 1912 | 3,000 | 2,170 | 2,000 | 1,900 | 900 | 1,000 | 1,000 | 1,000 | 1,000 | 1,500 | 1,570 | 1,300 | 19,040 |
| 96. Pierce Coal Mine... | 1912 | 2,740 | 2,369 | 2,249 | 1,871 | 1,529 | 1,012 | 1,227 | 1,133 | 991 | 1,536 | 1,779 | 1,215 | 19,651 |
| | 1913 | 540 | 474 | 449 | 374 | 306 | 202 | 245 | 226 | 198 | 307 | 366 | 243 | 3,820 |
| 97. Red Flag Coal Mine | 1912 | 50 | 25 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 75 |
| | 1913 | 5 | 3 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 50 |
| 98. Rich Coal Mine... | 1912 | 100 | 108 | 92 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 100 |
| | 1913 | 5 | 5 | 5 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 5 |
| 99. Smith Dry Coal Mine | 1912 | 550 | 560 | 560 | 540 | 470 | 460 | 470 | 460 | 596 | 708 | 1,158 | 1,309 | 7,841 |
| | 1913 | 973 | 957 | 895 | 382 | 311 | 366 | 403 | 385 | 335 | 1,265 | 1,692 | 1,300 | 8,728 |
| 100. Square Deal Coal Mine | 1912 | 185 | 179 | 139 | 72 | 76 | 62 | 73 | 81 | 67 | 263 | 338 | 260 | 1,745 |
| | 1913 | 65 | 115 | 20 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 122 |
| 101. Strong Coal Mine.. | 1912 | 117 | 121 | 20 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 100 |
| | 1913 | 12 | 12 | 175 | 175 | 76 | 74 | 92 | 128 | 150 | 475 | 330 | 580 | 4,000 |
| 102. Tree-Bausch Coal Mine | 1912 | 725 | 680 | 500 | 120 | 80 | 30 | 40 | 70 | 60 | 235 | 620 | 620 | 3,800 |
| | 1913 | 615 | 580 | 300 | 120 | 6 | 3 | 8 | 5 | 4 | 16 | 41 | 37 | 221 |
| 103. Vadnals Coal Mine | 1912 | 41 | 39 | 20 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 200 |
| | 1913 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 250 |
| 104. Wallace Coal Mine. | 1912 | 48 | 22 | 30 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 190 |
| | 1913 | 200 | 200 | 100 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 440 |
| Total..... | 1912 | 15,015 | 11,505 | 8,641 | 5,521 | 4,074 | 3,009 | 3,470 | 3,862 | 5,387 | 9,514 | 12,676 | 14,217 | 96,891 |
| | 1913 | 13,575 | 10,806 | 8,554 | 4,946 | 3,737 | 2,790 | 4,121 | 4,116 | 4,420 | 8,998 | 13,821 | 12,254 | 92,333 |
| Total..... | Slack | 2,084 | 1,721 | 1,477 | 864 | 660 | 447 | 664 | 687 | 688 | 1,440 | 2,176 | 1,847 | 14,156 |

STATE OF NORTH DAKOTA

WILLIAMS COUNTY

| | | | | | | | | | | | | | | |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 105. Black Diamond Coal Mine..... | 1912 | 824 | 776 | 619 | 1 | 80 | 84 | 78 | 92 | 175 | 405 | 835 | 965 | 5,004 |
| | 1913 | 716 | 724 | 335 | 136 | 150 | 178 | 136 | 156 | 275 | 734 | 750 | 730 | 5,002 |
| Slack | | 72 | 72 | 34 | 13 | 15 | 18 | 14 | 16 | 28 | 70 | 70 | 72 | 502 |
| 106. Bryn Coal Mine.... | 1912 | 45 | 25 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 150 | 270 | 300 | 720 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 15 | 27 | 30 | 720 |
| Slack |  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 12 | 27 | 30 | 720 |
| 107. Brown Coal Mine.. | 1912 | 315 | 305 | 75 | 40 | 25 | 35 | 60 | 80 | 89 | 76 | 373 | 297 | 1,600 |
| | 1913 | 250 | 250 | 125 | 125 | 30 | 30 | 40 | 40 | 60 | 60 | 300 | 220 | 1,150 |
| Slack | | 25 | 25 | 13 | 13 | 3 | 3 | 4 | 4 | 6 | 6 | 30 | 22 | 1,150 |
| 108. Cow Creek Coal Mine | 1912 | 34 | 16 | 20 | 10 | 6 | 10 | 6 | 10 | 13 | 32 | 38 | 30 | 225 |
| | 1913 | 7 | 3 | 4 | 2 | 1 | 2 | 1 | 2 | 3 | 6 | 7 | 6 | 225 |
| Slack |  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 225 |
| 109. Government Coal Mine | 1912 | 532 | 568 | 488 | 444 | 108 | 414 | 444 | 267 | 223 | 485 | 572 | 582 | 1,456 |
| | 1913 | 177 | 189 | 183 | 160 | 408 | 795 | 954 | 283 | 470 | 161 | 190 | 186 | 1,456 |
| Slack | | 407 | 170 | 200 | 14 | 136 | 285 | 318 | 87 | 156 | 161 | 190 | 186 | 1,456 |
| 110. Head Coal Mine.... | 1912 | 225 | 150 | 225 | 14 | ..... | ..... | ..... | ..... | ..... | 100 | 150 | 225 | 1,076 |
| | 1913 | 23 | 15 | 22 | ..... | ..... | ..... | ..... | ..... | ..... | 10 | 15 | 22 | 1,076 |
| Slack |  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,076 |
| 111. Husebye & Ellithorpe Coal Mine | 1912 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 125 | 426 | 750 | 1,301 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 125 | 426 | 750 | 1,301 |
| Slack |  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1,301 |
| 112. Low Level Coal Mine | 1912 | 2,100 | 1,700 | 300 | 225 | 175 | 150 | 150 | 170 | 240 | 1,200 | 3,700 | 2,300 | 12,440 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 12,440 |
| Slack |  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 12,440 |
| 113. Miller Coal Mine.... | 1912 | 130 | 120 | 130 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 480 |
| | 1913 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 480 |
| Slack |  | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 480 |
| 114. Moorman Coal Mine | 1912 | 125 | 100 | 75 | 50 | 10 | ..... | ..... | ..... | ..... | 75 | 100 | 125 | 700 |
| | 1913 | 200 | 225 | 122 | 9 | 10 | 10 | 10 | ..... | ..... | 10 | 200 | 200 | 995 |
| Slack | | 40 | 45 | 22 | 9 | 12 | 1 | 19 | ..... | ..... | 2 | 40 | 40 | 189 |
| 115. Powell Coal Mine.. | 1912 | 415 | 365 | 375 | 175 | 150 | 80 | 70 | 90 | 580 | 750 | 860 | 590 | 4,500 |
| | 1913 | 400 | 320 | 275 | 200 | 40 | 40 | 40 | 60 | 166 | 714 | 810 | 600 | 4,500 |
| Slack | | 40 | 32 | 20 | 20 | 4 | 4 | 5 | 6 | 17 | 72 | 81 | 60 | 3,676 |
| 116. Sharpe Coal Mine. | 1912 | 100 | 100 | 50 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 125 | 200 | 369 |
| | 1913 | 49 | 42 | 15 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 125 | 200 | 369 |
| Slack | | 10 | 8 | 3 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 12 | 34 | 200 |
| Total..... | 1912 | 4,461 | 3,561 | 1,824 | 575 | 538 | 763 | 802 | 699 | 1,357 | 2,876 | 6,143 | 5,067 | 24,486 |
| Total..... | 1913 | 2,406 | 2,395 | 1,608 | 917 | 644 | 1,058 | 1,196 | 528 | 989 | 2,410 | 3,726 | 3,318 | 21,595 |
| Total..... | Slack | 394 | 389 | 232 | 199 | 161 | 293 | 344 | 115 | 211 | 357 | 522 | 532 | 3,809 |

Note: No slack production figures available for 1912.

TABLE NO. 8
ADAMS COUNTY

| Name of Mine | Year | Av. No. Working days | Av. Daily production | Annual production | Value at mine | Value |
|---|------|----------------------|----------------------|-------------------|---------------|-------------|
| 1. Clermont Coal Mine.... | 1912 | 300 | 6.4 | 1,947 | \$1.75 | \$ 3,407.25 |
| | 1913 | 12 | 33.0 | 400 | 1.75 | |
| 2. Farmers Coal Mine..... | 1912 | 114 | 8.7 | 1,009 | 1.35 | 1,362.15 |
| | 1913 | 111 | 12.0 | 1,352 | 1.35 | |
| 3. Haynes Coal Mine..... | 1912 | 300 | 9.9 | 2,994 | 1.75 | 5,239.50 |
| | 1913 | 306 | 13.3 | 4,086 | 1.75 | |
| 4. Stevenson & Gunderson Coal Mine..... | 1912 | 147 | 11.0 | 1,628 | 1.75 | 2,849.00 |
| | 1913 | 300 | 13.1 | 3,942 | 1.62 | |

BILLINGS COUNTY

| | | | | | | |
|---------------------------|------|-----|------|-------|------|-----------|
| 5. De Mores Coal Mine.... | 1912 | 60 | 5.0 | 300 | 1.50 | \$ 450.00 |
| | 1913 | 120 | 5.0 | 600 | 1.50 | |
| 6. High Grade Coal Mine.. | 1912 | | | | | 2,250.00 |
| | 1913 | 39 | 38.0 | 1,500 | 1.50 | |
| 7. Jackson Coal Mine..... | 1912 | 60 | 3.3 | 200 | 1.25 | 250.00 |
| | 1913 | | | | | |

BOWMAN COUNTY

| | | | | | | |
|---------------------------|------|-----|------|-------|--------|--------------|
| 8. Scranton Coal Mine.... | 1912 | 270 | 29.6 | 7,994 | \$1.50 | \$ 11,991.00 |
| | 1913 | 264 | 33.6 | 8,889 | 1.62 | |

BURKE COUNTY

| | | | | | | |
|----------------------------|------|-----|------|-------|--------|-------------|
| 9. Domrese Coal Mine..... | 1912 | 210 | 14.1 | 2,978 | \$1.50 | \$ 4,467.00 |
| | 1913 | 150 | 10.6 | 1,598 | 1.50 | |
| 10. Fenster Coal Mine..... | 1912 | 90 | 8.3 | 754 | 1.50 | 1,131.00 |
| | 1913 | 36 | 7.0 | 250 | 1.50 | |
| 11. Gille Coal Mine..... | 1912 | 210 | 12.0 | 2,534 | 1.30 | 3,294.00 |
| | 1913 | 48 | 20.8 | 1,000 | 1.30 | |
| 12. Greenup Coal Mine..... | 1912 | 150 | 13.2 | 1,988 | 1.50 | 2,902.00 |
| | 1913 | 252 | 26.5 | 6,700 | 1.40 | |
| 13. Hagen Coal Mine..... | 1912 | 15 | 5.3 | 80 | 1.30 | 184.05 |
| | 1913 | 12 | 13.7 | 165 | 1.25 | |
| 14. Mackee Coal Mine.... | 1912 | 45 | 4.4 | 300 | 1.80 | 360.00 |
| | 1913 | 12 | 25.0 | 300 | 1.80 | |
| 15. Souther Coal Mine..... | 1912 | | | | | 525.00 |
| | 1913 | 24 | 14.5 | 350 | 1.50 | |
| 16. Olson Coal Mine..... | 1912 | 168 | 6.0 | 1,000 | 1.50 | 1,500.00 |
| | 1913 | | | | | |
| 17. Vick Coal Mine..... | 1912 | 150 | 16.6 | 2,500 | 1.20 | 3,000.00 |
| | 1913 | 108 | 95.0 | 1,025 | 1.20 | |

BURLEIGH COUNTY

| | | | | | | |
|-----------------------------|------|-----|-------|-----------|--------|------------|
| 1. Anderson Coal Mine.... | 1912 | | | | | \$ 700.00 |
| | 1913 | 48 | 8.3 | 400 | \$1.75 | |
| 19. Asplund Coal Mine.... | 1912 | | | | | 2,380.50 |
| | 1913 | 102 | 15.5 | 1,587 | 1.50 | |
| 20. Backman Coal Mine.... | 1912 | 144 | 5.1 | 762 | 1.50 | 1,143.00 |
| | 1913 | 120 | 6.6 | 793 | 1.50 | |
| 21. Johnson Coal Mine.... | 1912 | 30 | 8.3 | 250 | 1.50 | 375.00 |
| | 1913 | | | 100 | 1.50 | |
| 22. Lind Coal Mine..... | 1912 | 222 | 13.9 | 3,090 | 1.50 | 4,635.00 |
| | 1913 | 130 | 11.1 | 2,000 | 1.50 | |
| 23. Peterson Coal Mine.... | 1912 | 312 | 6.3 | 1,990 | 1.50 | 2,985.00 |
| | 1913 | 270 | 8.9 | 2,411 | 1.50* | |
| 24. Wilton Coal Mine No. 1. | 1912 | 259 | 702.3 | 181,918** | 1.35 | 245,589.30 |
| | 1913 | 183 | 649.1 | 119,117 | 1.35 | |

* Estimated.

** See detail description.

TABLE NO. 8—Cont.

DIVIDE COUNTY

| Name of Mine | Year | Av. No. Working days | Av. Daily production | Annual production | Value at mine | Value |
|----------------------------|------|----------------------|----------------------|-------------------|---------------|--------------|
| 25. Dougherty Coal Mine... | 1912 | 312 | 79.6 | 24,860 | \$1.50 | \$ 37,290.00 |
| | 1913 | 210 | 48.3 | 10,160 | 1.40 | 14,224.00 |
| 26. Houglet Coal Mine..... | 1912 | | | | | |
| | 1913 | 60 | 5.0 | 300 | 1.50 | 450.00 |
| 27. Noonan Coal Mine..... | 1912 | 132 | 11.2 | 1,485 | 1.75 | 2,598.75 |
| | 1913 | 90 | 29.6 | 2,671 | 2.00 | 5,342.00 |
| 28. Truax Coal Mine..... | 1912 | 312 | 59.6 | 18,600 | 2.00 | 37,200.00 |
| | 1913 | 300 | 76.7 | 23,020 | 2.00 | 46,040.00 |

GOLDEN VALLEY COUNTY

| | | | | | | |
|----------------------------|------|----|-----|-----|--------|-----------|
| 29. Corliss Coal Mine..... | 1912 | | | | | |
| | 1913 | 60 | 6.2 | 375 | \$1.50 | \$ 562.50 |
| 30. Kussick Coal Mine..... | 1912 | | | | | |
| | 1913 | 72 | 4.1 | 300 | 1.50 | 450.00 |
| 31. Porter Coal Mine..... | 1912 | | | | | |
| | 1913 | 30 | 5.0 | 150 | 1.50 | 225.00 |

McLEAN COUNTY

| | | | | | | |
|----------------------------|------|-----|------|-------|---------|-------------|
| 32. Bitumina Coal Mine.... | 1912 | 210 | 15.0 | 3,156 | \$1.37½ | \$ 4,339.50 |
| | 1913 | 300 | 15.5 | 4,672 | 1.60 | 7,475.20 |
| 33. Borchart Coal Mine.... | 1912 | 150 | 6.6 | 1,000 | 1.60 | 1,600.00 |
| | 1913 | 180 | 6.1 | 1,111 | 1.60 | 1,777.60 |
| 34. Fredrich Coal Mine.... | 1912 | | | | | |
| | 1913 | 174 | 2.3 | 400 | 1.50 | 600.00 |
| 35. Hansen Coal Mine..... | 1912 | 60 | 19.1 | 1,150 | 1.75 | 2,012.50 |
| | 1913 | 300 | 9.72 | 2,916 | 1.60 | 4,665.60 |
| 36. Hill Coal Mine..... | 1912 | | | | | |
| | 1913 | 150 | 6.7 | 1,013 | 1.50 | 1,519.50 |
| 37. Johnson Coal Mine.... | 1912 | | | | | |
| | 1913 | 126 | 8.0 | 1,016 | 1.50 | 1,524.00 |
| 38. Kunkel Coal Mine..... | 1912 | 132 | 10.2 | 1,350 | 1.50 | 2,025.00 |
| | 1913 | 103 | 19.4 | 2,100 | 1.50 | 3,150.00 |
| 39. Ulrich Coal Mine..... | 1912 | | | | | |
| | 1913 | 216 | 12.1 | 2,625 | 1.50 | 3,937.50 |
| 40. Youngquist Coal Mine.. | 1912 | 126 | 9.5 | 1,200 | 1.60 | 1,920.00 |
| | 1913 | 73 | 5.2 | 410 | 1.60 | 656.00 |

MORTON COUNTY

| | | | | | | |
|-------------------------------------|------|-----|------|--------|--------|-------------|
| 41. Feland Coal Mine..... | 1912 | 150 | 20.0 | 3,012 | \$1.50 | \$ 4,518.00 |
| | 1913 | 120 | 15.2 | 1,826 | 1.50 | 2,739.00 |
| 42. Garfield Coal Mine..... | 1912 | | | | | |
| | 1913 | 108 | 12.7 | 1,375 | 1.20 | 1,650.00 |
| 43. Hebron Brick Co. Coal Mine..... | 1912 | 288 | 40.1 | 11,570 | 1.00 | 11,570.00 |
| | 1913 | 270 | 44.8 | 12,105 | 1.00 | 12,105.00 |
| 44. New Salem Coal Mine.. | 1912 | 240 | 69.4 | 16,679 | 1.75 | 29,188.25 |
| | 1913 | 264 | 73.8 | 19,499 | 1.65 | 32,173.35 |
| 45. North Star Coal Mine... | 1912 | 220 | 11.1 | 2,450 | 1.30 | 3,185.00 |
| | 1913 | 300 | 10.3 | 3,100 | 1.30 | 4,030.00 |

MOUNTRAIL COUNTY

| | | | | | | |
|----------------------------|------|-----|------|-----|--------|-----------|
| 46. Blickre Coal Mine..... | 1912 | 90 | 2.2 | 200 | \$1.20 | \$ 240.00 |
| | 1913 | | | | | |
| 47. Barto Coal Mine..... | 1912 | | | | | |
| | 1913 | 30 | 10.0 | 300 | 1.50 | 450.00 |
| 48. Bowman Coal Mine..... | 1912 | 144 | 4.1 | 450 | 2.00 | 900.00 |
| | 1913 | 50 | 8.3 | 500 | 2.00 | 1,000.00 |
| 49. Elgers Coal Mine..... | 1912 | 120 | 2.5 | 300 | 1.50 | 450.00 |
| | 1913 | 120 | 5.0 | 608 | 1.50 | 912.00 |

