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Interpretation of Reflection Seismic Data Acquired for Knight Hawk Coal, LLC

by

Neil Anderson
Professor & Professional Geologist
Missouri University of Science and Technology

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16. Abstract

The Missouri University of Science and Technology geophysical crew acquired approximately 3000 lineal feet of reflection seismic data along five separate traverses (1-5) at the PEUG South mine site. The objective was to determine if any of the traverses overlie previously mined ground.

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Technical Report
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Interpretation of Reflection Seismic Data Acquired for Knight Hawk Coal, LLC

Submitted by:
Neil Anderson, Professor & Professional Geologist
Missouri University of Science and Technology

Executive Summary: The interpretation of the acquired reflection seismic data suggests that the five traverses (shown in Figure 1) probably do not overly previously mined ground, with the possible exception of a segment of traverse 1 (stations 25+41 to 30+46; see Profile A; Figure 2).

Discussion: The Missouri University of Science and Technology geophysical crew acquired approximately 3000 lineal feet of reflection seismic data along five separate traverses (1-5) at the PEUG South mine site (Figure 1). The objective was to determine if any of the traverses overlie previously mined ground.

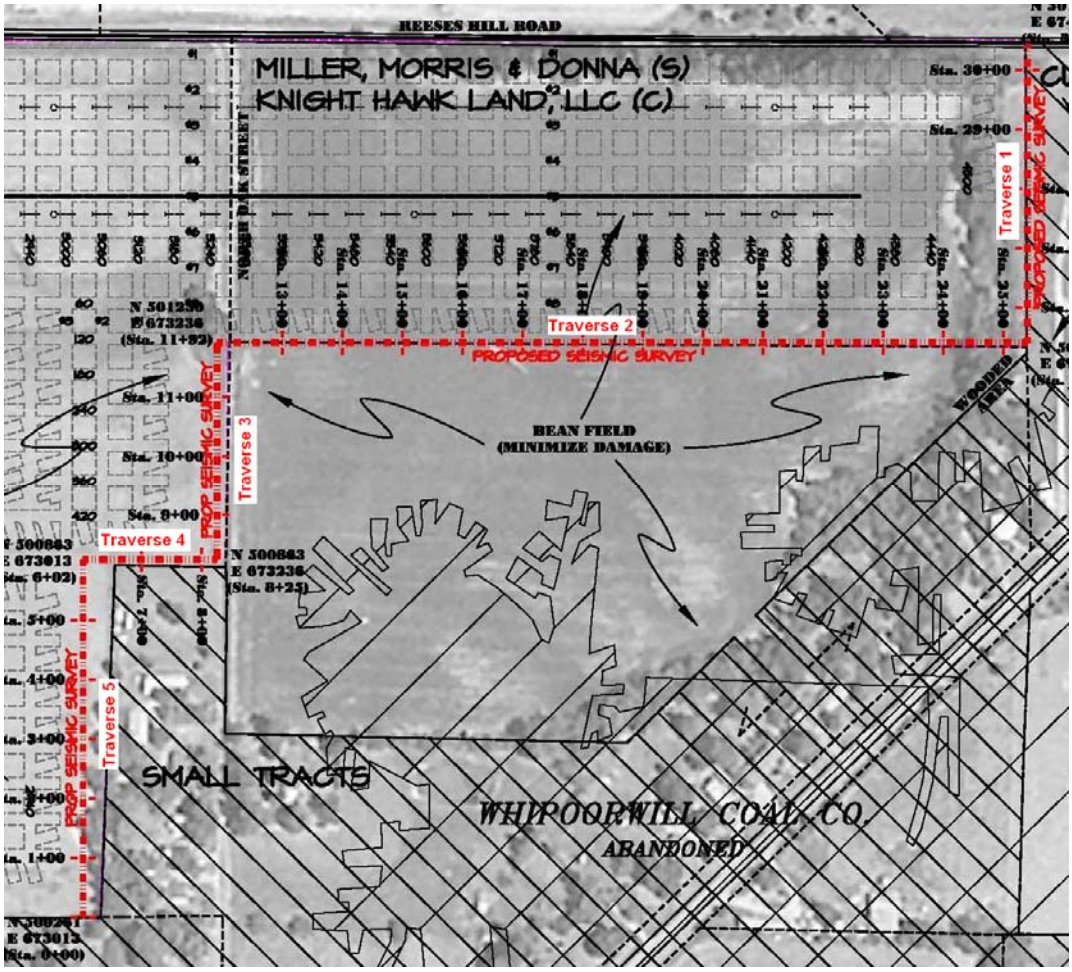

Figure 1: Plan view map showing location of five traverses (1-5) along which high-resolution reflection seismic data were acquired. The edge of previously mined ground (as per available mine maps) is also shown.

Seismic Profile A (Figure 2) was acquired along traverse 1 (Stations 25+41 to 30+46). As depicted in Figure 2, the time-depth to the refection from the top of bedrock (yellow line) appears to vary significantly across the seismic profile, being higher to the north and south than in the center. Such lateral variations in the depth to bedrock are typically associated with (and

often indicative of) irregular subsidence above previously mined ground. However, in my opinion, it is more likely that the time-structural relief observed along this profile at the bedrock level is due to natural causes (erosion). This interpretation is based on three observations: 1) traverse 1 parallels an existing stream; 2) bedrock is anomalously low over a distance of 250 ft; and 3) the reflection from the near-coal reflector (blue) almost parallels the bedrock event and is characterized by relatively uniform amplitudes. With respect to the last observation, I would anticipate seeing high amplitude reflections and diffractions from the top and base of mined out rooms on the seismic profile, if such rooms underlay traverse 1. In my opinion, if traverse 1 overlies previously mined ground, such ground would most probably be encountered by borehole placed at station 28+00.

