

The Washburn Mine at Wilton.—*Wilton* is situated near the northern boundary of Burleigh county, in the center of an area stretching north into McLean county and across the Missouri river into Oliver and Mercer counties, which has long been known to abound in lignite coal. In reality this area is but a portion of the great lignite area, this being somewhat better known than the large region just west of it. Later study will doubtless show that western Oliver and Mercer counties are as richly endowed with lignite as the eastern portions along the Missouri river, and the section outlined above will appear as but a small fraction_ of the eastern edge of the great lignite area.

The coal about Wilton was first brought into special prominence by the opening of the large Washburn mine, the largest mine up to this time operated in the state. Work on a large scale in this region was rendered possible by the building- of the Bismarck, Washburn & Great Falls Railroad, which developed a region with large mineral and agricultural resources. Although opened only two years ago, the Washburn mine would be regarded as a large mine, judged by the standards recognized in the older coal producing portions of the country.

The topography of the region about Wilton is that o: the moderately rolling older drift. Drainage is complete and the surface conditions for farming admirable. At the Washburn mine, which is a mile southeast of Wilton, the lignite lies sixty feet below the surface. No lignite is known to occur between the surface and the seam mined. In thickness this seam varies from eight to thirteen feet, the variations in thickness being irregular, and after being reduced to its minimum thickness it often thickens again. Variations of this sort are due to the rising of the floor or the lowering of the roof, or both. The base of the lignite dips consequently, not on account of folding in the strata, but because of unevenness of the floor on which it was deposited. Moreover it sometimes rises five degrees without any reduction in the thickness of the seam. Below the seam mined six to eighteen inches of clay occur, followed by a coal seam varying in thickness from six inches to two feet. The section, then, as given at the Washburn mine shaft is as follows :

	FEET.	INCHES.
5. Drift	8	
4. Clay and sand	52	
3. Lignite	8-13	
2. Clay		6-18
1. Lignite		6-24

Toward the west this vein grows thinner, and as shown by wells at Wilton, is there only two feet thick. Toward the north, however, it continues for seven or eight miles, its average thickness of eleven feet having been demonstrated in a considerable area by drilling. Whether the seam extends southeast continuously to the Ecklund mine, which is two miles away, is uncertain.

From six to eight feet of the seam are mined, the remainder being left to form a roof. Above the seam lie eight feet of brittle joint clay, which in turn is overlaid with sand. The mine is worked with the double entry and room and pillar systems, the width of the rooms being seventeen feet. A single row of wooden posts in the center of the rooms supports the roof. Between the rooms fourteen foot pillars are left. There is very little timber in the entries. While there is some water in the 'mine, the amount is not sufficient to render it troublesome. About 10,000 gallons are pumped every twenty-four hours. The flow in summer is somewhat stronger than in winter. The floor heaves slightly, due to the pinching in of the under clay, but the presence of the thin coal seam already noted as occurring two feet lower, greatly checks this tendency. Up to September, 1902, the lignite had been removed from about six acres.

The mine entry slopes from the surface at an angle of twenty-three degrees till the lignite is reached. At present six Jeffrey undercutting mining machines are in operation. After this machine is set it undercuts the lignite for a distance of seven feet in four minutes, the width of the groove being four feet. Electric drills are used, and six holes in two horizontal rows are drilled into the end of the room after the removal of the undercutter. Six shots are sufficient to bring down the lignite above the undercut, the lower row of three holes being shot first. For shooting, picking down and trimming rooms miners receive 30 cents a ton, and 35 cents for the same work in entries. Ventilation is secured by two thirty inch fans and one one hundred inch fan,

the latter installed on the surface. The coal is brought to the surface in an elevator made by the Jeffreys Manufacturing Co., which hoists it from the level of the seam, sixty feet beneath the surface, to the top of a tippie from which it slides down chutes into cars on the sidetrack. An Ottumwa box car loader facilitates the process of filling cars. The surface equipment of the mine is shown in plate Villa, while b shows Chapin, the new town of miners' houses.

In August, 1902, the output was 180 tons a day, while during the preceding winter it reached 475 tons a day. During the present winter the daily output amounts to 1,000 tons.

The mine was laid out by Mr. R. M. Hazeltine of Ohio, mining expert. Mr. A. C. Dixon is superintendent, and C. P. Eckels manager. A diagram of the underground development appears in a subsequent chapter.

Two analyses of the Wilton lignite will serve to illustrate its excellent quality.

Number 1.

Fixed carbon
Ash

Volatile matter

Number 2.

Volatile matter
Fixed carbon
Ash

*Analyses by Prof. E. J. Babcock, First Biennial Report North Dakota Geological Survey.
LIGNITE DEPOSITS OF BILLINGS COUNTY

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	PER CENT.
Top Layer.	
Volatile matter	41.62
Fixed carbon	53.75
Ash	4.63
Center of Layer.	
Volatile matter	40.61
Fixed carbon	53.67
Ash	5.72
Bottom Layer.	
Volatile matter	42.41
Fixed carbon	50.47
Ash	7.12