Using 3rd Party Seg-Y Files in HYPACK® 2014

By Jerry Knisley

Recently, there has been a lot of interest in using 3rd party Seg-Y files in the HYPACK® 2014 software. The Seg-Y format is standard in Sub-Bottom surveying. It was introduced in 1975 and has achieved widespread implementation. In the beginning, the format was simple because computers were simple. In the nearly 40 years of its existence, the Seg-Y format has been modified once officially in 2002. Unofficially, every company that uses Seg-Y files can and has modified the format to suit their needs.

With many companies handling the SEG-Y data collection and all of the variations, both intentional and unintentional, it has become increasingly difficult to read 3rd party Seg-Y files. At HYPACK, we have our own version of the SEG-Y format that we create when surveying that adheres to the official Seg-Y standard. The HYPACK® Sub-Bottom Processing software is designed to read this format. The software will read and interpret any SEG-Y file that adheres to the standard without any issues.

Where the problem arises is when a SEG-Y file was recorded in a 3rd party program and does not strictly adhere to the format. The HYPACK® SUB-BOTTOM PROCESSOR can read either XY or latitude/longitude, but its geodesy must match your project geodesy. There are other reasons a file may not load. If you are experiencing a problem, please contact HYPACK Support, but be warned that we may not be able to read every file.

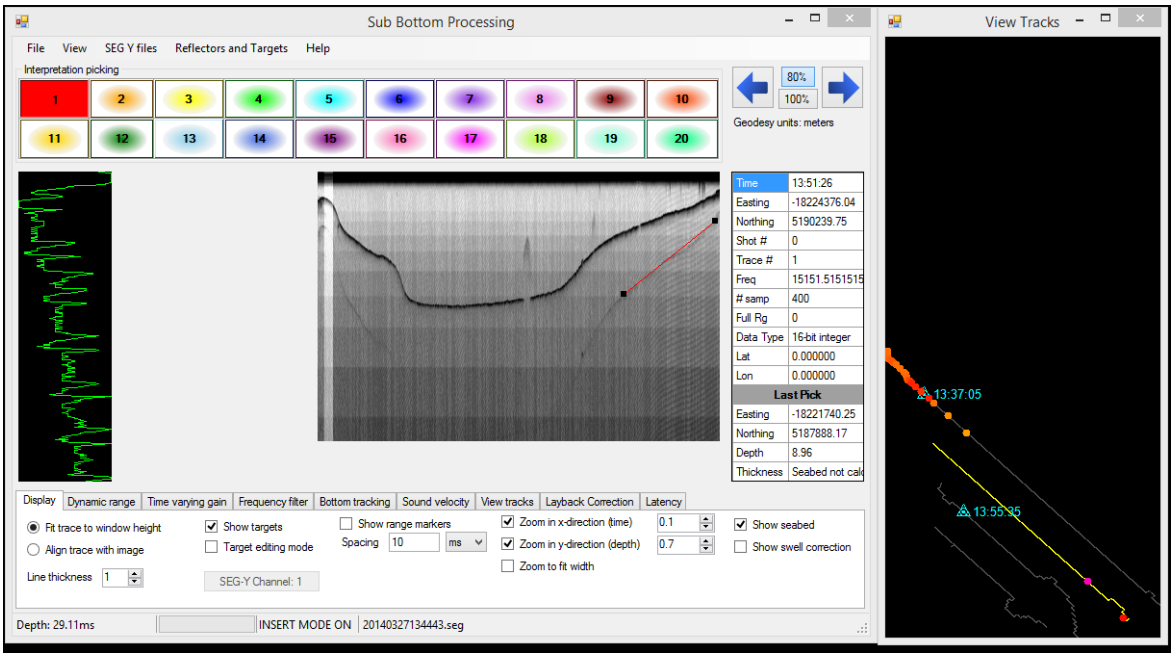
A great tool to investigate the SEG-Y file header, which is not associated with any company producing SEG-Y files, is SeiSee. The link to the program is http://www.dmng.ru/seisview/

If the Sub-Bottom data is logged in HYPACK®, we can digitize layers and export both HYPACK® Edited All format files and XYZ data for each layer. If the data is logged in a 3rd party software, the RAW HYPACK files will not exist so a HYPACK® Edited data file cannot be exported. The only option is to export XYZ data for the digitized layers.

PROCESSING THE SEG-Y DATA

To process the SEG-Y data, the files must be placed in the project RAW folder. This tells the software what geodesy to use; it will inherit the geodesy of the project where the files reside. The program does not allow multi-select of SEG-Y files in the Open dialog. Instead, the program assumes that, if you loaded one SEG-Y file from the RAW folder, you might want the rest and it creates a list of all SEG-Y files in that RAW folder, from which you can choose. The list is populated in the menu under SEGY files.