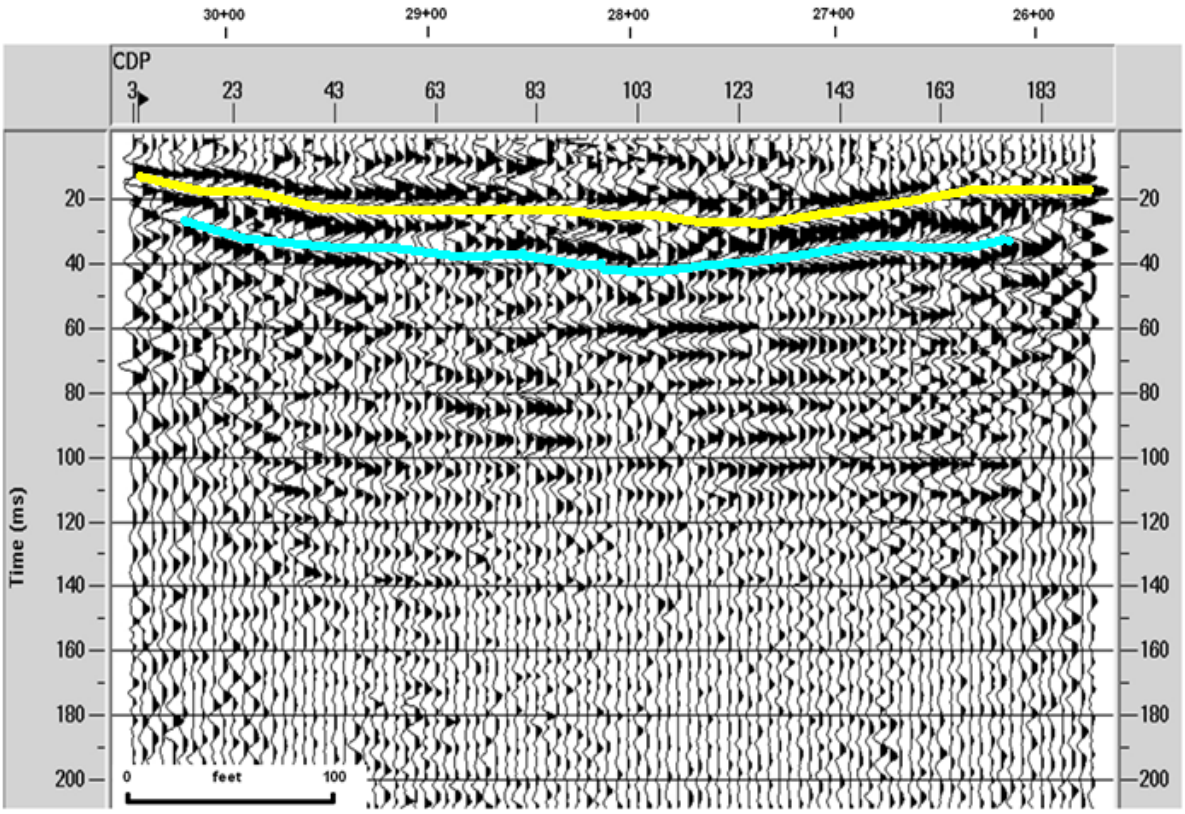

Figure 2: Seismic Profile A was acquired along traverse 1 (Stations 25+41 to 30+46). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).

Seismic Profiles B, C and D (Figures 3, 4 and 5) were acquired along traverse 2 (Stations 11+92 to 25+41). As depicted in Figures 3, 4 and 5, the reflection from the top of bedrock (yellow line) does not vary significantly (in terms of apparent depth) across the three seismic profiles and is characterized everywhere by relatively uniform amplitudes. The reflection from the near-coal reflector (blue) almost parallels the bedrock event and is also characterized by relatively uniform

amplitudes. Perhaps most significantly, we do not see any high-amplitude reflections or diffractions in proximity to the blue-colored (near-coal) event. Such features would normally be observed if water- or air-filled voids were from the top and base of mined out rooms on the seismic profile, if such rooms underlay traverse 2. In my opinion, traverse 2 does not overly previously mined ground.