TABLE NO. 8—Cont.
MOUNTRAIL COUNTY—Cont.

| Name of Mine | Year | Av. No. Working days | Av. Daily production | Annual production | Value at mine | Value |
|-----------------------------|------|----------------------|----------------------|-------------------|---------------|-----------|
| 50. Hardman Coal Mine.... | 1912 | 120 | 3.3 | 400 | 1.50 | 600.00 |
| | 1913 | 84 | 5.3 | 450 | 1.50 | 675.00 |
| 51. Hefte Coal Mine..... | 1912 | 120 | 4.1 | 500 | 1.50 | 750.00 |
| | 1913 | 60 | 10.2 | 616 | 1.50 | 924.00 |
| 52. John Coal Mine..... | 1912 | 24 | 2.0 | 50 | 1.00 | 50.00 |
| | 1913 | 60 | 3.3 | 200 | 1.50 | 300.00 |
| 53. North Star Coal Mine... | 1912 | 60 | 3.2 | 193 | 1.50 | 289.50 |
| | 1913 | 306 | 19.6 | 6,025 | 2.00 | 12,050.00 |
| 54. Palda Coal Mine..... | 1912 | | | | | |
| | 1913 | 78 | 13.9 | 1,088 | 1.50 | 1,632.00 |
| 55. Porger Coal Mine..... | 1912 | | | | | |
| | 1913 | 36 | 19.4 | 700 | 2.00 | 1,400.00 |
| 56. Rodgers Coal Mine.... | 1912 | 60 | 8 | 50 | 1.50 | 75.00 |
| | 1913 | 36 | 5.2 | 190 | 1.50 | 285.00 |
| 57. Sellar Coal Mine..... | 1912 | 36 | 5.2 | 190 | 2.00 | 380.00 |
| | 1913 | 18 | 5.0 | 90 | 2.00 | 180.00 |
| 58. Stacy Coal Mine..... | 1912 | | | | | |
| | 1913 | 80 | 5.0 | 150 | 1.50 | 225.00 |
| 59. Sunday Coal Mine..... | 1912 | 90 | 27.6 | 2,490 | 1.75 | 4,357.50 |
| | 1913 | | | | | |

OLIVER COUNTY

| | | | | | | |
|-------------------------------|------|-----|------|-------|--------|-----------|
| 62. Flint Coal Mine..... | 1912 | 72 | 4.0 | 293 | \$1.50 | \$ 439.50 |
| | 1913 | 39 | 6.2 | 188 | 1.50 | 282.00 |
| 63. Meyhoff Coal Mine.... | 1912 | | | | | |
| | 1913 | 18 | 8.3 | 150 | 1.50 | 225.00 |
| 64. Pleasant Valley Coal Mine | 1912 | 180 | 11.6 | 2,091 | 1.25 | 2,613.75 |
| | 1913 | 222 | 5.4 | 1,200 | 1.25 | 1,500.00 |
| 65. Spring Valley Coal Mine | 1912 | 264 | 11.5 | 3,050 | 1.00 | 3,050.00 |
| | 1913 | 210 | 9.6 | 2,015 | 1.00 | 2,015.00 |

RENNVILLE COUNTY

| | | | | | | |
|----------------------------|------|-----|-----|-----|--------|-------------|
| 66. Tehelka Coal Mine..... | 1912 | 126 | 6.0 | 760 | \$2.50 | \$ 1,900.00 |
| | 1913 | 42 | 2.9 | 125 | 2.50 | 312.50 |
| 67. Wooster Coal Mine..... | 1912 | | | | | |
| | 1913 | 18 | 4.1 | 75 | 2.50 | 187.50 |

STARK COUNTY

| | | | | | | |
|-----------------------------|------|-----|-------|--------|--------|-------------|
| 68. Gross Coal Mine..... | 1912 | | | | | |
| | 1913 | 72 | 8.3 | 600 | \$1.75 | \$ 1,050.00 |
| 69. Lehigh Coal Mine..... | 1912 | 300 | 120.4 | 36,123 | 1.75 | 63,215.25 |
| | 1913 | 282 | 81.4 | 22,981 | 1.75 | 40,216.75 |
| 70. Pittsburg Coal Mine ... | 1912 | 234 | 41.7 | 9,760 | 1.75 | 17,080.00 |
| | 1913 | 174 | 124.1 | 21,600 | 1.75 | 37,800.00 |
| 71. Wiley Coal Mine..... | 1912 | | | | | |
| | 1913 | 168 | 7.7 | 1,300 | 1.50 | 1,950.00 |
| 72. Zenith Coal Mine..... | 1912 | 216 | 69.6 | 15,050 | 1.75 | 26,337.50 |
| | 1913 | 204 | 60.0 | 12,258 | 1.75 | 21,451.50 |

TABLE NO. 8—Cont.

WARD COUNTY

| Name of Mine | Year | Av. No. Working days | Av. Daily production | Annual production | Value at mine | Value |
|------------------------------------|------|----------------------|----------------------|-------------------|---------------|-------------|
| 73. Baden Coal Mine..... | 1912 | 312 | 4.5 | 1,405 | \$1.75 | \$ 2,458.75 |
| | 1913 | 144 | 6.9 | 1,000 | 1.75 | 1,750.00 |
| 74. Bertelson Coal Mine No. 1 | 1912 | 312 | 11.5 | 3,600 | 2.00 | 7,200.00 |
| | 1913 | 312 | 15.0 | 4,700 | 2.00 | 9,400.00 |
| 75. Bertelson Coal Mine No. 2 | 1912 | 24 | 12.5 | 300 | 2.00 | 600.00 |
| | 1913 | 186 | 16.6 | 3,097 | 2.50 | 7,717.50 |
| 76. Brick Yard Coal Mine... | 1912 | 162 | 17.3 | 2,813 | 2.50 | 7,032.50 |
| | 1913 | 12 | 4.1 | 50 | 2.00 | 100.00 |
| 77. Burlington City Coal Mine..... | 1912 | 312 | 6.7 | 2,100 | 1.50 | 3,150.00 |
| | 1913 | 240 | 6.2 | 1,500 | 1.50 | 2,250.00 |
| 78. Cadisch Coal Mine..... | 1912 | 90 | 2.7 | 250 | 2.00 | 500.00 |
| | 1913 | 156 | 16.6 | 2,600 | 2.00 | 5,200.00 |
| 79. Christophson Coal Mine. | 1912 | 188 | 11.9 | 1,642 | 2.00 | 3,284.00 |
| | 1913 | 188 | 7.2 | 1,000 | 1.50 | 1,500.00 |
| 80. Conan Coal Mine..... | 1912 | 48 | 14.6 | 700 | 1.50 | 1,050.00 |
| | 1913 | 216 | 11.9 | 2,579 | 1.80 | 4,642.20 |
| 81. Crosby Coal Mine..... | 1912 | 312 | 7.3 | 2,299 | 1.80 | 4,138.20 |
| | 1913 | 270 | 43.1 | 11,660 | 1.50* | 17,475.00 |
| 82. Davis Coal Mine..... | 1912 | 276 | 24.6 | 6,805 | 1.50* | 10,207.50 |
| | 1913 | 90 | 16.6 | 1,500 | 2.00 | 3,000.00 |
| 83. Des Lacs Coal Mine..... | 1912 | 86 | 4.1 | 275 | 2.00 | 550.00 |
| | 1913 | 174 | 11.4 | 2,000 | 2.00 | 4,000.00 |
| 84. Diamond Coal Mine..... | 1912 | 114 | 12.2 | 1,891 | 2.00 | 2,782.00 |
| | 1913 | 270 | 11.9 | 3,297 | 1.80 | 5,926.60 |
| 85. Farmers Lignite Coal Mine..... | 1912 | 306 | 9.7 | 2,984 | 1.80 | 5,371.20 |
| | 1913 | 24 | 2.0 | 50 | 1.50 | 75.00 |
| 86. Fihelly Coal Mine..... | 1912 | 186 | 24.1 | 4,500 | 1.75 | 7,875.00 |
| | 1913 | 276 | 14.4 | 4,000 | 1.75 | 7,000.00 |
| 87. Foresythe Coal Mine.... | 1912 | 24 | 2.0 | 50 | 1.75 | 87.50 |
| | 1913 | 182 | 9.1 | 1,200 | 1.75 | 2,100.00 |
| 88. Hot Blast Coal Mine.... | 1912 | 126 | 6.3 | 800 | 1.75 | 1,400.00 |
| | 1913 | 120 | 2.2 | 268 | 2.00 | 536.00 |
| 89. Hunnewell Coal Mine... | 1912 | 86 | 2.8 | 100 | 2.00 | 200.00 |
| | 1913 | 300 | 8.3 | 2,500 | 1.50 | 3,750.00 |
| 90. Klondike Coal Mine..... | 1912 | 300 | 5.0 | 1,500 | 1.50 | 2,250.00 |
| | 1913 | 300 | 10.0 | 3,000 | 1.50 | 4,500.00 |
| 91. Lesson Coal Mine No. 1. | 1912 | 300 | 8.3 | 2,508 | 1.50 | 3,754.50 |
| | 1913 | 300 | 33.3 | 10,000 | 2.00 | 20,000.00 |
| 92. Lesson Coal Mine No. 2. | 1912 | 240 | 48.8 | 11,730 | 2.00 | 23,460.00 |
| | 1913 | 300 | 68.4 | 19,040 | 2.00 | 38,080.00 |
| 93. Lloyd Coal Mine..... | 1912 | 288 | 68.2 | 19,651 | 2.00 | 39,302.00 |
| | 1913 | 24 | 9.3 | 225 | 1.50 | 337.50 |
| 94. McClure Coal Mine..... | 1912 | 84 | 6.4 | 540 | 1.50 | 810.00 |
| | 1913 | 30 | 3.3 | 100 | 2.00 | 200.00 |
| 95. Pierce Coal Mine..... | 1912 | 300 | 26.1 | 7,841 | 2.50 | 19,602.50 |
| | 1913 | 252 | 34.6 | 8,728 | 2.33 | 20,336.24 |
| 96. Rich Coal Mine..... | 1912 | 60 | 5.1 | 310 | 2.25 | 697.50 |
| | 1913 | 144 | 6.2 | 897 | 2.25 | 2,018.25 |
| 97. Smith Dry Coal Mine .. | 1912 | 240 | 16.6 | 4,000 | 1.50 | 6,000.00 |
| | 1913 | 198 | 16.6 | 3,300 | 1.50 | 4,950.00 |
| 98. Square Deal Coal Mine.. | 1912 | 80 | 6.6 | 200 | 1.50 | 300.00 |
| | 1913 | 48 | 9.1 | 440 | 1.50 | 660.00 |
| 99. Strong Coal Mine..... | 1912 | 72 | 2.7 | 200 | 2.00 | 400.00 |
| | 1913 | 84 | 8.6 | 725 | 2.00 | 1,450.00 |
| 100. Tree-Bausch Coal Mine . | 1912 | 258 | 35.1 | 9,074 | 2.00 | 18,148.00 |
| | 1913 | 264 | 38.2 | 10,085 | 2.00 | 20,170.00 |

*Estimated.

TABLE NO. 8—Cont.

WILLIAMS COUNTY

| Name of Mine | Year | Av. No. Working days | Av. Daily production | Annual production | Value at mine | Value |
|------------------------------|------|----------------------|----------------------|-------------------|---------------|-------------|
| 105. Black Diamond Coal Mine | 1912 | 300 | 16.6 | 5,004 | \$1.50 | \$ 7,506.00 |
| | 1913 | 300 | 16.6 | 5,000 | 1.50 | 7,500.00 |
| 106. Bryn Coal Mine..... | 1912 | 96 | 5.2 | 500 | 1.60 | 800.00 |
| | 1913 | 210 | 3.4 | 720 | 1.60 | 1,152.00 |
| 107. Brown Coal Mine..... | 1912 | 120 | 13.3 | 1,600 | 1.60 | 2,560.00 |
| | 1913 | 90 | 17.0 | 1,530 | 1.60 | 2,448.00 |
| 108. Cow Creek Coal Mine... | 1912 | 72 | 3.1 | 225 | 1.80 | 405.00 |
| | 1913 | 126 | 11.5 | 1,456 | 1.50* | 2,184.00 |
| 109. Government Coal Mine . | 1912 | 300 | 21.9 | 6,574 | 1.50* | 9,861.00 |
| | 1913 | 96 | 11.8 | 1,141 | 1.50 | 1,711.50 |
| 110. Head Coal Mine..... | 1912 | 108 | 9.9 | 1,075 | 1.50 | 1,612.50 |
| | 1913 | 72 | 18.0 | 1,301 | 1.75 | 2,276.75 |
| 112. Low Level Coal Mine... | 1912 | 276 | 4.5 | 12,410 | 1.75 | 21,717.50 |
| | 1913 | 96 | 5.0 | 480 | 2.00 | 960.00 |
| 113. Miller Coal Mine..... | 1912 | 90 | 3.3 | 300 | 2.00 | 600.00 |
| | 1913 | 168 | 4.1 | 700 | 1.50 | 1,050.00 |
| 114. Moorman Coal Mine.... | 1912 | 144 | 6.9 | 995 | 1.50 | 1,492.50 |
| | 1913 | 300 | 15.0 | 4,500 | 1.50 | 6,750.00 |
| 115. Powell Coal Mine..... | 1912 | 270 | 13.6 | 3,675 | 1.50 | 5,512.50 |
| | 1913 | 138 | 4.8 | 675 | 1.50 | 1,012.50 |
| 116. Sharpe Coal Mine..... | 1912 | 48 | 4.1 | 200 | 1.50 | 300.00 |
| | 1913 | 48 | 4.1 | 200 | 1.50 | 300.00 |

*Coal is not sold. Estimated market value.

PRODUCTION AND VALUE BY COUNTIES

| County | 1912 | | 1913 | |
|--------------------|---------|--------------|---------|--------------|
| | Output | Value | Output | Value |
| Adams..... | 7,578 | \$ 12,857.90 | 9,780 | \$ 16,061.74 |
| Billings..... | 500 | 700.00 | 2,100 | 3,150.00 |
| Bowman..... | 7,994 | 11,991.00 | 8,889 | 14,400.18 |
| Burke..... | 12,134 | 16,838.20 | 11,388 | 15,953.25 |
| Burleigh..... | 188,010 | 254,727.30 | 126,408 | 171,844.45 |
| Divide..... | 44,945 | 77,088.75 | 36,151 | 66,056.00 |
| Golden Valley..... | | | 825 | 1,237.50 |
| McLean..... | 7,856 | 11,897.00 | 16,263 | 25,305.40 |
| Morton..... | 33,711 | 43,461.25 | 37,905 | 52,697.35 |
| Mountrail..... | 10,615 | 19,722.50 | 5,125 | 13,000.00 |
| Oliver..... | 5,434 | 6,103.25 | 3,553 | 4,022.00 |
| Renville..... | 760 | 1,900.00 | 200 | 500.00 |
| Stark..... | 60,933 | 106,632.75 | 58,739 | 102,468.25 |
| Ward..... | 96,891 | 180,158.45 | 92,133 | 177,476.39 |
| Williams..... | 24,456 | 46,251.50 | 21,595 | 54,377.75 |
| Total..... | 501,827 | \$795,329.85 | 431,054 | \$719,050.26 |

LIST OF MINES THAT SHIP COAL
ADAMS COUNTY

| Name of Mine. | Tonnage Shipped |
|---|-----------------|
| 3. Haynes Coal Mine..... | 369 |
| 4. Stevenson & Gunderson Coal Mine..... | 1,953 |
| BILLINGS COUNTY | |
| 6. High Grade Coal Mine..... | 1,500 |
| BOWMAN COUNTY | |
| 8. Scranton Coal Mine..... | 4,002 |
| BURKE COUNTY | |
| 10. Fenster Coal Mine..... | 100 |
| 11. Gille Coal Mine..... | 300 |
| 12. Greenup Coal Mine..... | 2,500 |
| 15. Souther Coal Mine..... | 300 |
| 17. Vick Coal Mine..... | 900 |
| BURLEIGH COUNTY | |
| 24. Wilton Coal Mine No. 1..... | 113,423 |
| DIVIDE COUNTY | |
| 27. Noonan Coal Mine..... | 2,507 |
| 28. Truax Coal Mine..... | 22,000 |
| McLEAN COUNTY | |
| 32. Bitumina Coal Mine..... | 676 |
| MORTON COUNTY | |
| 42. Garfield Coal Mine..... | 1,374 |
| 44. New Salem Coal Mine..... | 16,105 |
| STARK COUNTY | |
| 69. Lehigh Coal Mine..... | 20,000 |
| 70. Pittsburg Coal Mine..... | 18,000 |
| 71. Willey Coal Mine..... | 1,300 |
| 72. Zenith Coal Mine..... | 11,008 |
| WARD COUNTY | |
| 76. Brick Yard Coal Mine..... | 1,991 |
| 80. Colton Coal Mine..... | 148 |
| 83. Davis Coal Mine..... | 4,220 |
| 94. Lloyd Coal Mine..... | 10,760 |
| 95. McClure Coal Mine..... | 17,020 |
| 99. Smith Dry Coal Mine..... | 4,574 |
| 104. Wallace Coal Mine..... | 10,085 |
| WILLIAMS COUNTY | |
| 105. Black Diamond Coal Mine..... | 1,000 |
| 106. Bryn Coal Mine..... | 200 |
| 111. Husebye & Ellithorpe..... | 208 |
| Total..... | 268,523 |

LIST OF CHANGES IN NAMES OF MINES

DIVIDE COUNTY

| Name 1910-1911 | Owner | Name 1912-1913 | Owner |
|------------------------|-----------------|---------------------------|----------------------|
| Evanson Coal Mine..... | Ed Evanson..... | 27. Noonan Coal Mine..... | McDonald & Loubeski. |

STARK COUNTY

| | | | |
|-----------------------|------------------------|------------------------------|-----------------|
| Pelton Coal Mine..... | Mrs. M. McGillory..... | 70. Pittsburg Coal Mine..... | Dakota Fuel Co. |
|-----------------------|------------------------|------------------------------|-----------------|

WARD COUNTY

| | | | |
|------------------------|--------------------|---------------------------------|----------------|
| Spencer Coal Mine..... | Wm. Spencer..... | 91. Klondike Coal Mine..... | Wm. Spencer. |
| Hodgson Coal Mine..... | Steve Hodgson..... | 100. Square Deal Coal Mine..... | Steve Hodgson. |

WILLIAMS COUNTY

| | | | |
|--------------------------------|-----------------|----------------------------|-------------|
| Williston Lignite Coal Co..... | Ray Powell..... | 115. Powell Coal Mine..... | Ray Powell. |
|--------------------------------|-----------------|----------------------------|-------------|

LIST OF MINES OPERATING IN 1910-1911 AND CLOSED IN 1912-1913

ADAMS COUNTY

| Name of Mine | Owner | Lessee | Post Office | Location | | |
|------------------------------|-----------------|-------------------------|-------------|---------------------------------------|------|------|
| | | | | Subdiv. | Sec. | Twp. |
| Monroe & Krepper Coal Mine.. | State Land..... | Erickson & Wagoner..... | Haynes..... | SE $\frac{1}{4}$ SE $\frac{1}{4}$... | 16 | 129 |
| | | | | | | 94 |

BURKE COUNTY

| | | | | | | |
|-------------------------|--------------------|--|-------------|--------------------------------------|----|-----|
| Anderson Coal Mine..... | Nels Anderson..... | | Stampe..... | NW $\frac{1}{4}$ NW $\frac{1}{4}$.. | 26 | 162 |
| | | | | | | 94 |

BURLEIGH COUNTY

| | | | | | | |
|------------------------|---------------------|-------------------------|-------------|---------------------|----|-----|
| Coleman Coal Mine..... | Victor Coalman..... | | Wilton..... | NW $\frac{1}{4}$.. | 18 | 142 |
| Eckman Coal Mine..... | Oscar Eckman..... | Oscar Eckman 1910..... | Wilton..... | SE $\frac{1}{4}$.. | 8 | 142 |
| | | J. H. Daniels 1911..... | | | | 79 |

GOLDEN VALLEY COUNTY

| | | | | | | |
|---------------------|-----------------|----------------------|---------------------|--|---|-----|
| Rohl Coal Mine..... | Allen Rohl..... | Franzen & Brown..... | Sentinel Butte..... | | 8 | 189 |
| | | | | | | 104 |

McLEAN COUNTY

| | | | | | | |
|-----------------------------|-------------------|--------------------------|------------------|---------------------|----|-----|
| H. H. Hansen Coal Mine..... | H. H. Hansen..... | C. Mintz & J. Mintz..... | Turtle Lake..... | SE $\frac{1}{4}$.. | 84 | 147 |
| Quisel Coal Mine..... | C. K. Quisel..... | G. Burns..... | Underwood..... | NE $\frac{1}{4}$.. | 84 | 146 |
| | | | | | | 81 |
| | | | | | | 82 |

LIST OF MINES OPERATING IN 1910-1911 AND CLOSED IN 1912-1913—Cont.

