

The Occurrence of Coal Balls in No. 6 Coal Bed at Nashville, Illinois¹

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Coal balls were found in the mine at Nashville about one year ago, April 9, 1935, by L. C. McCabe, C. G. Ball, and the writer, who were being taken through the mine by Mr. Samuel Day, mine manager and part owner of the mine. At a recent visit, April 17, 1936, by J. M. Schopf, Eugene Baysinger, and the writer two other pockets of coal balls were observed, both, however, much smaller than the one found in 1935, from which nearly 200 coal balls were recovered, after a considerable part of the accumulation had been cut down and discarded.

The Nashville mine is located at a central position in Washington County, Illinois, and is working Herrin (No. 6) coal at a depth of 407 feet. Including a basal "bone" coal layer the bed has the unusual thickness of about 9 feet. The thickness of the part mined above the bone coal is $5 \frac{1}{6}$ to 6 feet.

The surface of the coal bed is even except for local depressions of relatively small area and an extensive channel-like depression along the east side of the mine which probably cuts entirely through the coal. There are a few places where the bed is broken for short distances by faults, none with a throw greater than about one-half the thickness of the bed. Except for the irregularity in the beds along the east side of the mine no definite alignment or arrangement of the depressions in the coal bed have been noted. These, of course, can only be observed in the face or ribs of rooms and entries but none seems to be traceable more than fifteen or twenty feet, and usually they do not extend this distance.

Three varieties of shale overlie the coal, each being in some places in direct contact with the coal bed. In addition there is to be seen over large areas of the mine the blanketing layer of the caprock, a limestone bed which at the shaft is reported as 10 feet in thickness. This limestone bed seems to be an unbroken, unjointed layer of limestone unaffected by the irregularities observed in the beds between it and the coal. The three varieties of shale are first, a gray shale, always when present immediately overlying the coal bed; second, a very argillaceous limestone or calcareous shale usually black to very dark gray in color but locally much purer limestone and of light gray color, which overlies either the coal or the gray shale into which it grades; and third, black

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sheety shale which always underlies the caprock, and may overlie the coal, the dark calcareous shale or limestone, or the gray shale. In general when the gray shale is present there is a transition upwards into the impure argillaceous limestone. The black slate is in abrupt contact with whatever strata underlie it but there is not uncommonly a thin streak of coal one-eighth to one-fourth inch in thickness at the bottom of this bed. This bed has a very uniform thickness of about 30 inches, the upper part being somewhat less carbonaceous and less indurated than the lower half. A few inches of rather soft shale lie immediately below the limestone. The base of the limestone, which is all that can be seen except in the shaft, is for the most part very even in its general appearance, but in detail this lower surface is a series of knobs and depressions several inches across and one or two inches deep. Here and there, however, the limestone extends downward in a knob-like protrusion several feet across at the top reaching almost to the top of the coal bed, thus they not uncommonly have a height of 20 to 30 inches.

From this description it is doubtless understood that there is involved in the stratigraphic succession a widespread coal bed, except where absent along a channel-like cut-out on the east side of the mine, a lenticular layer of gray shale which in general grades upward into a lenticular layer of argillaceous limestone or calcareous shale, a widespread bed of black sheety shale, and a massive limestone at the top.

The irregularities in the upper part of the bed are apparently all phenomena resulting from the lenticular character of the gray and calcareous shales. The lenses of such material in some instances thicken very gradually and widen the interval between the coal and the black slate. In other places they thicken very abruptly and very apparently represent deposition made in narrow depressions in the top of accumulated material. At such places there have been necessary adjustments in the coal and "slate" and in the arching and possibly faulting of the limestone because of the greater thickness of strata between the base of the coal bed and the base of the limestone where the shale lens is present. Such adjustments account for most of the structural irregularities in the mine.

The coal balls are found in the northern part of the mine where the immediate roof of the bed is the argillaceous lower limestone. At the locality where the largest accumulation was found the limestone was purer than usual and relatively massive, indicating an abundance of calcareous material present. They lie in the upper two or three feet of the bed and the adjacent coal is heavily impregnated with calcite facings.