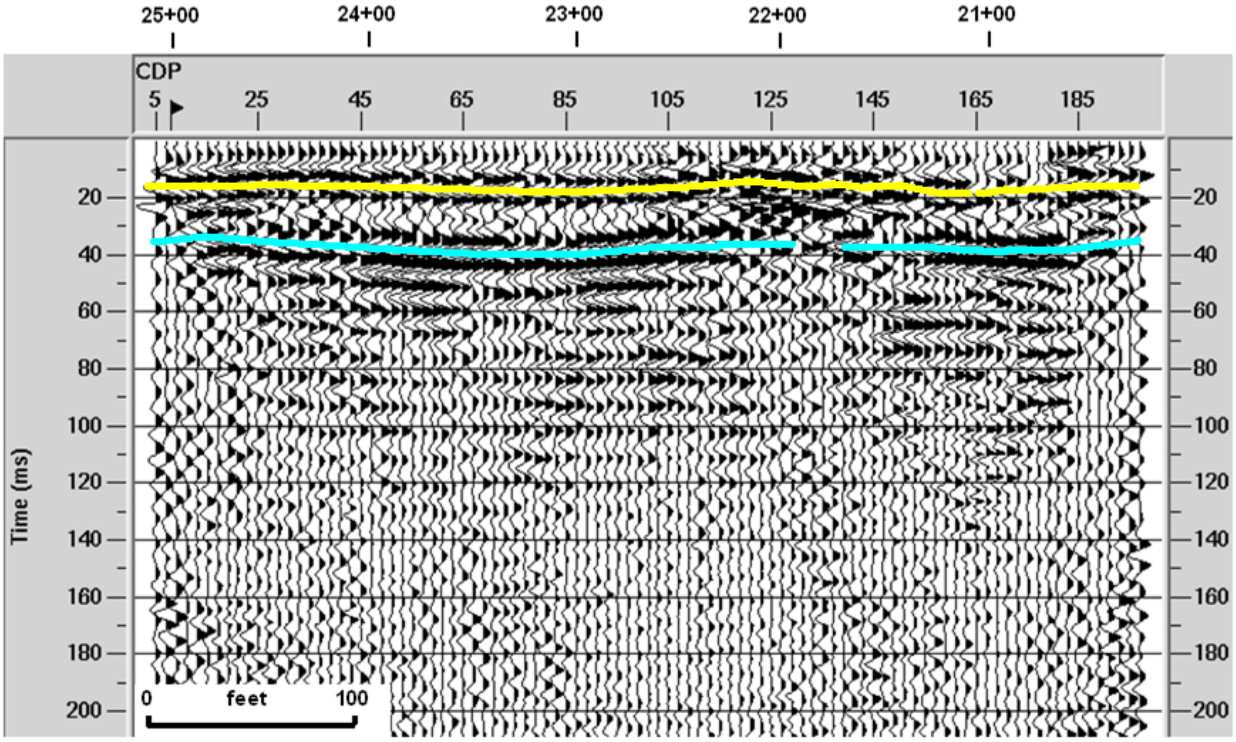

Figure 3: Seismic Profile B was acquired along eastern segment of traverse 2 (Stations 11+92 to 25+41). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).

Seismic Profile E (Figure 6) was acquired along traverse 3 (Stations 8+25 to 11+92). As depicted in Figure 6, the reflection from the top of bedrock (yellow line) does not vary significantly (in terms of apparent depth) across the three seismic profiles and is characterized everywhere by relatively uniform amplitudes. The reflection from the near-coal reflector (blue) almost parallels the bedrock event and is also characterized by relatively uniform amplitudes. Perhaps most significantly, we do not see any high-amplitude reflections or diffractions in proximity to the blue-colored event. Such features would normally be observed if water- or air-filled voids were from the top and base of mined out rooms on the seismic profile, if such rooms underlay traverse 3. In my opinion, traverse 3 does not overly previously mined ground.