MOUNTRAIL COUNTY

| | | | | | | |
|-------------------------|--------------------|------------------|---|----|-----|----|
| Common Coal Mine..... | Government..... | White Earth..... | NW $\frac{1}{4}$ SE $\frac{1}{4}$ | 23 | 156 | 94 |
| Hoepple Coal Mine..... | Henry Hoepple..... | Epworth..... | SW $\frac{1}{4}$ SE $\frac{1}{4}$ | 21 | 163 | 96 |
| Moore Coal Mine..... | Government..... | White Earth..... | SW $\frac{1}{4}$ NE $\frac{1}{4}$ | 7 | 157 | 94 |
| Peerless Coal Mine..... | Government..... | Paerno..... | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 12 | 154 | 88 |
| Setra Coal Mine..... | C. A. Setra..... | Epworth..... | NW $\frac{1}{4}$ SW $\frac{1}{4}$ | 17 | 163 | 89 |

OLIVER COUNTY

| | | | | | | |
|------------------------|-------------------|-------------|--|--|--|--|
| Anstadt Coal Mine..... | N. D. Garten..... | Center..... | | | | |
| | John Anstadt..... | | | | | |

RENVILLE COUNTY

| | | | | | | |
|-----------------------|------------------------|-----------------|---|----|-----|----|
| Jewell Coal Mine..... | Gus Wahl..... | Donnybrook..... | NW $\frac{1}{4}$ SW $\frac{1}{4}$ | 29 | 168 | 86 |
| | St. John & Bailey..... | | | | | |

WARD COUNTY

| | | | | | | |
|----------------------------|------------------------|-----------------|---|----|-----|----|
| Hart Coal Mine..... | Harry Hart Estate..... | Kenmare..... | Lot 3..... | 20 | 160 | 88 |
| Ingeson Coal Mine..... | J. W. Ingeson..... | Kenmare..... | Lot 3..... | 30 | 161 | 88 |
| Knorr Coal Mine..... | G. J. Knorr..... | Sawyer..... | SE $\frac{1}{4}$ NE $\frac{1}{4}$ | 30 | 152 | 88 |
| Scotty Coal Mine..... | Andrew Barrie..... | Burlington..... | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | 1 | 156 | 84 |
| Westergaard Coal Mine..... | O. R. Westergaard..... | Kenmare..... | NE $\frac{1}{4}$ SW $\frac{1}{4}$ | 32 | 161 | 88 |

FATAL ACCIDENTS
ADAMS COUNTY

| Name of Mine | Name of Employee | Address | Married or Single | Cause | Date |
|-----------------|------------------|---------|-------------------|-------------|----------------|
| Leff Coal Mine* | Charles Adkin | Reeder | | Caving Clay | Feb. 26, 1918. |
| Leff Coal Mine* | James Dahl | Reeder | | Caving Clay | Feb. 26, 1918. |

BURLEIGH COUNTY

| | | | | | |
|--------------------|---------------|--------|---------|---|----------------|
| Peterson Coal Mine | Virgil Monroe | Wilton | Single | Blast going through a pillar | Oct. 23, 1918. |
| Wilton Coal Mine | Alec Kanakt | Wilton | Married | Presumably fell from car while driving and run over by car. | Nov. 19, 1918. |

McLEAN COUNTY

| | | | | | |
|----------------|-------------|--|--|-------------------------|--|
| Hill Coal Mine | Mike Cowley | | | Crushed by falling roof | |
|----------------|-------------|--|--|-------------------------|--|

WILLIAMS COUNTY

| | | | | | |
|---------------------|------------|---------------|---------|---------------------------------------|----------------|
| Low Level Coal Mine | W. F. Hall | Ashton, S. D. | Married | Crushed between side of entry and car | Jan. 27, 1918. |
|---------------------|------------|---------------|---------|---------------------------------------|----------------|

MERCER COUNTY

| | | | | | |
|------------------|-------------|------------------|--|--------------|-----------------|
| Davis Coal Mine* | Wm. O'Brien | Berkenhead, Eng. | | Falling roof | Sept. 19, 1918. |
|------------------|-------------|------------------|--|--------------|-----------------|

No other data concerning these mines has been obtained.

TABLE OF NON-FATAL ACCIDENTS FOR 1912

BURLEIGH COUNTY

| Name of Mine | Name of Injured | Address | Married or Single | Cause | Extent of Injury | Date of Accident |
|------------------------------|-----------------------|-------------|-------------------|--|--|----------------------|
| 20. Backman Coal Mine..... | Victor Engstrom..... | Wilton..... | | Falling roof..... | Big toe hurt. | Jan. 14. |
| 24. Wilton Coal Mine No. 1.. | Wm. Vaughn..... | Wilton..... | | Entry car ran over toes.... | Nails taken off | |
| 24. Wilton Coal Mine N. 1.. | James Heaton..... | | | Foot caught in rails and car ran over it. | Foot badly strained | Jan. 16. |
| 24. Wilton Coal Mine No. 1.. | Roy Kraup..... | | | Box containing steam pipe broke. | Scalded about ankles. | Jan. 17. |
| 24. Wilton Coal Mine No. 1.. | Carl Falgren..... | | | Slipped off ladder when go- ing to turn off valve. | Scalded about ankle. | Jan. 19. |
| 24. Wilton Coal Mine No. 1.. | Willis Hollingsworth. | | | Slipped off one car and sec- ond motor ran on him. | Sprained ankle | Mar. 31. |
| 24. Wilton Coal Mine No. 1.. | Joe Kettichuck..... | | | Opening door of combustion chamber. | Scalded about legs. | Aug. 16. |
| 24. Wilton Coal Mine No. 1.. | Joe Pitwanekos.... | | | Car jumping off at switch | Arm fractured | Sept. 20. |
| 24. Wilton Coal Mine No. 1.. | John Paulka..... | | | Falling coal..... | Leg broken be- tween knees and ankle. | Sept. 25. Dec. 4. |
| 24. Wilton Coal Mine No. 1.. | Richard Tuenge..... | | | After making shot piece of coal glanced off and hit him. | Knee bruised. | |
| 24. Wilton Coal Mine No. 1.. | E. E. Swan..... | | | Was opening side of a gon- dola car assisting another man who let go and it fell back and hit Swan. | Bone in hand and one fin- ger broken. | Dec. 16. |
| 24. Wilton Coal Mine No. 1.. | Kozmney Pastushenke | | | Climbing on front of rack when mules started and he fell and wheels ran over his legs. | Muscles be- tween knee and ankle badly strained. | Nov. 12. |

DIVIDE COUNTY

| | | | | | | |
|--------------------------|-------------------|--|--|------------------------------|------------------------------|----------|
| 28. Truax Coal Mine..... | Axel Calberg..... | | | Shot broke through young rib | Skull slightly fractured. | Feb. 11. |
| 28. Truax Coal Mine..... | Wm. Dominick..... | | | Entry shot..... | Broken leg.... | Dec. 16. |

TABLE OF NON-FATAL ACCIDENTS FOR 1912—Cont.

WARD COUNTY

| Name of Mine | Name of Injured | Address | Married or Single | Cause | Extent of Injury | Date of Accident |
|---------------------------|------------------|---------|-------------------|--|------------------|------------------|
| 82. Crosby Coal Mine..... | George Vird..... | | | Shot went back on him and he was trying to run needle in when it went off. | Bruised..... | Dec. 12. |

TABLE OF NON-FATAL ACCIDENTS FOR 1913
BURLEIGH COUNTY

| Name of Mine | Name of Injured | Address | Married or Single | Cause | Extent of Injury | Date of Accident |
|----------------------------|------------------|---------|-------------------|--|--|------------------|
| 23. Peterson Coal Mine | Fred Anstrom | Wilton | Single | Mine timber dropped | Ribs broken | Oct. 8. |
| 24. Wilton Coal Mine No. 1 | Harry Peters | Wilton | Single | Thawing frozen water pipe with steam hose. | Toe on right foot broken. | Jan. 9. |
| 24. Wilton Coal Mine No. 1 | Roy Krouph | Wilton | Single | Box car apron fell during unloading. | Hands scalded and burned. | Jan. 12. |
| 24. Wilton Coal Mine No. 1 | Carl L. Hilton | Wilton | Single | | End of little finger on left hand mashed | Jan. 20. |
| 24. Wilton Coal Mine No. 1 | Chas. Pollock | Wilton | Single | Coal falling from tippie | Head cut | Jan. 31. |
| 24. Wilton Coal Mine No. 1 | Anton Koliski | Wilton | Married | Trying to uncouple empty car from passing trip and got squeezed between car and rib. | Both arms fractured and several ribs broken. | Mar. 25. |
| 24. Wilton Coal Mine No. 1 | Sebastian Doeyto | Wilton | Single | Piling coal on mine car which started and ran over his foot. | Toe on left foot bruised. | Apr. 10. |
| 24. Wilton Coal Mine No. 1 | Carl Johnson | Wilton | Married | Slipped on board | Right ankle sprained. | Apr. 15. |
| 24. Wilton Coal Mine No. 1 | Adam Deptota | Wilton | Single | Was fixing fire in power house when grate fell down and threw fire on him. | Skin on right cheek and shoulder and burned. | Apr. 25. |

| | | | | | | | |
|-----|--------------------------|---------------------|-------------|------------|---|---|-----------|
| 24. | Wilton Coal Mine No. 1.. | Thos. Torgeson.... | Wilton..... | Married.. | When taking plate off of blow off cross and plate fell down and hot water came out and scalded him. | Right leg scalded from knee to ankle. | July 24. |
| 24. | Wilton Coal Mine No. 1.. | Robt. Neely..... | Wilton..... | Married.. | Trimming piece of timber when adze struck knot and glanced off, hitting him. | Inside of right ankle cut to bone. | Aug. 8. |
| 24. | Wilton Coal Mine No. 1.. | Roger Manley..... | Wilton..... | Single.... | Was coupling string of empties to motor when another string struck cars he was coupling and squeezed him. | Right leg bruised between knee and ankle and right arm hurt at elbow joint. | Aug. 13. |
| 24. | Wilton Coal Mine No. 1.. | Adam Kraft..... | Wilton..... | Single.... | Digging bottom coal with pick which struck side of room and struck his foot. | Pick entered left foot and cut top of foot between ankle and toes. | Aug. 16. |
| 24. | Wilton Coal Mine No. 1.. | Dan Edwards..... | Wilton..... | Single.... | Breaking new mule and end of whip flew off foreman's whip and hit Edwards in eye. | Eyeball cut and sight probably lost in right eye. | Aug. 30. |
| 24. | Wilton Coal Mine No. 1.. | John Hyretzki..... | Wilton..... | Married.. | Got his foot under wheel of loaded mine car on tipple. | Foot slightly bruised. | Sept. 7. |
| 24. | Wilton Coal Mine No. 1.. | Mike Doneluke..... | Wilton..... | Married.. | Lump of coal fell..... | Toes on left foot injured. | Sept. 22. |
| 24. | Wilton Coal Mine No. 1.. | Joe Popson..... | Wilton..... | Single.... | Mule kicked him..... | Bruised in thigh. | Oct. 6. |
| 24. | Wilton Coal Mine No. 1.. | Chas. Pollock..... | Wilton..... | Single.... | When digging coal a chunk flew up and hit him in eye. | Eye slightly injured. | Oct. 8. |
| 24. | Wilton Coal Mine No. 1.. | Joe Kettichuck..... | Wilton..... | Single.... | Fire shot out of fire box when throwing in coal. | Face and neck slightly burned. | Oct. 19. |
| 24. | Wilton Coal Mine No. 1.. | Pete Bodner..... | Wilton..... | Married.. | Got caught on rope on drum of car pulper engine. | Two fingers on left hand bruised. | Oct. 19. |
| 24. | Wilton Coal Mine No. 1.. | Wm. Wilson..... | Wilton..... | Single.... | Machine jack fell off of cutting machine on his foot. | Little toe on left foot broken. | Nov. 6. |
| 24. | Wilton Coal Mine No. 1.. | Wm. Nobbe..... | Wilton..... | Married.. | Made shot and went to test roof when coal fell down and hit him. | Skin on top of head cut. | Nov. 20. |

TABLE OF NON-FATAL ACCIDENTS FOR 1913—Cont.
BURLEIGH COUNTY—Cont.

| Name of Mine | Name of Injured | Address | Married or Single | Cause | Extent of Injury | Date of Accident |
|--------------------------------------|------------------|------------|-------------------|--|--|------------------|
| 24. Wilton Coal Mine No. 1. | Mike Smith. | Wilton. | Single. | Loaded car jumped track and got on his foot. | Toes on right foot badly bruised. | Dec. 17. |
| 24. Wilton Coal Mine No. 1. | Joe Mike. | Wilton. | Single. | Straightening wire on ex-ploder; had candle near and ran hand with ex-ploder in it over candle flame, which exploded it. | Thumb and fingers on left hand shot off. | Dec. 17. |
| 24. Wilton Coal Mine No. 1. | Roy Krouph. | Wilton. | Single. | Threw chunk of coal in fire box and fire flew out. | Left side of face and neck burned. | Dec. 18. |
| DIVIDE COUNTY | | | | | | |
| 28. Truax Coal Mine. | H. Myen. | Kenmare. | Single. | | Broken leg. | |
| STARK COUNTY | | | | | | |
| 70. Pittsburg Coal Mine. | Stanley Gunther. | Lehigh. | Single. | Bumped by box car. | Jaw broken. | |
| 70. Pittsburg Coal Mine. | Alex Archkok. | Lehigh. | Married. | Short fuse. | Face burned and bruised. | |
| 70. Pittsburg Coal Mine. | Jos. Jurch. | Lehigh. | Single. | Short fuse. | Face burned. | |
| WARD COUNTY | | | | | | |
| 99. Smith Dry Coal Mine. | Joe Avott. | Kenmare. | Married. | Careless. | Broken wrist. | Oct. 25. |
| 99. Smith Dry Coal Mine. | W. C. Zeitz. | Kenmare. | Single. | Careless. | Bruised. | Nov. 29. |
| WILLIAMS COUNTY | | | | | | |
| 109. Government Coal Mine. | Chas. Burehard. | Williston. | Single. | Car left track. | Bruised arm and shoulder. | July 25. |
| 110. Husebye & Ellithorpe Coal Mine. | Clifford Head. | Williston. | Single. | Explosion. | Burned. | Jan. 14. |
| 111. Husebye & Ellithorpe Coal Mine. | L. Hagenston. | Williston. | Single. | Explosion. | Burned. | Oct. 5. |
| 111. Husebye & Ellithorpe Coal Mine. | John Enga. | Williston. | Single. | Explosion. | Burned. | Oct. 6. |

Detail Coal Mine Data

ADAMS COUNTY

1. Clermont Coal Mine

The Clermont Coal Mine is owned and operated by the Clermont Coal Company of Haynes, A. W. Peterson being the superintendent in active charge of the workings. Mr. Peterson formerly operated a mine on a school section, but when the lease expired in the spring of 1912, a new mine was opened on an adjoining section.

As the coal is approximately 16 feet thick, little timbering is necessary and so far none has been done except in the slope, where three-piece sets were placed on four foot centers.

A tipple having a storage capacity of twenty loaded cars and arranged to hold some coal in the chute was not completed.

Well water is struck at a depth of about 100 feet and it is not known whether or not it is fit for steam purposes.

2. Farmers Coal Mine

This mine is owned and operated by an association, chiefly for the benefit of its members, coal being sold to them at about cost. F. H. Due has general supervision of the mine, while J. W. Robinson has charge of the underground operations. The tipple has a small storage capacity. The coal when dumped passes over a screen which removes most of the slack from the coal. Most of the coal is sold locally.

Practically no timbering has been done except in the slope before the coal bed is reached. Occasional props are placed in the rooms. Water in the vicinity is struck at approximately 60 feet and has not been tested locally for steam purposes.

The mine buildings consist of a scale house, bunk house and stable.

The company is incorporated under the laws of North Dakota, with a capitalization of \$18,000; \$3,000 has been invested in surface equipment and \$250 in tracks and cars.

