Arclar Company, LLC
Willow Lake Mine
Saline County, IL

Arclar - Willow Lake

Arclar Company, LLC - Willow Lake Mine - Saline County, Illinois Notes by John Nelson on visit with Tom Moore and Russ Jacobson of the ISGS, accompanied by Ron Pickering of Arclar, February 20, 2004.

Arclar (pronounced Are-clare), which formerly operated the Big Ridge underground mine, is now a subsidiary of Peabody Coal. The Big Ridge Mine was abandoned a bit prematurely on account of a fire underground. The workings of Willow Lake adjoin those of Big Ridge on the east.

Currently five units are in operation. Each has two continuous miners, four battery-powered ramcars or shuttle cars, and two double-boom roof bolters. Pillars in the main headings are generally 70 X 80 feet, those in the panels are 60 X 60 feet. Pillars are not pulled.

We had a quick tour underground to two working faces in the northeast part of the mine. Diesel mantrips run directly up and down the slope from the surface; there is no hoist or cage. From the bottom, the coal drops off to the north steadily for some distance, then it levels out. The slope bottom is near the crest of a structural dome. Inside the mine, the coal is quite uniform in thickness at 5 to 5½ feet and it undulates gently. The only structural feature to mention is the igneous dike, which I saw on my visit last summer. We did not look at the dike this time.

At the face areas we visited, the roof consists of small lenses (maybe 2 to 3 feet thick) of Dykersburg Shale, overlain in turn by Turner Mine black shale and St. David Limestone. The Dykersburg is dark gray, silty, and it contains pyrite nodules and pectenoid pelecypods such as *Dunbarella*. The black, hard, thinly fissile Turner Mine Shale varies from 2 to 4 feet thick and contains numerous large spheroidal concretions that have pyrite rims. In places, large gray horizontal burrows are present near the top of the black shale. Only the base of the limestone is visible; it is gray and nodular.

Apparently the lower part of the shale (Dykersburg in particular) is prone to fall right after mining, so the continuous miner takes as much as 2 feet of shale in places. Where this has been done, the shale remains almost entirely intact. Roof conditions generally are excellent. We saw no roof falls worthy of mention. The workings are so dry that they water the roadways to keep down the dust.

Planar, vertical joints are seen in the shale throughout the mine; measurements made in three different areas agree, showing N 80 W strike. Joints are widely spaced and are of little, if any concern for roof control.

A lack of geologic problems makes for productive mining and a short set of notes.

Black Beauty Coal Co. - Willow Lake Mine
Notes by John Nelson, July 15, 2003
with Penny Padgett of Black Beauty

Willow Lake is a slope mine in the Springfield (No. 5) Coal. It has been open less than two years, but already a substantial area has been mined out. Last year the coal production was more than 2 million tons. As of today they are operating 5 units or sections, each with two continuous miners, four shuttle cars, and two roof bolters. Pillars are not pulled. Coal haulage is via conveyor belt, diesel-powered machines move men and materials. The mantrips drive up and down the main slope. Two air shafts are fitted with cages for use in case of emergency.

I made a brief underground tour with Penny Padgett and two professors of mining engineering from the University of Kentucky. They are performing tests of the strength of the roof strata in mines throughout the Illinois Basin and Northern Appalachian coal fields. The tests are performed in holes drilled into the roof by the roof bolting machine. At Willow Lake, they tested one 12-foot borehole in No. 4 Unit, which is currently the northernmost working of the mine. A device is inserted into the hole, having a pin which is forced against the side of borehole. The operator works a hydraulic jack, monitoring a pressure gauge and gradually increasing the pressure to force the pin against the rock until the rock breaks. The pressure at which the rock fails is then recorded. Readings are taken at intervals of 4 to 12 inches along the length of the hole. In this case, the St. David Limestone was clearly evident about 3 feet above the coal; it had a breaking strength in excess of 4,000 PSI compared to 1,500-2,200 PSI for shales above and below (my numbers are approximate and from memory).

While the rock-strength test was being performed I made a quick inspection of the working faces. The Springfield Coal measured 4.3 to 4.8 feet thick. Because of heavy rock dust coating, I did not have opportunity to observe detailed structure of the coalbed; but there were no obvious partings. The floor is gray, slickensided claystone. The immediate roof in most places is the black, fissile Turner Mine Shale. It has well-developed joints that trend approximately east-west and are spaced several to the foot. I

am told that the east-west joint orientation prevails throughout the mine. Lenses of Dykersburg Shale are present. Where freshly exposed, this is dark brownish-gray and faintly laminated, containing lenses of pyrite and numerous pectenoid pelecypods. The Dykersburg does not hold well in the roof, and generally is taken down with the coal during mining. I was told that lenses of Dykersburg are more numerous in the western part of the mine, and reach maximum thickness of about 3 feet.

According to Penny, the St. David Limestone is commonly a competent layer about one foot thick, but in places it is absent or grades to shale.

I did not observe any roof falls during my visit, not even in passing while riding to and from the face.

The mine has encountered an igneous dike that strikes slightly west of north. This is one of a swarm of such dikes that accompany the Cottage Grove Fault System. We had a look at the dike where it crosses the Main North Entries; unfortunately little detail could be seen because of the heavy coating of rock dust.

The best exposure of the dike was at Crosscut 74 in the easternmost return-air entry. Here the dike is about 11 feet wide (scaled off from a diagram made by Penny) and its margins are more or less vertical. It strikes N 15 W. The coal is coked on both sides of the dike out to about 5 feet from the margins. Penny says the coked coal zone is usually about half the width of the actual dike. In the roof, planar and steeply dipping fractures run parallel to both margins of the dike. Several of these bear vertically plunging slickensides, but they have little, if any displacement. Also, no offset of the coal across the dike is evident.

A lens of Dykersburg Shale is exposed close to the dike. The Turner Mine Shale overlies the Dykersburg with an erosional contact: horizontal layering in the gray shale is truncated by the inclined base of the black shale.