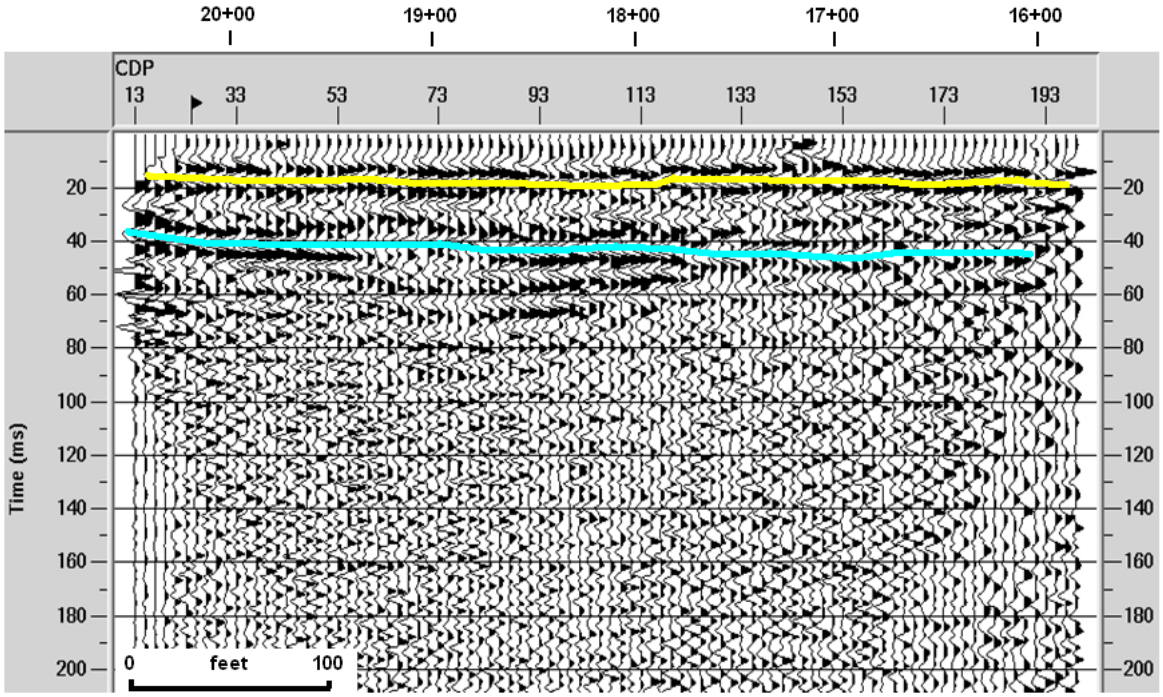

Figure 4: Seismic Profile C was acquired along central segment of traverse 2 (Stations 11+92 to 25+41). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).

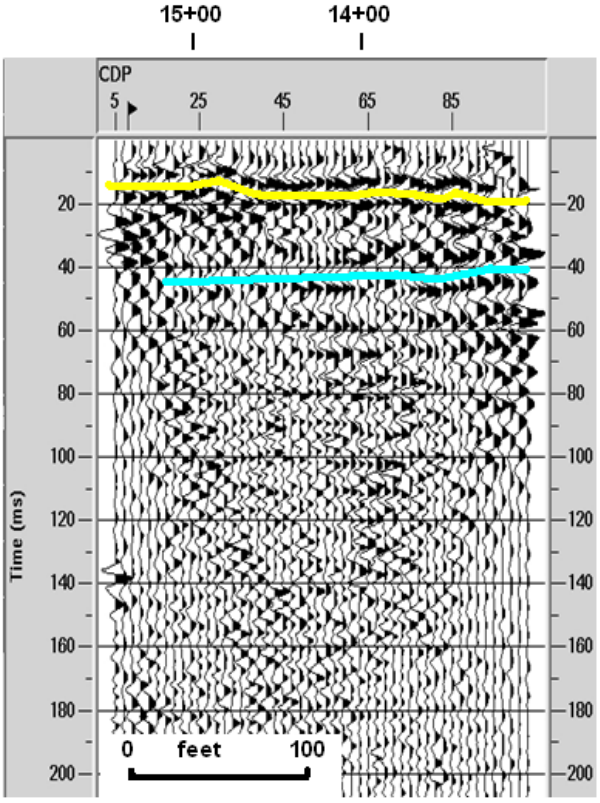

Figure 5: Seismic Profile D was acquired along western segment of traverse 2 (Stations 11+92 to 25+41). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).