On November 2, 1913 when this mine was inspected, conditions were not entirely satisfactory, due chiefly to the fact that no regular system of mining has been adopted and the entries are not driven straight and the rooms are irregular in width and length.

3. Haynes Coal Mine

This mine is owned and operated by W. H. Brown of Chicago and J. B. Slosson of Bismarck. Geo. H. Gantvoort is the superintendent and James Thies acts in the capacity of pit boss. No timbering is done except in the slope, and occasional props in the rooms, the coal roof making the mine safe. The tippie provides for but little storage and is the end rocker dump kind. Water is struck at a depth of 125 feet and is reported as being fit for steam. The mine buildings consist of house, office, barn and tunnel shed.

On November 2, 1913, when this mine was inspected it was found to be in a safe condition.

4. Stevenson & Gunderson Coal Mine

This mine is owned and operated by Stevenson & Gunderson. The thickness of the coal makes it necessary to do but little timbering except in the slope, only occasional props being set, as the conditions of the roof require. A tippie having a storage capacity sufficient for the requirements of the mine, and equipped with an exceptionally good screen, is in use. The mine cars are made by the operators at the mine, and are exceptionally well made and serviceable. The chute stores about five tons of coal. About half of the output is sold locally and half is shipped. The mine buildings consist of a boarding house, bunk house, scale house and barn. The mine is dry. Water is struck at a depth of about 80 feet, but it is not known whether it is fit for steam. Powder is bought in 25 keg lots and is safely stored, the miners being allowed to take one keg at a time into the mine.

On November 2, 1913, when this mine was inspected, it was found to be in a safe condition.

BILLINGS COUNTY

5. De Mores Coal Mine

The De Mores Coal Mine is owned by the Northern Pacific Refrigerator Car Company and has been leased for the past few years by H. G. Kinmarck of Medora, who operates the mine in a small way and supplies chiefly local trade. The coal is about eight feet thick and from one to two feet are left for a roof. Little timbering is required, railroad ties being used chiefly. A small hand dump tippie dumps directly into wagons or sleighs. Mr. Kinmarck keeps the mine in a safe condition, and on November 7, 1913, conditions were satisfactory.

6. High Grade Coal Mine

The High Grade Coal Mine is owned and operated by N. D. Nichols. The mine is located on the southeast side of a large hill, the coal bed being reached by a drift through scoria and clay. The mine is situated so that a tippie has been built which permits the dumping of mine cars directly into freight cars on a siding. The mine is dry, and very little timbering is necessary, a double row of props and caps being used in the rooms.

On the other side of the hill the coal bed is known to be on fire. Mr. Nichols has previously tried to drive a drift through the scoria and past

the fire, but has been unable to do so. One drift was driven below the coal bed and an attempt was made to reach the coal by stoping up, but this method also failed. Entering the tunnels, as one may approach the face of the coal, the heat is very noticeable and the fumes from the burning coal charge the air. Mr. Nichols makes use of one of these tunnels for the purpose of storing his dynamite, which is placed a short distance in the tunnel, just past the freezing line. A satisfactory double entry system has been adopted and good ventilation is furnished by an air shaft.

On February 27, 1914, when the mine was visited, conditions were found to be first class.

7. Jackson Coal Mine

This mine is located on land said to be controlled by Mr. Jackson. Coal is found here at a depth of from two to four feet, and it is operated as a surface mine. The coal bed is about nine feet thick, the top two feet being too soft to be saleable, and the bottom two feet being in water. The mine has not proved very profitable and was abandoned by Mr. Jackson in the winter of 1912-1913.

On November 3, 1913, I found the mine open and farmers helping themselves to coal. No one was leasing the mine or in charge of it.

BOWMAN COUNTY

8. Scranton Coal Mine

The Scranton Coal Mine was formerly owned and operated by the Consolidated Coal Company, but was bought by the Scranton Coal Company in 1912. Chas. A. Liddell has active charge of the mining operations. The mine is situated in the town of Scranton, and a spur of the Milwaukee permits the loading of freight cars directly from the tipple. Little timbering other than a row of props is necessary except in the slope. Powder is purchased in 10 ton lots and stored in a suitable powder house, located at a safe distance. Miners are permitted to take one keg of powder and 10 sticks of dynamite into the mine at a time. The blasting is done between eleven and twelve in the forenoon and after five in the afternoon. The mine buildings consist of an office, hotel, blacksmith shop, granary, two dwellings and a stable.

The company is incorporated under the laws of North Dakota, with a capitalization of \$50,000. Approximately \$5,000 is invested in surface equipment, while \$2,000 has been put into the underground equipment.

BURKE COUNTY

9. Domrese Coal Mine

The Domrese Coal Mine is owned and operated by H. J. Domrese. Where the mine is now worked there is nine feet of coal, underlying from 10 to 15 feet of clay which is removed by teams and scrapers. There is a considerable amount of water, which is kept down by a windmill and pump and a gasoline engine driven centrifugal pump. Wells

in this vicinity are from 30 to 50 feet in depth and so far as could be learned it is not known whether or not the water is fit for boiler use.

On March 11, 1914, the engine was broken down and the pit nearly filled with water.

10. Fenster Coal Mine

This small mine is situated about five miles west of Larson and is owned and operated by the Fenster Brothers. This mine is worked largely as a surface mine, although during the winter time a small underground working is operated. This is reached by a steep slope which has practically no timbering, and after the coal is reached no particular system of mining is followed. The ventilation is very poor.

On March 11, 1914, the mine was not satisfactorily timbered in the entry and no system of mining was being followed.

11. Gille Coal Mine

The Gille Coal Mine is a small surface mine operating in a bed of coal about 10 feet thick, the upper three feet of which is largely slack which can be loosened with a plow and scraped off. From nine to 25 feet of overlying clay is removed by teams during the summer. When the amount of coal that has been stripped during the summer months proves insufficient to supply the demand for coal, rooms are worked out under the clay. These are generally driven from 15 to 20 feet in width and the sleighs are backed up in them to the face, where they are loaded. These rooms cave during the summer.

12. Greenup Coal Mine

The Greenup Coal Mine has been acquired by Zimdas Bros. & Kielhock. The mine is located in a shallow coulee and has been worked largely as a surface mine, but as the overburden which had to be removed increased in depth, it was found advisable to start working underground, and in 1912 a drift was driven from the pit. A tippie was built, up which cars were hauled by means of a team and cable. This was high enough to permit dumping the coal over screens to separate the slack and let the coal directly into wagons or sleighs. A windmill was used to drain the underground works, and in 1913 surface operations were again resumed and two gasoline engines and a centrifugal pump were installed to keep the pits clear of water. The water is quite abundant, although it is not known whether it could be used for steam purposes or not. Ventilation of the underground mine is fair, although on March 11, 1914 it had not been in operation for some time and the main entry was partially filled in one place by a cave-in. It is not expected that the mine will be operated as other than a surface mine for some time.

13. Hagen Coal Mine

This mine is owned and operated by Even Hagen and is one of the smaller mines in Burke County. The coal is about six feet in thickness and is all mined. Considerable timbering has to be done in order to hold the clay roof. The cars are hauled up the slope by hand, a block and tackle being used. On March 11, 1914, the mine was found to be partially filled with water and in poor condition.

14. Mackee Coal Mine

The Mackee Coal Mine is situated within a few feet of the Canadian boundary, and has been in operation for a number of years. The tippie has a storage capacity of eight cars, which are dumped over a screen into wagons. As the coal is all mined, a great deal of timbering has been necessary in order to make the roof safe. The entry has been lagged throughout with cedar posts, shipped largely from Minnesota. Water is found at a depth of about 18 feet and is said to be fit for steam purposes. Powder is bought in 100-pound lots and stored in a convenient building. Ventilation is secured by an air shaft.

Mr. F. G. Ruffcorn, who has run this mine for a number of years, died in 1913, and the mine is being operated by the administrators of the estate, who intend to put it in first class condition.

15. Souther Coal Mine

This mine is owned and operated by J. P. Souther. The coal bed is about nine feet thick, seven feet of which is mined. The coal is delivered at the surface by means of horse-power. Operations were begun late in 1913, and on March 11, 1914, a little timbering had been done. The ventilation, secured by means of a small air shaft, is not sufficient. If this mine is operated longer, a larger air shaft should be provided and the entry should be more substantially timbered.

16. Olson Coal Mine

The Olson Coal Mine was opened in 1911 and operated until the summer of 1912. As the coal occurs at a depth of from six to ten feet, it was operated as a surface mine. In the summer of 1912 the mine was abandoned on account of water. The coal bed dipping toward a hill and the overburden getting thicker and the water becoming deeper soon rendered the mine unprofitable.

17. Vick Coal Mine

The Vick Coal Mine is a surface mine, operating in a bed of coal about eight feet in thickness. The overburden being but six feet to ten feet in depth, it is stripped. There is a good deal of water, which is removed by a 3½-horse power gasoline engine and a centrifugal pump. Most of the coal mined is shipped.

BURLEIGH COUNTY**18. Anderson Coal Mine**

The Anderson Coal Mine is a new mine owned and operated by B. L. Anderson. It is located on a seven-foot bed of coal, occurring at a depth of 40 feet. An insufficient amount of timbering has been done, and on March 23, 1914, no means of ventilation had been provided. An air shaft should be installed before the work of another season is begun, and the slope should be more securely timbered.

19. Asplund Coal Mine

The Asplund Coal Mine is owned and operated by William Asplund. The mine is located 10 miles southeast of Wilton and the coal bed is

seven feet thick, the overburden being about 40 feet in depth. The mine was opened in the winter of 1913 and is comparatively new. There are no tipple arrangements, the coal being loaded from the mine cars into wagons. There are no regulations concerning the use of powder, other than that the miners shoot at noon and at five o'clock. The mine buildings consist of a bunk house and a barn.

On March 23, 1914, conditions in and about the mine were found to be quite satisfactory.

20. Backman Coal Mine

The Backman Coal Mine is owned and operated by Emil Backman. The mine has been operated for a number of years by Mr. Backman, and during 1912 a new slope was driven and a new tipple built. The coal occurs at a depth of about 50 feet, and a cable and team are used in getting the coal to the surface. The mine buildings consist of a bunk house and two barns.

On March 24, 1914, no one was found at the mine, but conditions were satisfactory, except in the slope, which is not timbered.

21. Johnson Coal Mine

The Johnson Coal Mine has never been anything but a small mine supplying a local trade. The coal being but four feet in thickness and of poor quality, it did not prove profitable and in 1913 the mine was abandoned.

22. Lind Coal Mine

This mine is owned by Mrs. Anna Lind of Wing, N. D., and is leased by Oscar Ostrom of Wilton. The coal occurs at a depth of 40 feet and is from 11 to 13 feet thick and is reached by a steep slope, up which the coal is hauled by means of a long cable and a team on the surface. Little timbering other than a few props in rooms is done in the mine, except in the slope, which is timbered and lagged. The powder is bought in 200-pound lots and stored in the mine. Shot firing is done at noon and in the evening. A tipple which permits of the direct loading of cars into wagons and sleighs has been built. Fair ventilation is secured by means of an air shaft.

On March 24, 1914, the mine was found to be in fair condition.

23. Peterson Coal Mine

The Peterson Coal Mine is located not far from the Asplund Mine and is owned and operated by C. J. Peterson. This mine is being worked in an 11-foot bed of coal, from three to four feet of which is left to support the roof, little timbering being necessary. Little, if any system of mining has been followed and rooms have been turned off from other wide rooms, and the mine is getting into poor condition. There are no regulations concerning the use of powder other than the customary shot firing at noon and at night.

On March 23, 1914, this mine was inspected, and is considered as being in poor condition, and generally speaking, unsafe.

24. Wilton Coal Mine No. 1

Wilton Coal Mine No. 1, owned and operated by the Washburn Lignite Coal Company for whom W. P. Macomber is general manager and P. J. Cahill, superintendent, is the largest lignite mine operating in this state. The coal is from 10 to 15 feet in thickness and occurs at an average depth of 65 feet.

The panel system of mining is used. The main entry is about 510 feet in length. Cross entries are spaced 450 feet to 500 feet. The distance between the main entry and the parallel entry is about 38 feet center to center. Cross cuts are made at 60-foot intervals. The rooms are driven 200 to 300 feet in length, with break-throughs at 60 feet. The pillars are from 12 to 13 feet in thickness. Room necks 8x10x15 feet are driven. Mining is done by machinery. The powder is stored in a magazine and bought in carload lots. Each miner is allowed to take a 25-pound can into the mine, and he is required to keep his powder in a locked box. Firing is done by electricity, the men being instructed not to connect their wires until they have everything ready and then to retire to a safe distance before doing so.

Water occurs at a depth of about 200 feet and is suitable for steam purposes. Electric haulage is used underground, two electric motors being in operation. Nine Jeffrey undercutting machines are kept in operation and three Christy box car loaders are used, two electric and one steam.

Everything in connection with the shaft and hoisting equipment was in excellent condition. Special provisions for safety are that no miners shall go up and down the cage, except foremen, for the necessary examination of the shaft. The workmen use a slope.

The mine buildings consist of a power-house, boarding house, two wash houses, a blacksmith and machine shop, office building, store house, stables and other buildings and shops.

All coal sold by the company is screened, and in the report all coal under six inches is classed as slack. This causes a considerable difference in the coal production figures for 1912 and 1913. The 1912 production figures include the slack. The slack production shown for 1913 represents slack, which is sold. Slack that is actually wasted is only a very small percentage of the production.

Ventilation is secured by means of electric blower fans and air shafts, which furnish a sufficient amount of air. Timbering is done wherever necessary and in a secure and substantial manner.

The company is incorporated under the laws of Minnesota, with a capitalization of \$500,000. There is \$57,120.71 invested in surface equipment, power-plant, etc., and \$74,832.25 invested in underground machinery and equipment.

On March 24, 1914, the mine was found to be in a satisfactory condition in every respect.

DIVIDE COUNTY

25. Dougherty Coal Mine

The Dougherty Coal Mine is owned and operated by the Dougherty Coal Mining Company, with Charles Dougherty in active management. It is located near Noonan on the opposite side of a coulee from the Truax Coal Mine. The tippie has room for about 10 cars. Timbering is done as conditions require. Outside of the slope no timbering is done in the entries, props and caps being used in the rooms. No system of mining is being followed. Well water is found at a depth of between 200 and 250 feet, and is said to be suitable for steam purposes. The mine buildings consist of a boarding house, bunk house, scale house and barn. No regulations concerning the use of powder are enforced. Ventilation was found to be quite satisfactory. On March 15, 1914, three miners were at work and the mine was found to be in a fair condition.

26. Houglet Coal Mine

The Houglet Coal Mine is owned and operated by Joe Houglet. This mine was opened up during the summer of 1913, and is situated within a few hundred feet of the Dougherty and Truax mines. Timbering is done only in the slope and in rooms. Ventilation is secured through an old entry which connects with the new works. The air seemed to be fairly pure, but an air shaft should be installed if operations are to be continued.

On March 10, 1914, conditions at the mine were found to be satisfactory.

27. Noonan Coal Mine

The Noonan Coal Mine was formerly operated by Ed Evanson, but was purchased by Dr. C. H. McDonald and J. L. Loubeski, the latter being in active charge of the mine. They began operations in September, 1913 and intend to run it continuously. It is anticipated that the old works will be abandoned and a new entry driven to the coal bed during the coming season. A home-made whim is used to draw the coal up the tippie. Well water in the vicinity is said to be struck at a depth of from 200 to 250 feet, and to be fit for steam. No regulations concerning the use of powder are in force, except that the shooting is done at 12 and at 6 o'clock. The powder is stored near the tippie in 500-pound quantities. Timbering in the mine is confined to props and caps in the rooms. Ventilation is fair.

On March 10, 1914, the mine was found to be in good condition.

28. Truax Coal Mine

The Truax Coal Mine is the largest mine operating in Divide County and is owned and operated by E. M. Truax. A. H. Truax acts as superintendent and A. M. Leogellan is pit boss. No timbering is done in the entries; a row of props are set in the rooms. The timber is shipped from Minnesota. The mine buildings consist of a cook house, bunk house, engine house, blacksmith shop, powder building and office. The

mine cars are hauled up the slope by a gasoline engine hoist and cable. The cars have attached to them a bar which drags on the ground behind and which is calculated to derail the car should the hoisting apparatus fall.

There are no regulations concerning the use of powder. Ventilation is secured by means of air shafts and in a sufficient amount. Water is said to occur at a depth of 250 feet and to be fit for steam.

Approximately \$15,000 have been invested in surface equipment, while the cars, tracks and timber underground cost about \$5,000.

On March 10, 1914, the mine was found to be in a satisfactory condition.

GOLDEN VALLEY COUNTY

29. Corliss Coal Mine

The Corliss Coal Mine is owned and operated by I. J. Corliss and is situated well up on a high butte near Sentinel Butte. This is a strip pit and a considerable amount of clay has to be removed before the coal is exposed. The coal bed is about 20 feet in thickness, the top five feet of which is too soft to be used. The mine supplies only a local trade. Coal is sold by the wagon load to farmers, and the owner also contracts to deliver coal at school houses. There is but little water in the pit. Well water is said to occur at a depth of from 10 to 200 feet, depending on the location, and some of it is thought to be suitable for steam purposes.

The mine was inspected on November 7, 1913, at which time four teams and five or six men were busy stripping.

30. Kussick Coal Mine

The Kussick Coal Mine is located in a nearly inaccessible place in the rough country near Sentinel Butte. The coal bed is found to be about 16 feet in thickness and the mine is worked in a small way by B. I. Greene. No system of mining is followed and there is no artificial means of ventilation. Such water as seeps in is ditched to the mouth of the drift and hauled away in a threshing tank.

On November 7, 1913, when the mine was inspected, the lessee was just getting the mine pumped out. As operations had only begun the mine was not in good condition.

31. Porter Coal Mine

The Porter Coal Mine is located on the side of a sloping hill, where the coal outcrops and it is possible to get at the coal by stripping. The coal is about 10 feet in thickness and of fair quality. Water is said to occur at a depth of 50 feet and to be suitable for steam purposes. The mine supplies only a local trade.

