1. In the shot record below, several events are highlighted. We discussed several of the features observed in this record during class. At this point, you are also familiar with the mathematical representation for refractions arriving from more than one constant thickness layer. Given this background, make observations on shot record and determine the depths to the layers giving rise to events observed in the record.

Answer the following questions:

a. How many layers are indicated by the shot record?

b. What are their velocities?

c. What are the time-intercepts?

d. Determine the thickness of each layer.

2. Suppose that a layer with a velocity of 1500 \( \text{m/s} \) and a thickness of 100 m lies above another layer with a velocity of 3000 \( \text{m/s} \). Compute the expected crossover distance and intercept time for the critically refracted waves.

\[
x_{\text{cross}} = 2h_1 \frac{V_1 + V_2}{\sqrt{V_2^2 - V_1^2}}
\]
3. Suppose that based on well information a structure consisting of four layers is recognized. The velocity and thickness of each layer is listed below:

\[
V_1 = 1500 \text{ m/s} \quad h_1 = 50 \text{ m} \\
V_2 = 2250 \text{ m/s} \quad h_2 = 100 \text{ m} \\
V_3 = 3500 \text{ m/s} \quad h_3 = 75 \text{ m} \\
V_4 = 4000 \text{ m/s}
\]

a. What is the critical distance for the refracted wave from the interface between the layers defined by velocities of 3500 and 4000 m/s?

b. If you change \(V_2\) to 3000 m/s, what will be the new value for the critical distance?

4a. Do problem 3.2 (Burger et al.). Instead of using the shot record presented in Figure 3.41, use the record shown at right. Note that the first geophone is at 3 meters from the source; the remainder are spaced at 10m intervals.

What can you see?

Interpret the data. This implies that you will determine the velocities of layers observed in the record and layer thickness to the extent possible.
4b. Determine the **velocities of layers** observed in the record and **layer thickness** to the extent possible.

What sources of error are more significant in this record than in that appearing in the above shot record?