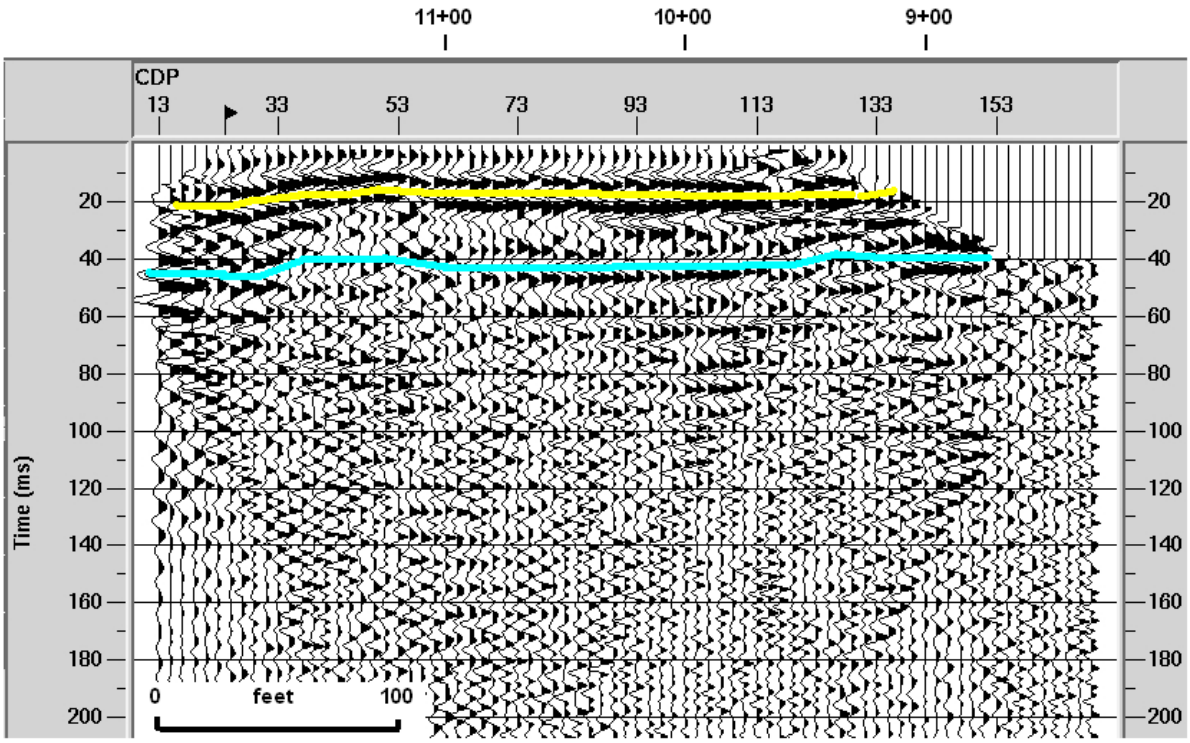

Figure 6: Seismic Profile E was acquired along traverse 3 (Stations 8+25 to 11+92). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).

Seismic Profile F (Figure 7) was acquired along traverse 4 (Stations 6+02 to 8+25). As depicted in Figure 7, the reflection from the top of bedrock (yellow line) does not vary significantly (in terms of apparent depth) across the three seismic profiles and is characterized everywhere by relatively uniform amplitudes. The reflection from the near-coal reflector (blue) almost parallels the bedrock event and is also characterized by relatively uniform amplitudes. Perhaps most significantly, we do not see any high-amplitude reflections or diffractions in proximity to the blue-colored event. Such features would normally be observed if water- or air-filled voids were from the top and base of mined out rooms on the seismic profile, if such rooms underlay traverse 1. In my opinion, traverse 4 does not overly previously mined ground.

Seismic Profile G (Figure 8) was acquired along traverse 5 (Stations 0+00 to 6+02). As depicted in Figure 8, the reflection from the top of bedrock (yellow line) does not vary significantly (in terms of apparent depth) across the three seismic profiles and is characterized everywhere by relatively uniform amplitudes. The reflection from the near-coal reflector (blue) almost parallels the bedrock event and is also characterized by relatively uniform amplitudes. Perhaps most significantly, we do not see any high-amplitude reflections or diffractions in proximity to the blue-colored event. Such features would normally be observed if water- or air-filled voids were from the top and base of mined out rooms on the seismic profile, if such rooms underlay traverse 1. In my opinion, traverse 5 does not overly previously mined ground.