McLEAN COUNTY

32. Bitumina Coal Mine

The Bitumina Coal Mine is owned by John Satterlund and is operated by Ed Kugler. The coal bed is about 11 feet in thickness and overlaid

with 100 feet of clay. The coal is drawn to the mouth of the drift by horses and from there is elevated to a tippie by a hoisting engine. The tippie has a storage capacity of 400 tons. Mining is done by machinery and a Goodman air breast undercutting machine is used. An air compressor, receiver, steam boiler, steam pump and hoisting engine are in use. The mine buildings consist of engine room, boiler room, machine room, coal shed, powder house, bunk house, two dwelling houses, a blacksmith shop, shed and one barn. There is no market for the slack produced, and it is waste. Machine men are paid \$2.80 per day. The underground equipment is reported as being worth about \$2,500. Wells in the neighborhood are from seven to 24 feet in depth and water is said to be suitable for steam purposes.

On March 23, 1914, the mine was inspected and was found to be in a very satisfactory condition.

33. Borchardt Coal Mine

E. G. Borchardt owns and operates this mine, which is located about three miles south of Underwood. The mine is practically dry and the coal occurs in two seams, separated by about a foot of clay. The upper seam is seven feet thick and the lower about five feet. The coal is reached by a shaft which is about 50 feet deep, and on March 23, 1914, this shaft was in a very dangerous condition and ought to be timbered and lagged, especially in the upper portion. From one to three men are employed, and the coal is lifted to the surface by a whim operated by horses. The mine is ventilated by several 24-inch holes bored from the surface. Water is found at a depth of 200 feet or more and has been used for steam purposes. The tippie has no storage rooms, and the mine buildings consist of a shed which covers the shaft and hoisting arrangement. About \$540 has been invested in the surface equipment and \$120 underground.

34. Frederich Coal Mine

William Frederich owns and operates this mine, which is located about four miles east of Underwood. It is a new mine and is reached by a 60-foot shaft, which will need timbering to prevent caving near the top. A ladder of rather flimsy build is used to enter the mine, and the coal is raised to the surface by a whim operated by horses. The coal bed is about nine feet in thickness, of which about seven feet is mined. This coal is left in the roof; therefore little timbering is required in the entries.

March 23, 1914, when the mine was inspected, it was found to be in fair condition.

35. Hansen Coal Mine

This mine is located four and one-half miles east of Underwood and is owned by P. J. Hansen and operated by N. C. Hardman. It is located in a nine-foot bed of coal which outcrops on the west side of a deep coulee. The double entry system of mining is used, and practically no water is encountered in the mine. Its location on the hillside is very favorable for easy hauling to the surface and loading. The coal is de-

livered from the mine by horses, where it is dumped directly into sleighs. Two or three men are employed during the summer months and from five to ten during the winter months. The buildings consist of a bunk house, boarding house and barn.

On March 23, 1914, general conditions about this mine were found to be fairly satisfactory, with the exception of the ventilating shaft, which is too small to supply sufficient air at all times.

36. Hill Coal Mine

This mine is located three miles southwest of Garrison and has been operated by P. A. Hill. It is located on the west bank of a deep coulee. The drainage of the mine is ditched into the coulee. The mine was formerly operated as a surface mine, but lately several entries have been driven from the pit. Little system has been followed in the underground workings. A large storage shed has been built over the entries. From two to four men have been employed, but on March 20, 1914, the mine had been closed for some time, and was in fair order.

37. Johnson Coal Mine

This is a small mine situated near the Ulrich mine and is owned and operated by S. A. Johnson to supply a little local trade. A windmill and gasoline engine are used to drain the mine. Timbering is done in both entries and rooms. The tippie permits dumping into wagons or sleighs, but has no storage room. On March 21, 1914, the mine was found to be quite satisfactory.

38. Kunkel Coal Mine

The Kunkel Coal Mine is a small surface mine located about a half mile out of Garrison. It is owned by J. A. Kunkel and operated by Charles Hall. The coal bed is from three to eight feet in thickness and has an overburden of from four to 40 feet. Water is found in wells at a depth of 30 to 120 feet and is said to be fit for steam. A scale house, bunk house and barn comprises the buildings.

39. Ulrich Coal Mine

The Ulrich Coal Mine is located six miles east of Garrison and is owned by A. G. Anderson and is leased and operated by John Ulrich, George Louser and Charles Kingsley under the name of the Ulrich Coal Company. The coal bed here is from four and one-half to five feet thick, and usually has one or more thin seams of sand in it. It is also underlaid by the same material, and usually is loosened by undermining by hand. The double entry system of mining has been adopted and ventilation is furnished by an air shaft extending 12 or 15 feet above the surface, which is equipped with four doors, one of which is opened toward the wind. Near the portal of the entry is another short shaft equipped with the same number of doors. A heavy curtain is suspended between this shaft and the portal. Ventilation is obtained by the wind blowing into the tall shaft into the mine. The warm air escapes by means of the short shaft near the entry, the door on the leeward side being open. The mine is drained by a pump driven by a gasoline engine. From one to

six men are employed, and on March 19, 1914, the mine was found to be in a very satisfactory condition, being one of the mines in which ventilation is first rate.

40. Youngquist Coal Mine

This mine is owned by Ed Youngquist and operated by him and Mr. Phister. It is located about 10 miles south of Underwood on a deep coulee near the Missouri. The mine buildings consist of bunk house, cook shack, and barn. The coal seam is about 8 feet in thickness and the coal is delivered to the surface by a horse. The mine is drained by a gasoline engine-driven rotary pump. Well water occurs at a depth of from six to 20 feet and is said to be good for boiler use. Very little system has been used in driving the entries and rooms, but on March 23, 1914, the mine seemed to be safe and fairly well ventilated.

MORTON COUNTY

41. Feland Coal Mine

The Feland Coal Mine is owned and operated by Theodore Feland. The mine is on a spur at Sims, and box cars may be loaded directly from the mine cars. The tipple has storage capacity for about 10 cars. This is one of the older mines of the state and the haulage way is so long and in bad repair that it will be abandoned for a new entry. The mine is quite well timbered. The ventilation, which is secured by an air shaft, is sluggish and insufficient. The main buildings consist of a bunk house, scale house, enclosed tipple and barn.

42. Garfield Mine

This mine is located about six miles northwest of New Salem in a shallow coulee. It is a surface mine and is owned and operated by Carl Lueder. The coal bed is six feet in thickness and underlies from six to 40 feet of clay. The mine is drained by a diaphragm pump, operated by a small gasoline engine. Water, which occurs at a depth of from eight to 22 feet, is plentiful, but doubtful as to fitness for boiler purposes.

43. Hebron Brick Company Mine

This mine is owned and operated by the Hebron Fire & Pressed Brick Company, and is located about five miles north of Hebron. It is connected with the company's brick plant by a narrow gauge track, where practically all of its output is used. The coal bed is from eight to nine feet in thickness. The mine, which is practically dry, is entered by a drift, from which the coal is delivered by horses. Ventilation is furnished by several air shafts and furnaces. The mine is worked on the double entry room and pillar method. All entries are driven in straight lines. Entries and parallels are about 20 feet apart and break-throughs are spaced at about 50 feet. The mine was visited on March 3, 1914, and the conditions were found to be excellent, except that several of the rooms were too wide to be reasonably safe. Only two men were working at that time, but usually eight or nine are employed.

44. New Salem Coal Mine

This mine is situated just east of New Salem on a spur of the Northern Pacific. It is owned by the Dakota Products Company and leased by M. Tausend. The coal bed is about six feet in thickness where the present work is being done. About 200 feet below this is a 17-foot seam which the company contemplates working if the quality proves satisfactory. A test hole is being sunk by a core drill to determine the quality of this seam. Two electrically-driven Jeffrey undercutting machines are used and the coal is delivered up the slope to the tipple by a steam hoist. Ventilation is furnished by an air shaft and when necessary a 60-inch Sturtevant fan is used. The mine is dry and the wells in this vicinity are from 50 to 460 feet deep, the water being suitable for steam purposes. During the summer from 12 to 20 men are employed and during the winter months from 25 to 35. The company has a well-equipped electric plant at the mine, which furnishes light for New Salem. The mine buildings consist of a powder house, tipple, blacksmith shop, office, dwelling house and boarding house. The company reports a capitalization of \$30,000, and has invested in surface equipment \$25,000, and in underground equipment \$5,000.

On March 4, 1914, ventilation was found to be very good, and other conditions in and about the mine were very satisfactory.

45. North Star Coal Mine

The North Star Coal Mine is a small mine located about four and one-half miles north of Hebron and practically all of the output is consumed locally. The coal seam is about 10 feet in thickness, but only about six and one-half feet are mined on account of a clay seam occurring about three feet from the top. This gives three feet of coal for the roof and makes the entries safe without timbering. The coal is delivered from the mine by horses, up a steep entry. No regular system of ventilation or mining has been adopted. However, the small air shaft now being used seems to be sufficient for present needs. From two to five men are employed and on March 3, 1914, the mine was in a fairly satisfactory condition.

About \$1,200 has been invested in surface equipment, a bunk house, a boarding place and scale house and barn, while \$200 has been spent underground.

MOUNTRAIL COUNTY

46. Blickre Coal Mine

This mine has been operated for several years, but was closed down during the summer of 1912, except that some coal is taken out by nearby farmers and ranchers. The mine is operated as a strip pit and is located in the valley of the White Earth River, where the overburden of clay is from five to 25 feet. Water collects in the pit and is ditched out. Water is found at shallow depths. On December 12, 1913, the mine was found abandoned.

47. Barto Coal Mine

The Barto Coal Mine was opened in the fall of 1913 in a three-foot bed of coal. The miners believed that they would find the coal bed increasing in thickness further under the hill, and so confined their efforts to driving the main entry back, and working night and day. December 12, 1913, I found the entry being driven in a workmanlike manner. No ventilation was yet provided and owing to the length of the tunnel it took some time for powder smoke to clear.

48. Bowman Coal Mine

This mine is owned by C. H. Bowman, but is leased to J. E. Landaker. The bed is reached by a shaft, the timbering of which is now in need of repair. Coal is brought to the surface in cars, which are pulled up the shaft by hooking the cable into a specially made sling. One or two feet of coal is left to strengthen the roof. The coal is good in quality. Local trade only is supplied.

On December 11, 1913, I found conditions at the mine, with the exception of the shaft, satisfactory.

49. Elgers Coal Mine

This mine is owned by Fred Elgers and is leased by F. E. Blake. It is operated as a strip pit and supplies a local demand. From four to eight feet of clay has to be scraped away, and a ditch drains the pit.

50. Hardman Coal Mine

This mine was formerly owned and operated by W. T. Hardman, but is now operated by B. A. Blake. It is a surface mine and has only a local market. There is much water in the pit, which is ditched out. At times the miners drive under the clay and run a sort of underground mine. This is done only in the winter. On December 11, 1913, I found no one at the mine.

51. Hefte Coal Mine

The Hefte Coal Mine is in the hills on the east side of the valley of the White Earth River. The coal outcrops on the side of a hill. The overburden is stripped off. Drainage is easily secured through a ditch. This mine has a local market only. It can be operated as a strip pit only for a limited time, after which underground mining will be done.

52. John Coal Mine

The John Coal Mine is a small underground mine owned by A. G. John. The coal is poor and the bed is too thin to be mined economically. The mine supplies a very limited trade, and unless the coal bed is found thicker and better further under the hill it will be abandoned. The mine is located in the hills, forming the west bank of the Shell River.

53. North Star Coal Mine

The North Star Coal Mine is owned and operated by Albert Roseno. The coal bed is seven feet thick and about seven feet of stripping is necessary. The mine is located on the side of a coulee and water which occurs in quantities here is ditched out. The mine is run as a side issue to farming operations. The mine supplies a local trade.

54. Palda Coal Mine

This mine is owned by G. S. Rogers. It had to be abandoned at the close of 1912, as the mine was worked out, that is, no more mining could be done through the old entry. Water also became troublesome, as the coal bed dipped away from the entry.

55. Porger Coal Mine

The Porger Coal Mine is located down the White Earth River from Stanley. This mine has been opened up in a new place and with a better entry than was in use at the old works. Little attention is given to the underground system of mining. Rooms are turned directly off the main entry. On December 12, 1913, I found the mine in a satisfactory condition.

56. Rodgers Coal Mine

This mine was opened by Mr. G. S. Rodgers during the summer of 1913, following the closing down of the Palda mine, which was abandoned by Mr. Rodgers at the close of 1912. The Rodgers mine is a strip pit and is located across a narrow coulee from the Palda and is in the same bed of coal. The strip pit is so situated that it can be drained by a ditch. On December 12, 1913, I found seven teams and eight men at work.

57. Sellar Coal Mine

The Sellar Coal Mine is one of the smaller mines and is owned and operated by W. L. Sellar. The coal bed is between $3\frac{1}{2}$ and four feet in depth and all the coal is removed. The clay roof is very poor and hard to hold. A local demand is supplied at this mine.

58. Stacy Coal Mine

The Stacy Coal Mine is owned by the State Bank of Crary and is leased by George Stacy, who operates it as a strip pit. The coal outcrops on a side hill, and it cannot be operated for long as a strip pit as the overburden increases in depth very rapidly. The mine is drained by a ditch and supplies a small local trade. On December 17, 1913, I found three men at work.

59. Sunday Coal Mine

The Sunday Mine is owned by Albert Roseno and has been leased to Herman Moerke, and is a small mine having a local market. The mine was opened in the fall of 1913. There are no tippie arrangements, coal delivered at the mouth of the entry having to be loaded into wagons by hand. A ditch drains the entry. On December 11, 1913, there had been no rooms turned. The entry had been driven about 100 feet.

60. Williams Coal Mine

The Williams Coal Mine is owned by B. D. Williams and is situated seven miles down the White Earth Creek from the town of White Earth. This mine is operated as a strip pit, the removal of three to eight feet revealing a fairly good bed of coal, eight feet in thickness. The top three feet is of poorer quality than the rest. The mine is drained by a

ditch. The coal is sold locally to farmers at the mine, and some is also hauled to the town of White Earth.

61. White Earth Coal Mine

The White Earth Coal Mine has been operated under various managements during the past few years, and at the close of 1912 seems to have been closed down and abandoned. The mine was originally laid out in an excellent manner, equipped with good track, mining cars and an incline leading from the mouth of the entry to the top of the bluff and operated by a steam hoisting engine.

OLIVER COUNTY

62. Flint Coal Mine

The Flint Coal Mine is a small mine operated by Mrs. Henregetta Flint, to supply local trade. It is a surface mine and is located near Hannover. There is three feet of workable coal in the mine, but the top portion of the seam has evidently been burned off at this point so it is probable that a thicker bed will be found further under the hill. The mine is unusually drained by a ditch, but on March 4, 1914, the pit was partly filled with water.

63. Meyhoff Coal Mine

The Meyhoff Mine is a small surface mine that is owned and has been operated by Dick Meyhoff. It is located near Center, but was closed about February 15, 1914, for an indefinite period.

64. Pleasant Valley Coal Mine

The Pleasant Valley Mine is owned and operated by Victor Boerner, and is located about two and one-half miles west of Center. It is a surface mine and the coal occurs in two seams. The top seam is about six feet thick and the bottom seam about ten feet. Between these is about three feet of clay. Where the present mine is located only about six feet of clay has to be removed. Considerable water is encountered, but a ditch keeps the mine fairly dry.

65. Spring Valley Coal Mine

The Spring Valley Coal Mine is located about six miles southeast of Center and is owned and operated by N. O. Nelson. The coal seam is about nine feet thick, but the top three feet is of poor quality. About eight feet of clay and the top three feet of coal are removed by scrapers during the summer. The coal is sold in the solid, each man doing his own mining. About \$150 has been invested in a surface equipment.

RENVILLE COUNTY

66. Tehelka Coal Mine

The Tehelka mine is located three and one-half miles north of Carpio on the west side of the valley, and is owned by P. P. Tehelka and operated by Hopkins & Bates. A new slope was driven in 1913, and the mine has been operated only a few months. The coal bed here is only about 30 inches thick and a poor roof is encountered in most places. The

coal is delivered to the surface by horses, and about four men are employed during the winter months. On March 16, 1914, no timbering had been done in the entry and no ventilating system had been installed. Fifty dollars has been invested in surface equipment, while \$95.00 has been spent underground.

67. Wooster Coal Mine

This is a new mine operated by Dan Danielson and John Akur and owned by Bert Wooster. It is located just across the valley from the Tehelka mine. The coal bed is from 32 to 44 inches in thickness, but the roof material on this side of the valley at this point is comparatively good. A drift has been driven directly into the coal, which is delivered at the surface by hand. The rooms and entries are very low in places, and no ventilating system has yet been adopted.

STARK COUNTY

68. Gross Coal Mine

This mine is owned by Paul Gross and has been leased and operated by Bert Collins. It is located two and one-half miles northeast of Bel-field. The coal seam is about eight feet thick and the output supplies only local demands. At present coal is delivered from the slope by horses. No regular system of mining has been adopted and the air shaft is not properly located for good ventilation. On February 28, 1914, the mine seemed to be in a safe condition, but ought to be timbered before it is extended much further.

69. Lehigh Coal Mine

This mine is located at Lehigh and is owned and operated by the Consolidated Coal Company of Dickinson. The coal bed averages about 10 feet in thickness and is undercut by two electrically-driven Jeffrey undercutting machines. The coal bed is reached by a drift from which the coal is hauled to the tippie by mules, where a Christy box car loader is used. The mine is equipped with an electrically-driven fan which is now located too far from the present works to be of much value. An electric pump has been used in the older portions of the mine, but in the portion now being worked the water is removed in barrels. The mine buildings consist of a hotel, two store houses, two barns and three houses. During the summer about 16 men are employed, and during the winter months from 25 to 30. The mine was visited on March 2, 1914, but few of the miners were at work at that time, so the actual working conditions could not be ascertained. Several of the rooms were quite wet and portions of the main entry were in poor condition and unsafe. Twelve thousand dollars is reported as being invested in surface equipment, and \$25,000 in the underground workings.

70. Pittsburg Coal Mine

The Pittsburg mine is owned and operated by the Dakota Fuel Company of Dickinson. The mine is on a spur of the Northern Pacific near Lehigh, on the bank of the Heart River, about six miles east of Dickinson. The coal bed is from 10 to 11 feet thick and is being mined by the

double entry system. Ventilation is furnished by a steam-driven fan and drainage by a jet pump. Portions of the mine are very wet, but further away from the river conditions are good.

The tippie and power house are situated on the opposite side of the river from the mine. Horses are used underground, but a steam hoist delivers the cars to the surface, where an Ottumwa box car loader is used. From eight to ten men are employed during the summer months and from 12 to 20 during the winter. The mine was visited on March 2, 1914, and conditions were found to be excellent except in the wet portions of the mine. The company is incorporated under the laws of North Dakota with a capitalization of \$25,000. The surface equipment investment is reported at \$35,000, the underground equipment at \$15,000.

71. Wiley Coal Mine

The Wiley Coal Mine is a small surface mine owned and operated by Mr. C. H. Wiley of Dickinson. It is located about three miles from South Heart, where most of the output is hauled for shipment. The coal seam is about 20 feet in thickness and at present is mined by stripping.

72. Zenith Coal Mine

The Zenith Coal Mine is owned and operated by the Zenith Coal Company. Henry Truelson is vice president and general manager of the company and has active charge of the mine. The coal bed is from 20 to 22 feet thick and seems to be quite uniform. The mine is entered by a slope about 1,000 feet long on a 5 per cent grade, and the coal is delivered to the surface by a steam hoist. About seven feet of the bottom portion of the coal is first mined and when rooms are worked their entire length, as much as possible of the roof coal is mined by shooting down, beginning at the further end of the room and returning toward the entry. Portions of the mine are quite wet, but two pumps of about 300 gallons capacity have been installed and one of these is kept in operation day and night. Ten or 12 men are employed in and about this mine throughout the year. The mine is equipped with two tipples and they have a storage capacity of 20 cars. The mine buildings consist of boiler house, engine house, boarding house, bunk house and barns. The company is capitalized at \$50,000 under the laws of Minnesota; \$2,800 has been put into surface equipment and \$2,500 into the underground work. On February 28, 1914, the conditions in and about this mine were satisfactory, although no regular system of ventilation can be maintained on account of numerous openings caused by cave-ins in the rooms that have been worked out. The air, however, was good.

WARD COUNTY

73. Baden Coal Mine

This mine is located about a mile south of Baden on the property of Herbert French and is operated by Gilbert Mahlum. It is entered by a steep slope and has not been timbered in the lower portion and is far from being safe. A traction engine has been used to deliver the coal to the surface, but this will be abandoned and a horse-operated whim

used. Considerable water is encountered, and is removed by means of a tank. On March 16, 1914, the mine was muddy and in a very unsatisfactory condition in regard to both safety and ventilation.

74. Bertelson Coal Mine No. 1

Jonas Johnson owns and operates this mine, which is located six and one-half miles north of Kenmare, on the east bank of the Upper Des Lacs Lake. A drift has been driven several hundred feet into the lake bank where a shaft is used to deliver part of the coal on top of the bluffs. An old traction engine and a home-made hoist are used to deliver the coal to the tippie at the top of the shaft, which is about 150 feet deep. Coal is delivered from the drift entry by means of horses, where it is dumped directly into sleighs in winter and hauled to Kenmare on the lake. The entries and shaft have been well-timbered, but in the entries near the shaft the timbering has become very rotten and this portion of the mine is dangerous. On March 13, 1914, Mr. Johnson was robbing portions of the old mine and expected to abandon the shaft and most of the old entries in about a month. He contemplates working several rooms near the lake where the entry is safe, and will drive a new entry as soon as these rooms are worked out. During the summer months three men are employed in this mine and during the winter months about ten. About \$1,500 is invested in surface equipment.

75. Bertelson Coal Mine No. 2

This is a new mine located at Spiral, which is a siding on the Soo Line between Kenmare and Bowbells. It is owned and operated by B. J. Bertelson. Several coal seams occur here and the one worked lies 180 feet below the surface and is about five and one-half feet in thickness. It is reached by a well-timbered shaft which has been sunk to accommodate two cages, although only one has been used. The cage is operated by a steam hoist, and the mine is drained by a Dean steam pump. The mine buildings consist of a boarding house, boiler room, barn and tippie shed. A trestle connects the shaft with the siding a few hundred feet away, where the coal is dumped directly into the cars. The timbering has been well done, and on March 13, 1914, this mine was in a fairly satisfactory condition, although quite wet.

76. Brick Yard Coal Mine

The Kenmare Brick & Coal Company operates this mine in connection with their brick plant. The coal seam at this point is about four feet in thickness and considerable extra work is necessary to make the entry high enough, and owing to a poor roof, much timbering has to be done. The mine buildings consist of scale house, blacksmith shop, boarding house, bunk house and barns. Coal is delivered to the tippie by mules, where it is dumped directly into cars. During the summer months five or six men are employed about the mine and during the winter months from 10 to 15. On March 14, 1914, this mine was well-ventilated and timbered, and in a satisfactory condition. The company is incorporated under the laws of Iowa at \$100,000.

77. Burlington City Coal Mine

This is a new mine that has been opened by J. P. Perlecheck, in Burlington. The coal bed is about 10 feet thick and on March 17, 1914, the slope had been driven about 150 feet and little room work had been done.

78. Caffisch Coal Mine

The location of this mine is about eight miles south of Sawyer and it is owned and operated by W. D. Caffisch. It is located in a deep coulee where the coal outcrops near the bottom. The coal bed is about 12 feet thick and lies about 40 feet below the general surface. Roomy entries have been driven and little timbering is necessary, as several feet of coal is left in the roof. From one to five men are employed in this mine and drainage is accomplished by means of a ditch. The mine buildings consist of a bunk house, boarding house and barn. On March 19, 1914, only two miners were at work and conditions in the mine were satisfactory.

79. Christophson Coal Mine

This is a small mine about a mile and a half north of Carpio, owned and operated by C. Christophson. The coal bed at this point is only 32 inches thick, and on March 16, 1914, when this mine was visited, a new slope had just been driven, but no timbering had yet been done. The mine will be in a satisfactory condition as soon as sufficient timbering is put in the slope.

80. Colton Coal Mine

These mines are located a mile and a half southeast of Burlington and are owned and operated by L. D. Colton. The shaft mine is located on the top of the bluffs and is reached by a shaft which is 112 feet deep. The coal is hoisted by steam and the equipment used is first class. Ventilation is furnished by a steam fan, and a No. 7 Cameron pump is used to drain the mine.

The slope mine is located about a quarter of a mile from the other mine on a small coulee that runs into the Des Lacs Valley. Here the coal is hauled directly to the tipple by horses. Both mines are in the same coal bed, which is about 10 feet thick. The mine buildings consist of engine room, bunk house, cook house and tipple. On March 18, 1914, the shaft mine had been shut down for several weeks on account of a cave-in of the air shaft, and the slope mine had not progressed far enough for room work, and no ventilating system had yet been installed. About \$3,000 has been invested in surface equipment and \$500 in underground works.

81. Conan Coal Mine

The Conan Mine is one mile east of Burlington and is owned by D. Conan and has recently been leased by J. M. Cody. It has been leased and operated by so many different persons that little permanent work has been done, and it is now in a run-down condition. On March 18, 1914, no system of ventilation was in use and little work was being done. The mine will have to be abandoned in a short time if it is not soon given the needed repairs.

82. Crosby Coal Mine

John Crosby owns and operates this mine, which is located six miles north of Kenmare on the west bank of the Upper Des Lacs Lake. The coal seam is $5\frac{1}{2}$ feet thick and has an overburden of 130 feet. Coal is delivered to the tipple by hand, where it may be dumped directly into wagons or sleighs or into a storage shed. The mine buildings consist of an office, a boarding house, bunk house and storage house, blacksmith shop, stable and powder magazine. During the fall and winter months seven men are employed about the mine, but on March 13, 1914, only one was at work. On this date ventilation and timbering throughout the mine were in a fair condition. A ditch and gasoline engine are used to free the mine of water.

83. Davis Coal Mine

This mine is owned by P. L. Simmons and is located at Foxholm. The Soo Railroad and is owned and operated by the Northern Briquetting Company of Minot. A briquet plant at Minot and a brick plant located at the mine are operated in connection with it. L. M. Davis is the general manager of the company, and W. H. Somers is superintendent of the mine and brick yard.

The coal bed is about 10 feet thick and underlies 150 feet of clay and other material. Coal is delivered to the surface by a large steam hoist, which delivers it from the slope to the coking ovens of the briquetting plant, which are located near by; or to the brick kilns, or to the tipple, where it is loaded directly into box cars after being screened. A large steam pump is used to remove the water from the mine and a large fan has been installed and is used when necessary. During the winter months from 15 to 25 men are employed and in the summer from six to 15. The mine buildings consist of boiler house, blacksmith shop, scale room, engine room, bunk house, boarding house, dwelling house, office and barn.

On March 18, 1914, this mine was found well-timbered, but ventilation was slow. To relieve this condition a new air shaft is being driven. It was started from the bottom and another seam of coal was encountered above the one being mined. Here a small explosion of gas occurred, when a miner entered with a lamp, but no serious damage was done. This is one of the very rare occasions that an explosive gas has been encountered in the lignite fields.

The company is capitalized under the laws of this state at \$50,000.

84. Des Lacs Coal Mine

This mine is located one mile south of Burlington, on a spur of the coal bed is about seven feet thick at this point, but the mine has not been operated since March, 1913, chiefly on account of the water, which proved difficult to handle.

85. Diamond Coal Mine

This is an old mine near Kenmare, owned by H. E. Peck and operated by Frank Terence. Considerable trouble is experienced with poor roof and heaving floors in portions of the entries. The coal bed is four and

one-half feet thick and is entered by a drift from which the coal is delivered to the tibble by mules. On March 17, 1914, the timbering was found to be in a fair condition, but the ventilation was slow.

86. Farmers Coal Mine

The Farmers Coal Mine is located about six miles southeast of Bowbells on the west bank of the Upper Des Lacs Lake. It is owned and operated by the Farmers Lignite Coal & Transportation Company, with Arthur Hanson as operator and O. P. Hanson as superintendent. The mine buildings consist of boarding house, bunk house, two storage houses, office and barn. The coal seam, which is about five and one-half feet thick, is reached by a drift, from which the mine cars are delivered by hand to the tibble, where a storage shed of about 100 tons capacity is located. Ten miners are usually employed in the winter and two during the summer, but on March 13, 1914, no one was at work. The entry has been driven through clay and the roof is supported by light timbers and lagging. A great deal of caving has occurred from the sides and this has allowed a great deal of the roof to cave above the lagging, so that the timbering is of little value. A new entry ought to be driven or heavier timbers and lagging used in the present one, as it is becoming very unsafe.

87. Fihelly Coal Mine

On March 16, 1914, I found that this was one of the new mines. James Murphy and John Harper were engaged in driving an entry into the edge of the bluff on the property of Pat Fihelly and at that time they were getting a good start. No rooms had been turned, it being the plan of the operators to drive the entry into the coal body a considerable distance before doing any room work.

88. Foresythe Coal Mine

This mine is located one mile west from Lloyd's spur and a few hundred yards from the Lloyd mine. It is owned by A. P. Foresythe and leased by Peterson Brothers for a term of five years. A slope has been driven to a coal bed which is $8\frac{1}{2}$ feet in thickness. Horses are used for delivering coal to the tibble and a 2-H. P. gasoline engine and a rotary pump are used to drain the mine. The double entry system of mining is employed and ventilation is obtained by an air shaft. From 10 to 12 men are employed in the winter months and only two during the summer. The mine buildings consist of bunk house, boarding house, barn and storage house. On March 17, 1914, the mine was very muddy and the ventilation slow. Two men were at work robbing pillars at that time.

89. Hot Blast Coal Mine

This is a small mining proposition owned by Rogers & Maynard and is located about three miles north of Donnybrook. It has been operated only a short time and all of the work done to date is very temporary and no regular system of mining has yet been employed. The coal bed is only 30 inches thick and is reached by a short slope, from which the coal is hauled by a team and long cable. On March 14, 1914, the mine was found to be fairly safe.

90. Hunnewell Coal Mine

This mine is located near Burlington between the Conan and Colton mines and is owned and operated by R. J. Hunnewell. A drift has been driven directly into the coal, which outcrops along the valley. The coal seam is about nine feet thick and the coal is delivered to the tipple by horses. Water is removed from the mine by a siphon, and ventilation is furnished by an air shaft. From two to five men are employed during the winter, but during the summer months the mine is closed down. Well water is found at a depth of from 25 to 50 feet and is reported as being serviceable for steam. The mine buildings are a store house, blacksmith shop, bunk house and boarding house. On March 18, 1914, conditions in this mine were found very satisfactory. It is reported that \$1,000 has been put into surface equipment and \$1,000 into underground equipment.

91. Klondike Coal Mine

This mine is located about five miles north of Donnybrook and is owned by Wm. Spencer. The coal bed is about three feet thick and all of the coal that was taken out of the mine in 1913 was obtained by robbing pillars. On March 14, 1914, this mine had been abandoned for the summer.

92. Leeson Coal Mine No. 1

The location of this mine is about 10 miles southwest of Velva. It is owned and operated by J. J. Leeson. It was formerly a surface mine but during the last two years most of the mining was done underground. Wide entries have been driven without much regard to direction or line. About four feet of coal is left in the roof; consequently little timbering is necessary. The coal is hauled out of the mine on stone boats by means of horses. On March 19, 1914, conditions were found to be fairly satisfactory excepting the utter lack of system in driving the work. One thousand five hundred dollars has been put into surface equipment, consisting of scale house, dwelling house and barn.

93. Leeson Coal Mine No. 2

J. J. Leeson owns and operates this mine, which is located about eight miles southwest of Velva. The coal seam here is from 12 to 14 feet thick and outcrops in an old strip pit, from which several entries have been driven. A tipple has been built for one of these entries, where the coal is delivered directly into sleighs or wagons. During the winter considerable coal is dumped directly on the ground for storage. Water occurs at a depth of 18 feet and is said to be good for steam purposes. About four feet of coal is left for roof, consequently little timbering is necessary, and the mine is drained by a ditch. Six men are employed in and about the mine during the winter and only one in the summer months; \$1,500 has been invested in surface equipment, \$600 in underground equipment.

94. Lloyd Coal Mine.

The location of this mine is about three miles north of Burlington and one mile from the Lloyd siding on a deep coulee that runs into the

Des Lacs valley. It is owned by the Lloyd Coal Company, of which D. J. Lloyd is president and H. M. Graves is mine superintendent. An eight foot bed of coal is entered by a drift, from which the coal is hauled by mules, to the siding about a mile away. The roof is poor and considerable timbering in the entries and rooms is necessary. A 5½-h.p. gasoline engine driving a Fairbanks pump is used to drain the mine. Water is said to be good for steam purposes, and in the coulee at the mouth of slope is struck at a depth of 18 to 20 feet. About 22 men are employed during the winter months and about 14 during the summer. The Company is incorporated under the North Dakota laws at \$70,000; \$12,000 has been invested in surface equipment, \$7,000 in underground works. The mine buildings consist of office, engine house, boarding house, two bunk houses, three dwelling houses and two barns. On March 17, 1914, the main haulage way was found very muddy in places and the ventilation slow on account of the small air shaft, but the timbering was generally satisfactory.

95. McClure Coal Mine

The McClure mine is one of the larger mines of the state and is located at Tasker. It is owned and operated by the McClure Company of Minot, of which George E. McClure is general manager. A long covered trestle connects the slope entry with the tippie, where the coal is delivered by mules. The tippie has no bin storage but has a capacity of 60 cars. A Christy box car loader is used. The double entry system of mining is followed and ventilation is furnished by a large air shaft and furnace. The mine buildings consist of a boarding house, two bunk houses, 14 cottages, superintendent's residence, barn, blacksmith shop, store, boiler house, tippie shed and barn. During the winter months from 25 to 40 men are employed and during the summer from 20 to 25. On March 17, 1914, practically no work was being done and the ventilating furnace was not lighted; consequently the ventilation was slow. Otherwise conditions in and about the mine were satisfactory.

The Company is incorporated under the laws of Minnesota with a capitalization of \$150,000.

96. Pierce Coal Mine

The Pierce Coal mine is located two miles south of Kenmare on the east bank of Lower Des Lacs lake, and is owned by Fox & Cole. An old traction engine has been converted into a hoisting engine by using one of the rear wheels for a hoisting drum, and a steam ejector is used for draining the mine. On March 14, 1914, the mine was found to be fairly safe.

97. Red Flag Coal Mine

The Red Flag mine is a small mine located 11 miles south of Velva and is largely a surface mine. It is owned by Jed Knowles and leased by John Nordstrum. A drift has been driven about 150 feet into the coal bed, which is 11 feet thick. Three or four feet of coal is left for roof and little timbering has been done. The coal is hauled out of the entry on a stone boat by horses, and the mine is drained by a ditch. On March 19, 1914, the mine was found to be in fair working shape.

98. Rich Coal Mine

This mine is located about eight miles southeast of Bowbells on the west bank of the Upper Des Lacs Lake. It is now owned and operated by R. W. Rich and is located in a five foot bed of coal which occurs about 150 feet below the surface of the surrounding country. The mine is entered by a drift and the coal is delivered to the surface by a horse. On March 13, 1914, the ventilation, which is furnished by an air shaft, was found to be fair, but some of the entry will have to be retimbered before the mine can be considered safe.

99. Smith Dry Coal Mine

This mine is located about two miles north of Kenmare and is owned and operated by the National Briquetting Company of Minneapolis. Frank E. Abbott is manager and Harry Hirst is superintendent. The coal bed is 5½ feet thick and has an overburden of about 175 feet. The roof is slippery soap stone and a great deal of timbering has been done. The mine is entered by a slope and a long trestle connects it with the tippie where the coal is screened and an Ottumwa box car loader is used. A well timbered drift has recently been driven and part of the long trestle will be abandoned. An electric haulage motor is used underground but the coal is delivered from the portal to the tippie by a motor driven hoist. In connection with the mine is a power plant which furnishes the city of Kenmare with power and light. The mine buildings consist of the power house, tippie, weigh house, loader house, haulage house, bunk house, cook house, blacksmith shop, commissary and 12 cottages. This is one of the best equipped mines of the state, but the underground workings have been poorly laid out. An electric fan is used to accelerate the ventilation. The entries are lighted with electricity. During the winter from 35 to 45 men are employed and during the summer months from 15 to 20. On March 13, 1914, conditions in and about the mine were very satisfactory, especially the timbering.

The Company is incorporated under the laws of South Dakota with a capitalization of \$1,500,000. It is reported that \$65,000 has been spent in surface equipment and \$15,000 in underground equipment.

100. Square Deal Coal Mine

Stephen Hodgson owns and operates this mine, which is located between Baden and Donnybrook on the west side of the valley. The coal bed is three feet thick and is reached by a drift, from which the coal is delivered to the surface by horses, where it is dumped directly into wagons or sleighs or is stored in a small shed. From two to five men are employed in this mine, and on March 14, 1914, it was found to be in a safe condition, but the ventilation is very poor on account of the small air shaft.