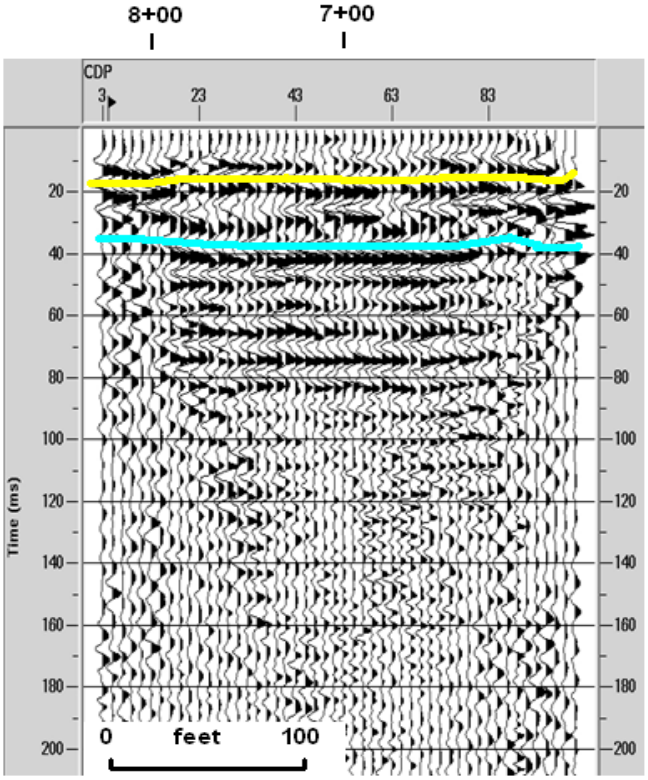

Figure 7: Seismic Profile F was acquired along western segment of traverse 4 (Stations 6+02 to 8+25). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).

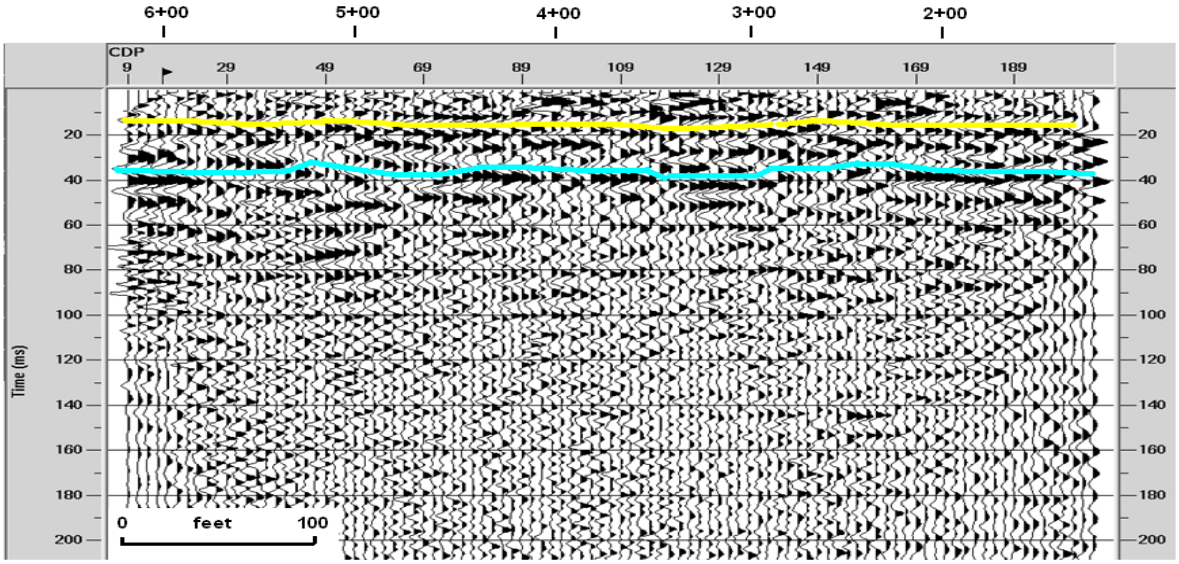

Figure 8: Seismic Profile G was acquired along traverse 5 (Stations 8+25 to 11+92). Two reflectors have been mapped on the seismic profile. The yellow-colored seismic event represents the top of bedrock; the blue-colored event represents a reflector in proximity to the coal layer (estimated depth of 100 ft).