101. Strong Coal Mine

This mine is located about 10 miles south of Velva and is owned and operated by Joe Strong. The 11 foot coal bed is entered directly from an old surface mine and the coal is delivered by hand. No timbering is necessary in the entries, but two lines of posts are used in the

rooms. The mine is drained by a windmill and gasoline driven pumps and ventilation is furnished by boring 18 inch shafts from the surface to various parts of the mine. The mine buildings consist of a house, granary, two bunk houses, barn and scale house. Four or five men are employed during the winter but only one is necessary during the summer. On March 19, 1914, ventilation and other conditions in the mine were satisfactory; \$800 has been invested in surface equipment, \$400 in underground equipment.

102. Tree-Bausch Coal Mine

This mine is located near the Leeson Coal Mine No. 2 and is a surface mine owned by Rufus Tree and Jacob Bausch and has been leased by L. Marleme. A 10 inch tile drain has been run about a quarter of a mile down the shallow coulee in which the mine is situated, to provide drainage. About 12 feet of coal lies just below the bottom of this coulee and considerable can be mined with a little stripping. On March 19, 1914, the upper end of the drain had become clogged and the pit was nearly full of water and ice.

103. Vadnais Coal Mine

This mine is located near the Brick Company's mine at Kenmare and is owned by O. Adams and operated by W. D. Hall. The three-foot coal bed, which lies about 150 feet below the general surface, is reached by a slope. The coal is delivered to the surface by horses. Six or seven men are employed during the winter but during the summer of 1913 this mine was closed. The mine buildings consist of a bunk house, storage, house and barn. The tipple has no storage. The coal is dumped from the mine cars directly into wagons or sleighs. On March 14, 1914, the main entry of this mine was in a dangerous condition, as no timbering had been done and a great deal of the clay roof had fallen.

104. Wallace Coal Mine

The Wallace Coal mine is situated just south of Burlington and is owned and operated by John S. Wallace. The coal seam, which is from nine to ten feet thick, is reached by a drift and the coal is delivered to the surface by mules. Most of the mine is dry, but in the southern portion, near the outcrop, a dip was encountered which had to be drained. A small opening was drilled from the surface and an ordinary deep well pump and gasoline engine were installed and connected to pipes below, which lead to the various sumps. Well water is struck at a depth of from 15 to 40 feet and said to be fit for steam purposes. The buildings consist of a wash house, tipple, scale house and barn. A large brick air shaft and furnace furnish the ventilation. During the winter months from 20 to 28 men are employed, in the summer from 10 to 18. This mine has a very good roof, consequently comparatively little timbering is necessary, especially in the entries. On March 14, 1914, few men were at work, but the ventilation in most parts of the mine was excellent and the arrangement and general conditions in the mine were equally satisfactory. Mr. J. S. Wallace has been in active charge of lignite coal mines for the past 16 years in North Dakota, and reports that in that time he has never had an accident of any kind occur.

WILLIAMS COUNTY

105. Black Diamond Coal Mine

The Black Diamond Coal Mine is owned and operated by the Williston Coal & Power Company, under the immediate direction of J. W. Jackson, president of the Company. Aleck Thompson is in active charge at the mine. The coal occurs at a depth of from 90 to 125 feet and is from nine to twelve feet in thickness. The hand room and pillar retreat system of mining is employed. The main entry has been driven in 600 feet and from this cross entries have been turned, from which the rooms are worked. The roof of the mine is exceptionally good and little timbering is done after the solid coal is reached, other than a few props that are used in the rooms. The mine is free from water and the floor is of hard blue clay which does not heave. The mine buildings consist of a small blacksmith shop, bunk house, powder house, barn and scale house. A hand dump tippie is used, the chutes providing a storage of about 60 ton capacity. The management have made a special effort to have the mine run in a systematic manner, and careless and incompetent miners are not employed.

The company is incorporated under the laws of North Dakota with a capitalization of \$3,000. Approximately \$1,000 has been invested in surface equipment and \$1,000 in the underground equipment.

The coal bed is clean and solid and free from clay seams and has a dip of several feet from the face to the entry. On December 10, 1913, I found conditions in and about the mine very satisfactory. There are worked out rooms that have stood for a number of years and are apparently still secure.

106. Bryn Coal Mine

The Bryn mine is owned by Maret Bryn and operated by Harry O. Hanson, who leases it. The coal occurs at a depth of 80 feet and is approximately 10 feet in thickness, reached by a slope. Seven feet of coal is mined leaving about three feet for a roof. Powder is kept at a store house 150 feet from the mine and is bought in 20—25 pound keg lots. There are no particular regulations concerning the use of powder excepting that two and one-half inch augers are used, the paper cartridges are made in charges not to exceed 30 inches in length and miners are required to use at least three feet of tamped slack. Miners are required to use a fuse in lengths of not less than four feet. The roof is in good condition and the mine is dry. Well water, which occurs at a depth of about 30 feet, is said to be good for steam purposes. Fire extinguishers are kept in the mine and in the bunk house. The mine buildings consist of bunk house, cook house and barn. Three hundred dollars has been spent for surface equipment and about \$400 for the underground works. The condition of the mine was found to be satisfactory on December 9, 1913.

107. Brown Coal Mine

The Brown Coal Mine is owned by J. I. Brown and is leased by Eric Larson, who has operated it for the past few years. The mine is being

developed along the double entry system, with the room and pillar method of recovering the coal. The coal occurs at a depth of about 100 feet and is $9\frac{1}{2}$ to 10 feet in thickness. A good coal roof is left, which is very substantial, requiring little timbering other than in the main entry before the solid coal is reached. Props with caps are used in the rooms. The tippie has a capacity in the chutes of about 30 tons. The mine buildings consist of a bunk house, boarding house and barn. On December 9, 1913, I found conditions at the Brown Mine to be very satisfactory.

108. Cow Creek Coal Mine

This mine is owned and operated by H. H. Skogberg. The coal outcrops on the side of a hill on a coulee and the entry is driven directly into the coal bed. The coal bed here is about seven feet in thickness and about one foot is left to help support the roof. Timbering is done with ash and pine secured from the Missouri River. The mine is dry excepting that a little seepage occurs in the summer time. Water is said to be satisfactory for steam purposes, and wells are 14 to 18 feet in depth. The tippie has a storage capacity of 20 tons. The mine buildings consist of a shaft, coal shed and barn.

109. Government Coal Mine

The Government Coal Mine is owned and operated by the United States Reclamation Service, at Williston, North Dakota, for the purpose of supplying the power house with fuel for pumping and power. The double entry room and pillar system of mining is followed out, and ventilation is secured by means of two air shafts, each two feet in diameter. The intention is to install an electric ventilating fan in a short time. Coal occurs at a depth of 150 feet below the level of the surface, and is about 10 feet in thickness. The main entry is driven 1149 feet and is $6\frac{1}{2} \times 6\frac{1}{2}$ feet in the clear. The parallel entry is 6x7 feet and all cross entries are 6x7 feet. The cross entries are 50 feet apart and cross cuts are driven every 50 feet. The parallel entry and the main entry are 50 feet apart and break thrus between the rooms are driven at 50 foot intervals. The mine uses United States permissible explosives and 60 per cent blasting cap and fuse, the explosive being bought in one and one-half ton quantities, and being stored in a suitable powder magazine 200 feet west of the portal. Each miner is permitted to take into the mine five pounds at a time. The regulations concerning the use of powder are to use 60 per cent blasting caps with a fuse, wooden tampers, and not to enter a room in case of a miss fire for 24 hours. In loading holes the fuse must project out of the holes to light and not more than three holes are to be fired together. In entries where the coal is broken or seamy the timbering consists of two uprights and a cross bar. In the rooms uprights and cross bars are used, as well as pin props. There is practically no water in the mine, 30 barrels per month being the maximum. The tippie is the old style end rocker dump and the storage consists of five concrete bins, each bin having a capacity of 100 tons, and an outside dump storage of 600 tons, making a total storage capacity of 1,100 tons. The mine buildings consist of a blacksmith shop, powder magazine, bath house with running hot and cold water and three bunk houses. No sale of coal

is made except to employees, to whom it is sold at the cost of mining plus the haulage; \$6,000 have been invested in surface equipment and \$21,000 in underground equipment. There has never been a fatal accident in the mine and but one serious accident has ever occurred, which was a broken leg. In this case the United States paid for the loss of time at the average earning capacity of a miner, at \$4.72 per day, the total amount paid being approximately \$500.

110. Head Coal Mine

The Head Coal Mine has been operated for some years. The coal is from 9 to 13 feet in thickness and occurs at a depth of from 40 to 45 feet. It is operated on a single entry system of mining, the main entry being driven in about 450 feet. Rooms have been worked off from the main entry and rooms off from these rooms again, no uniform system of mining being adopted. No regulations concerning shot firing are enforced, excepting that it is customary to shoot at noon and at six o'clock or after supper. No timbering is done in the entry; props and caps are used in the rooms. The mine is drained by a siphon, the water being ditched to a sump and a 2½ inch pipe running from there outside of the mine and down a coulee until a siphon effect is produced. The surface equipment consists of office, bunk house and boarding house. There is approximately \$750 invested in the surface equipment. On December 9, 1913, I found conditions in and about the mine to be safe.

111. Husebye & Ellithorpe Coal Mine

This coal mine was opened up during the fall of 1913. The mine is owned by Husebye & Ellithorpe of Williston, J. A. Husebye acting as superintendent and John Marek having charge of the underground work. The coal is 10 feet in thickness and occurs at a depth of about 70 feet. Timbering in the entries has been necessary and three piece sets are placed at five foot intervals, while in the rooms posts are placed at five foot intervals also. There is no water in the mine. The powder is stored in a powder house about 800 feet from the mine, in approximate amounts of 1,000 kegs. The coal is delivered at the top of the hill, on which the tipple is placed, by means of a steam hoist. Quite a complete tipple and scaling device has been built, and designed with a storage capacity in the chutes of 25 tons. An entry driven from the side hill into the coal body on the east side permits loading coal at this point. It also provides a second means of egress from the mine and assists the ventilation. Approximately \$2,200 has been spent for surface equipment and the same amount for underground equipment. On December 9, 1913, I found the mine to be in a satisfactory and safe condition.

112. Low Level Coal Mine

The Low Level Coal Mine is located at the station of Avoca about six miles east of Williston. The coal is between 10 and 11 feet in thickness. This mine was abandoned at the end of 1912 on account of the water, which proved excessive. The dip of the bed was to the north and as the work was driven that way the water constantly got worse. A Fairbanks & Morse Duplex Pump with a capacity of 600 gallons per minute was taxed

to the utmost to keep the mine dry. When the water got so that this pump could not handle it the mine was abandoned. The surface equipment consisted of a tippie with a large storage capacity, power house, compressor, hoisting engine, bunk house, boarding house and a dwelling house. The floor was of clay which heaved badly on account of the water. This mine was well laid out and well managed, but operations had to be discontinued on account of the unfavorable conditions.

113. Miller Coal Mine

The Miller Coal Mine is a small mine located about 12 miles north of Williston in a deep coulee, where the coal outcrops near the bottom. A drift is driven straight into the coal and from this entry rooms are turned off. The coal is about nine feet in thickness but is somewhat soft and full of seams. A sump has been dug and from this tiling leads to the outside. The mine supplies only a local trade and is not developed in a permanent manner. However, on December 10, 1913, I found the mine to be safe.

114. Moorman Coal Mine

The Moorman Coal Mine is owned and operated by J. M. Moorman. The mine supplies a local trade, and is located about seven miles southeast of Wheelock in what is called Hungry Gulch. The coal is from 9 to 10 feet thick and about seven feet is taken out. The mine is nearly dry. What little water collects at the face is ditched outside. Little timbering is done other than in the rooms, as the coal roof is very solid. About \$1,000 has been invested in underground equipment.

115. Powell Coal Mine

The Powell Coal Mine operated previously as the Williston Lignite Coal Mine. It has been leased by Ingram & Wilson, who operate it. The mine is operated within less than half a mile of the Black Diamond Coal Mine. The coal is from 8 to 10 feet in thickness and a coal roof from two to three feet thick is left which provides a secure roof. Little timbering is done other than posts and caps in the rooms. This mine is not laid out very well. This is partly due to the fact that an odd shaped block of coal lying between the entry and the north property line is being recovered. Another year it is anticipated that the coal to the south side will be worked mostly and this work will doubtless be laid out in a systematic manner. On December 9, 1913, I found the mine to be in a safe condition.

116. Sharpe Coal Mine

The Sharpe Coal Mine is located on school land and will be operated only until the lease expires. It has been leased by Mr. Sharpe to Wm. Penman, who operates it. This mine is a small one, supplies only a very local trade, and has not been opened in a sufficient manner. A single entry has been driven in for a distance of 250 feet and from this rooms have been turned. The ventilation is secured through a caved room which extended up through to the surface. The surface equipment consists of a bunk house, barn and scale house. The tippie permits direct loading in wagons, but provides no storage capacity. The coal is screened by forking when loaded in the mine cars. On December 10, 1913, I found that portion of the mine where work was being done safe.

Analyses of Lignite Coal Samples from North Dakota Mines

BY

DR. E. J. BABCOCK, Dean
College of Mining Engineering
University of North Dakota

EXPLANATORY

The State Engineer takes special pleasure in being able to include in this report the analyses of the coal of most of the mines of the state, the laboratory work being done by Dr. E. J. Babcock, Dean of the College of Mining Engineering. Dean Babcock is the foremost authority on lignites, and it is due to his courtesy and interest in the lignite industry that this department is able to present this valuable additional information.

The sampling was done at the time of inspection, by the State Engineer's officer, in the following manner:

A sample cloth about five feet square was spread on the floor of the mine next to the face of the coal where the sample was to be taken. A sample was cut extending from the roof to the floor of the mine. Special care was exercised to take samples only from fresh coal surfaces. The sample as collected on the sample cloth was then carefully broken into small uniform pieces, very thoroughly mixed and then spread out uniformly on the cloth and an average sample taken, sufficient to fill a two-quart jar. The jars were then tightly sealed. The sample before being reduced, i. e. as collected on the sample cloth, ordinarily amounted to from one-half to one bushel of coal.

JAY W. BLISS,
State Engineer.

University, North Dakota, August 22, 1914.

HON. JAY W. BLISS,
State Engineer,
Bismarck, N. D.

Dear Sir: The following are the results of the analyses and tests of 84 samples of lignite from mines of the state as gathered and sent by you. See index with corresponding laboratory number for name and location of mine.

Very respectfully,

E. J. BABCOCK, Dean,
College of Mining Engineering.

ANALYSES

| Laboratory Number | With Moisture as Received. | | | | | | Moisture Removed (Dry Basis.) | | | | |
|-------------------|----------------------------|--------------|-------|----------|---------|------------------------|-------------------------------|--------------|-------|---------|------------------------|
| | Volatle Matter. | Fixed Carbon | Ash | Moisture | Sulphur | Caloric Value B. T. U. | Volatle Matter | Fixed Carbon | Ash | Sulphur | Caloric Value B. T. U. |
| 3249 | 30.58 | 28.98 | 7.00 | 33.44 | 1.90 | 6,845 | 45.96 | 43.54 | 10.50 | 2.86 | 10,284 |
| 3250 | 29.45 | 31.66 | 7.97 | 30.92 | 0.51 | 6,911 | 42.64 | 46.84 | 11.52 | 0.74 | 10,005 |
| 3251 | 28.20 | 34.82 | 4.68 | 32.30 | 0.37 | 7,553 | 41.65 | 51.43 | 6.92 | 0.55 | 11,157 |
| 3252 | 30.28 | 32.30 | 7.15 | 30.27 | 1.56 | 7,165 | 43.42 | 46.33 | 10.25 | 2.24 | 10,280 |
| 3253 | 29.98 | 32.53 | 5.62 | 31.87 | 0.61 | 7,246 | 44.00 | 47.75 | 8.25 | 0.89 | 10,636 |
| 3254 | 26.30 | 28.35 | 11.03 | 34.32 | 0.41 | 6,507 | 40.05 | 43.16 | 16.79 | 0.63 | 9,907 |
| 3255 | 28.03 | 33.39 | 6.01 | 32.57 | 0.42 | 7,348 | 41.57 | 49.52 | 8.91 | 0.62 | 10,897 |
| 3256 | 28.30 | 30.63 | 8.76 | 32.31 | 0.43 | 7,006 | 41.81 | 46.25 | 12.94 | 0.64 | 10,350 |
| 3257 | 28.02 | 32.94 | 5.24 | 33.80 | 0.42 | 7,286 | 42.33 | 49.75 | 7.92 | 0.64 | 11,006 |
| 3258 | 30.08 | 27.55 | 7.07 | 35.30 | 0.32 | 6,663 | 46.49 | 42.59 | 10.92 | 0.49 | 10,298 |
| 3259 | 31.50 | 27.73 | 10.81 | 29.96 | 0.66 | 6,948 | 44.97 | 39.59 | 15.44 | 0.94 | 9,920 |
| 3260 | 27.61 | 33.02 | 5.63 | 33.74 | 0.42 | 6,967 | 41.67 | 49.84 | 8.49 | 0.63 | 10,530 |
| 3261 | 29.24 | 31.01 | 5.65 | 34.10 | 0.92 | 6,646 | 44.37 | 47.06 | 8.57 | 1.39 | 11,076 |
| 3262 | 26.53 | 26.66 | 6.81 | 40.00 | 0.80 | 5,935 | 44.22 | 44.44 | 11.34 | 1.34 | 9,890 |
| 3263 | 26.63 | 25.88 | 4.63 | 42.86 | 0.57 | 5,990 | 46.60 | 45.30 | 8.10 | 0.99 | 10,485 |
| 3264 | 26.32 | 27.02 | 6.22 | 40.44 | 0.77 | 6,210 | 44.19 | 45.36 | 10.45 | 1.29 | 10,430 |
| 3265 | 26.03 | 25.34 | 8.80 | 39.83 | 1.78 | 6,070 | 43.27 | 42.11 | 14.62 | 2.96 | 10,090 |
| 3266 | 33.53 | 23.86 | 6.81 | 35.80 | 0.84 | 6,840 | 52.22 | 37.17 | 10.61 | 1.31 | 10,665 |
| 3267 | 27.20 | 29.42 | 6.48 | 36.90 | 0.88 | 6,640 | 43.10 | 46.62 | 10.28 | 1.40 | 10,360 |
| 268 | 28.20 | 30.60 | 6.30 | 34.90 | 1.02 | 6,800 | 43.30 | 46.93 | 9.77 | 1.56 | 10,440 |
| 3269 | 26.66 | 26.99 | 9.33 | 36.52 | 3.01 | 6,495 | 42.00 | 42.52 | 15.48 | 4.74 | 10,230 |
| 3270 | 26.32 | 28.67 | 8.04 | 36.97 | 1.84 | 6,590 | 41.75 | 45.48 | 12.77 | 2.92 | 10,450 |
| 3271 | 25.40 | 30.04 | 4.24 | 40.32 | 0.47 | 6,330 | 42.56 | 50.33 | 7.11 | 0.78 | 10,610 |
| 3272 | 24.61 | 26.97 | 4.64 | 43.78 | 0.54 | 5,840 | 43.77 | 47.97 | 8.26 | 0.96 | 10,380 |
| 3273 | 26.13 | 25.41 | 6.81 | 41.65 | 0.86 | 6,075 | 44.78 | 43.54 | 11.68 | 1.47 | 10,410 |
| 3274 | 25.17 | 28.00 | 4.91 | 41.92 | 0.44 | 6,100 | 43.34 | 48.21 | 8.45 | 0.75 | 10,490 |
| 3275 | 24.39 | 29.76 | 3.53 | 42.32 | 0.43 | 6,290 | 42.29 | 51.60 | 6.11 | 0.75 | 10,900 |
| 3276 | 24.82 | 28.29 | 3.62 | 43.27 | 0.53 | 6,180 | 43.76 | 49.87 | 6.37 | 0.94 | 10,890 |
| 3277 | 26.66 | 21.72 | 5.44 | 46.18 | 0.64 | 5,250 | 49.54 | 40.36 | 10.10 | 1.19 | 9,740 |
| 3278 | 33.06 | 27.57 | 6.59 | 32.78 | 1.21 | 7,400 | 49.18 | 41.02 | 9.80 | 1.80 | 11,010 |
| 3279 | 30.72 | 29.88 | 6.24 | 33.16 | 0.98 | 7,385 | 45.97 | 44.72 | 9.31 | 1.47 | 11,050 |
| 3280 | 29.27 | 31.36 | 4.07 | 35.30 | 0.18 | 7,020 | 45.22 | 48.45 | 6.33 | 0.28 | 10,850 |
| 3281 | 28.57 | 29.20 | 4.17 | 38.06 | 0.17 | 6,715 | 46.13 | 47.14 | 6.73 | 0.27 | 10,840 |
| 3282 | 30.98 | 27.05 | 4.87 | 37.10 | 0.60 | 6,780 | 48.98 | 43.01 | 8.01 | 0.95 | 10,780 |
| 3283 | 29.52 | 30.93 | 3.75 | 35.80 | 0.22 | 6,940 | 45.98 | 43.17 | 5.85 | 0.35 | 10,810 |
| 3284 | 28.42 | 28.66 | 6.42 | 36.50 | 1.37 | 6,745 | 44.76 | 45.14 | 10.10 | 2.16 | 10,620 |
| 3285 | 29.57 | 30.64 | 5.91 | 33.88 | 0.86 | 7,140 | 44.73 | 46.34 | 8.93 | 1.30 | 10,800 |
| 3286 | 31.93 | 26.11 | 8.04 | 33.92 | 0.37 | 6,580 | 48.32 | 39.52 | 12.16 | 0.56 | 9,955 |
| 3287 | 28.71 | 29.47 | 4.74 | 37.08 | 0.68 | 6,870 | 45.63 | 46.84 | 7.53 | 1.08 | 10,915 |
| 3288 | 33.55 | 25.15 | 7.30 | 34.00 | 0.33 | 6,865 | 50.84 | 38.10 | 11.06 | 0.50 | 10,400 |
| 3289 | 32.35 | 24.32 | 6.71 | 36.64 | 0.92 | 6,560 | 51.03 | 38.89 | 10.58 | 1.45 | 10,350 |
| 3290 | 31.52 | 29.92 | 7.11 | 31.45 | 0.36 | 6,980 | 45.98 | 43.65 | 10.37 | 0.53 | 10,170 |
| 3291 | 34.57 | 32.85 | 5.26 | 27.32 | 0.35 | 7,765 | 47.57 | 45.20 | 7.23 | 0.48 | 10,670 |
| 3292 | 34.37 | 25.00 | 5.85 | 35.28 | 0.54 | 6,505 | 53.11 | 38.62 | 8.27 | 0.83 | 10,050 |
| 3293 | 33.00 | 26.86 | 3.68 | 36.46 | 0.46 | 6,900 | 51.94 | 42.27 | 5.79 | 0.71 | 10,860 |
| 3294 | 25.97 | 25.03 | 17.77 | 31.23 | 0.30 | 5,710 | 37.77 | 36.40 | 25.83 | 0.44 | 8,300 |
| 3295 | 27.86 | 29.57 | 9.17 | 33.40 | 0.15 | 6,430 | 41.86 | 44.40 | 13.74 | 0.22 | 9,650 |

ANALYSES

| Laboratory Number | With Moisture as Received. | | | | | Moisture Removed (Dry Basis). | | | | | |
|-------------------|----------------------------|--------------|-------|----------|---------|-------------------------------|-----------------|--------------|-------|---------|--------------------------|
| | Volatile Matter | Fixed Carbon | Ash | Moisture | Sulphur | Calorific Value B. T. U. | Volatile Matter | Fixed Carbon | Ash | Sulphur | Calorific Value B. T. U. |
| 3296 | 27.93 | 25.11 | 13.66 | 33.30 | 0.62 | 6,015 | 41.88 | 37.65 | 20.47 | 0.93 | 9,015 |
| 3297 | 26.33 | 29.09 | 8.88 | 35.20 | 0.19 | 6,140 | 41.41 | 44.89 | 13.70 | 0.29 | 9,475 |
| 3298 | 26.33 | 31.07 | 6.25 | 36.30 | 0.36 | 6,650 | 41.42 | 48.78 | 9.80 | 0.57 | 10,440 |
| 3299 | 28.86 | 31.15 | 6.99 | 33.00 | 0.36 | 7,040 | 43.08 | 46.50 | 10.42 | 0.53 | 10,510 |
| 3300 | 29.26 | 32.67 | 6.20 | 31.87 | 0.29 | 7,305 | 42.95 | 47.95 | 9.10 | 0.42 | 10,720 |
| 3301 | 29.92 | 29.67 | 6.41 | 34.00 | 0.26 | 6,700 | 45.34 | 44.96 | 9.70 | 0.40 | 10,150 |
| 3302 | 28.43 | 28.43 | 5.14 | 38.00 | 0.49 | 6,300 | 45.85 | 45.85 | 8.30 | 0.79 | 10,970 |
| 3303 | 28.55 | 30.10 | 5.60 | 35.75 | 0.50 | 7,020 | 44.43 | 46.83 | 8.74 | 0.77 | 10,925 |
| 3304 | 30.10 | 28.04 | 11.19 | 30.67 | 0.33 | 6,285 | 43.41 | 40.44 | 16.15 | 0.48 | 9,065 |
| 3305 | 31.14 | 26.79 | 12.47 | 29.60 | 0.23 | 6,295 | 44.24 | 38.06 | 17.70 | 0.32 | 8,940 |
| 3306 | 29.55 | 29.12 | 8.38 | 32.95 | 0.29 | 6,410 | 44.07 | 43.43 | 12.50 | 0.43 | 9,560 |
| 3307 | 30.39 | 27.35 | 8.36 | 33.90 | 0.26 | 6,570 | 45.95 | 41.38 | 12.67 | 0.29 | 9,940 |
| 3308 | 32.21 | 28.12 | 5.97 | 33.70 | 1.15 | 7,040 | 48.59 | 42.41 | 9.00 | 1.84 | 10,620 |
| 3309 | 32.82 | 22.88 | 8.40 | 35.90 | 0.99 | 6,420 | 51.20 | 35.70 | 13.10 | 1.55 | 10,810 |
| 3310 | 30.33 | 26.38 | 5.29 | 38.00 | 0.89 | 6,525 | 48.92 | 42.55 | 8.53 | 1.44 | 10,520 |
| 3311 | 30.03 | 25.74 | 7.43 | 36.80 | 1.20 | 6,660 | 47.52 | 40.73 | 11.75 | 1.89 | 10,540 |
| 3312 | 29.95 | 23.83 | 4.92 | 41.30 | 0.75 | 6,293 | 51.03 | 40.60 | 8.37 | 1.28 | 10,720 |
| 3313 | 27.88 | 19.99 | 8.88 | 43.75 | 0.51 | 5,340 | 49.56 | 35.54 | 14.90 | 0.93 | 9,490 |
| 3314 | 30.06 | 24.32 | 7.77 | 37.85 | 0.61 | 6,225 | 48.36 | 39.14 | 12.50 | 0.98 | 10,015 |
| 3315 | 30.18 | 27.54 | 4.43 | 37.85 | 0.48 | 7,058 | 48.56 | 44.32 | 7.12 | 0.77 | 11,355 |
| 3316 | 28.14 | 27.41 | 4.00 | 40.45 | 0.54 | 6,580 | 47.26 | 46.04 | 6.70 | 0.90 | 11,050 |
| 3317 | 30.01 | 26.71 | 5.48 | 37.80 | 0.82 | 6,850 | 48.25 | 42.95 | 8.80 | 1.31 | 11,010 |
| 3318 | 28.90 | 28.97 | 6.83 | 35.30 | 0.98 | 6,935 | 44.67 | 44.77 | 10.56 | 1.52 | 10,720 |
| 3319 | 27.73 | 22.17 | 13.40 | 36.70 | 1.76 | 5,795 | 43.81 | 35.02 | 21.17 | 2.78 | 9,155 |
| 3320 | 29.30 | 23.50 | 6.20 | 36.00 | 0.91 | 6,615 | 45.79 | 44.55 | 9.66 | 1.42 | 10,335 |
| 3321 | 27.04 | 25.36 | 5.63 | 41.97 | 1.15 | 6,215 | 46.60 | 43.70 | 9.70 | 1.98 | 10,710 |
| 3322 | 29.72 | 27.14 | 3.19 | 39.95 | 0.28 | 6,610 | 49.50 | 45.20 | 5.30 | 0.44 | 11,010 |
| 3323 | 33.63 | 30.92 | 5.75 | 29.70 | 0.36 | 7,360 | 47.84 | 43.98 | 8.18 | 0.51 | 10,470 |
| 3324 | 27.94 | 31.62 | 5.50 | 34.94 | 0.46 | 6,805 | 42.94 | 48.61 | 8.45 | 0.71 | 10,460 |
| 3325 | 27.18 | 18.00 | 11.50 | 43.32 | 0.27 | 5,290 | 47.96 | 31.76 | 20.28 | 0.47 | 9,325 |
| 3326 | 23.94 | 22.08 | 18.35 | 35.63 | 1.92 | 5,180 | 37.19 | 34.31 | 28.50 | 2.99 | 8,045 |
| 3327 | 25.27 | 26.00 | 5.07 | 43.66 | 0.33 | 5,865 | 44.85 | 46.15 | 9.00 | 0.59 | 10,410 |
| 3328 | 30.10 | 22.00 | 9.90 | 38.00 | 1.23 | 5,370 | 48.55 | 35.48 | 15.97 | 1.99 | 8,660 |
| 3329 | 30.57 | 24.65 | 5.03 | 39.75 | 0.61 | 6,236 | 50.75 | 40.92 | 8.33 | 1.01 | 10,350 |
| 3330 | 37.26 | 29.78 | 12.86 | 20.10 | 4.56 | 7,292 | 46.63 | 37.27 | 16.10 | 5.71 | 9,125 |
| 3331 | 32.48 | 27.31 | 4.51 | 35.70 | 0.50 | 7,070 | 50.52 | 42.38 | 7.10 | 0.77 | 10,840 |
| 3332 | 30.80 | 28.85 | 5.50 | 34.85 | 0.50 | 6,925 | 47.27 | 44.28 | 8.45 | 0.77 | 10,630 |
| Av. of 84 samples | 29.13 | 27.90 | 6.99 | 35.98 | .... | 6,591 | 45.53 | 43.60 | 10.87 | .... | 10,323 |

Note—Names and location of mines will be found in the index to laboratory numbers.

INDEX TO LABORATORY NUMBERS

| Laboratory Number. | Name of Mine. | Location. | *Number of Mine. |
|--------------------|-------------------------------------|-------------------|------------------|
| 3249 | New Salem Coal Mine..... | New Salem..... | 44 |
| 3250 | Noonan Coal Co. Mine..... | Noonan | 27 |
| 3251 | Dougherty Coal Mine..... | Noonan | 25 |
| 3252 | Houghtlet Coal Mine..... | Noonan | 26 |
| 3253 | Pleasant Valley Coal Mine..... | Center | 64 |
| 3254 | Domrese Coal Mine..... | Columbus | 9 |
| 3255 | Fenster Coal Mine..... | Larson | 10 |
| 3256 | Souther Coal Mine..... | Larson | 15 |
| 3257 | Hagen Coal Mine..... | Larson | 13 |
| 3258 | Gille Coal Mine..... | Stampede | 11 |
| 3259 | Greenup Coal Mine..... | Columbus | 12 |
| 3260 | Truax Coal Mine..... | Noonan | 28 |
| 3261 | North Star Coal Mine..... | Hebron | 45 |
| 3262 | Zenith Coal Mine..... | Zenith | 72 |
| 3263 | Gross Coal Mine..... | Belfield | 68 |
| 3264 | Lehigh Coal Mine..... | Dickinson | 69 |
| 3265 | Pittsburg Coal Mine..... | Dickinson | 70 |
| 3266 | Flint Coal Mine..... | Hannover | 62 |
| 3267 | Spring Valley Coal Mine..... | Center | 65 |
| 3268 | Garfield Coal Mine..... | New Salem | 42 |
| 3269 | High Grade Coal Mine..... | Medora | 6 |
| 3270 | High Grade Coal Mine..... | Medora | 6 |
| 3271 | Sharpe Coal Mine..... | Williston | 116 |
| 3272 | Husebye & Ellithorpe Coal Mine..... | Williston | 111 |
| 3273 | Barto Coal Mine..... | White Earth | 147 |
| 3274 | Miller Coal Mine..... | Williston | 113 |
| 3275 | Bryn Coal Mine..... | Williston | 106 |
| 3276 | Head Coal Mine..... | Williston | 110 |
| 3277 | Jackson Coal Mine..... | Bowman | 7 |
| 3278 | Farmers Coal Mine..... | Haynes | 2 |
| 3279 | Haynes Coal Mine..... | Haynes | 3 |
| 3280 | Caflisch Coal Mine..... | Velva | 78 |
| 3281 | Strong Coal Mine..... | Velva | 101 |
| 3282 | Leeson Coal Mine No. 1..... | Velva | 92 |
| 3283 | Leeson Coal Mine No. 2..... | Velva | 93 |
| 3284 | Tehelka Coal Mine..... | Carplo | 66 |
| 3285 | Wooster Coal Mine..... | Carplo | 67 |
| 3286 | McClure Coal Mine..... | Tasker | 95 |
| 3287 | Baden Coal Mine..... | Baden | 73 |
| 3288 | Bertelson Coal Mine No. 2..... | Kenmare | 75 |
| 3289 | Bitumina Coal Mine..... | Washburn | 32 |
| 3290 | Rich Coal Mine..... | Bowbells | 98 |
| 3291 | Farmers Lignite Coal Mine..... | Bowbells | 86 |
| 3292 | Borchardt Coal Mine..... | Underwood | 33 |
| 3293 | Hansen Coal Mine..... | Underwood | 35 |
| 3294 | Foresythe Coal Mine..... | Burlington | 83 |
| 3295 | Davis Coal Mine..... | Burlington | 83 |
| 3296 | Lloyd Coal Mine..... | Burlington | 94 |
| 3297 | Burlington City Coal Mine..... | Burlington | 77 |
| 3298 | Crosby Coal Mine..... | Kenmare | 82 |
| 3299 | Bertelson Coal Mine No. 1..... | Kenmare | 74 |
| 3300 | Smith Dry Coal Mine..... | Kenmare | 99 |
| 3301 | Diamond Coal Mine..... | Kenmare | 85 |

INDEX TO LABORATORY NUMBERS—Cont.

| Laboratory Number. | Name of Mine. | Location. | *Number of Mine. |
|--------------------|---------------------------------------|---------------------|------------------|
| 3302 | Vadnais Coal Mine..... | Kenmare | 103 |
| 3303 | Brick Yard Coal Mine..... | Kenmare | 76 |
| 3304 | Hunnell Coal Mine..... | Burlington | 90 |
| 3305 | Wallace Coal Mine..... | Burlington | 104 |
| 3306 | Conan Coal Mine..... | Burlington | 81 |
| 3307 | Colton Coal Mine..... | Burlington | 80 |
| 3308 | Lind Coal Mine..... | Wilton | 22 |
| 3309 | Anderson Coal Mine..... | Wilton | 13 |
| 3310 | Peterson Coal Mine..... | Wilton | 23 |
| 3311 | Scranton Coal Mine (East Entry)..... | Scranton | 8 |
| 3312 | Scranton Coal Mine (North Entry)..... | Scranton | 8 |
| 3313 | Williams Coal Mine..... | White Earth..... | 60 |
| 3314 | Porger Coal Mine..... | White Earth..... | 55 |
| 3315 | Powell Coal Mine..... | Williston | 115 |
| 3316 | Brown Coal Mine..... | Williston | 107 |
| 3317 | Black Diamond Coal Mine..... | Williston | 105 |
| 3318 | Stevenson & Gunderson Coal Mine..... | Haynes | 4 |
| 3319 | †"Section 16 Mine" (141-105)..... | Beach | ... |
| 3320 | De Mores Coal Mine..... | Medora | 5 |
| 3321 | †Sentinel Butte Coal Mine..... | Sentinel Butte..... | ... |
| 3322 | Ulrich Coal Mine..... | Garrison | 39 |
| 3323 | Hill Coal Mine..... | Garrison | 36 |
| 3324 | Youngquist Coal Mine..... | Washburn | 40 |
| 3325 | John Coal Mine..... | Epworth | 52 |
| 3326 | Elgers Coal Mine..... | Stanley | 49 |
| 3327 | Bowman Coal Mine..... | Epworth | 48 |
| 3328 | Sunday Coal Mine..... | Amanda | 59 |
| 3329 | Rodgers Coal Mine..... | Palermo | 56 |
| 3330 | North Star Coal Mine..... | Amanda | 53 |
| 3331 | Hot Blast Coal Mine..... | Donnybrook | 89 |
| 3332 | Square Deal Coal Mine..... | Donnybrook | 100 |

*Refers to the number given the mine in the mine report.

†Samples were taken at these mines as the coal was exposed in fresh faces, but insufficient data made it useless to list them. Both mines were very small. (State Engineer.)