FIGURE 1. *HYPACK® SUB-BOTTOM PROCESSOR*

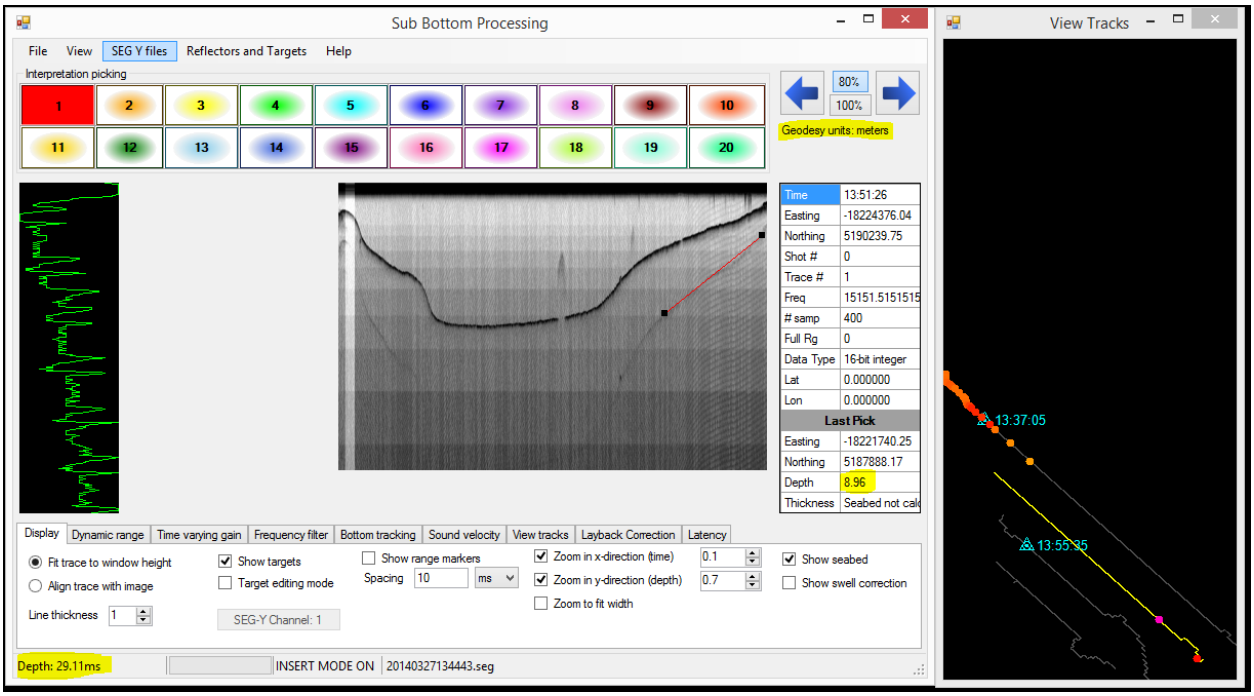


In the SUB-BOTTOM PROCESSOR, users commonly notice the SEG-Y data displays the depth in both meters and milliseconds. Look at the yellow highlighted areas in Figure 2.

- At the top right is the depth units from the geodetic parameters.
- The bottom right shows the last digitized point in meters as determined from the speed of sound entered and the depth of the point in milliseconds.
- On the bottom left, the depth is displayed in milliseconds.

The reason for all of this confusion is that the data is recorded as a signal level in milliseconds after transmission. With differing speed of sound entries, the layer can be digitized at any depth. All Sub-Bottom processing is conducted in milliseconds and then converted to depth.

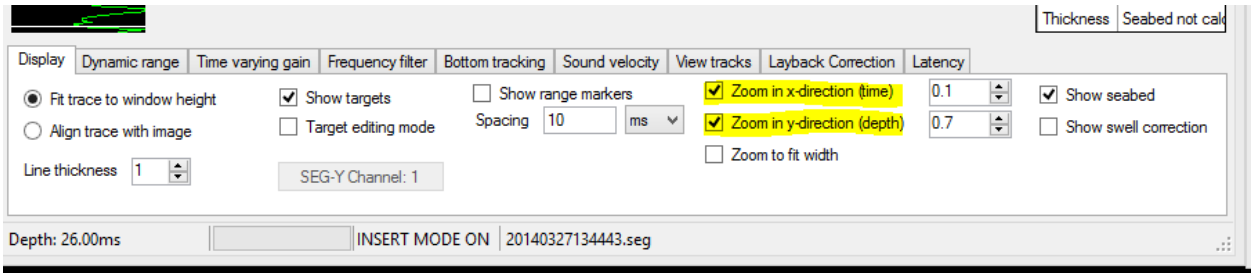
FIGURE 2. *SEG-Y Depths Expressed in Meters and Milliseconds*



DISPLAY TAB

When processing the files, it may be necessary to zoom in and out. The program allows you to zoom in both the horizontal and vertical directions. In Figure 3, I have highlighted the check boxes that control the zoom direction.

FIGURE 3. *Configuring the Zoom Controls*

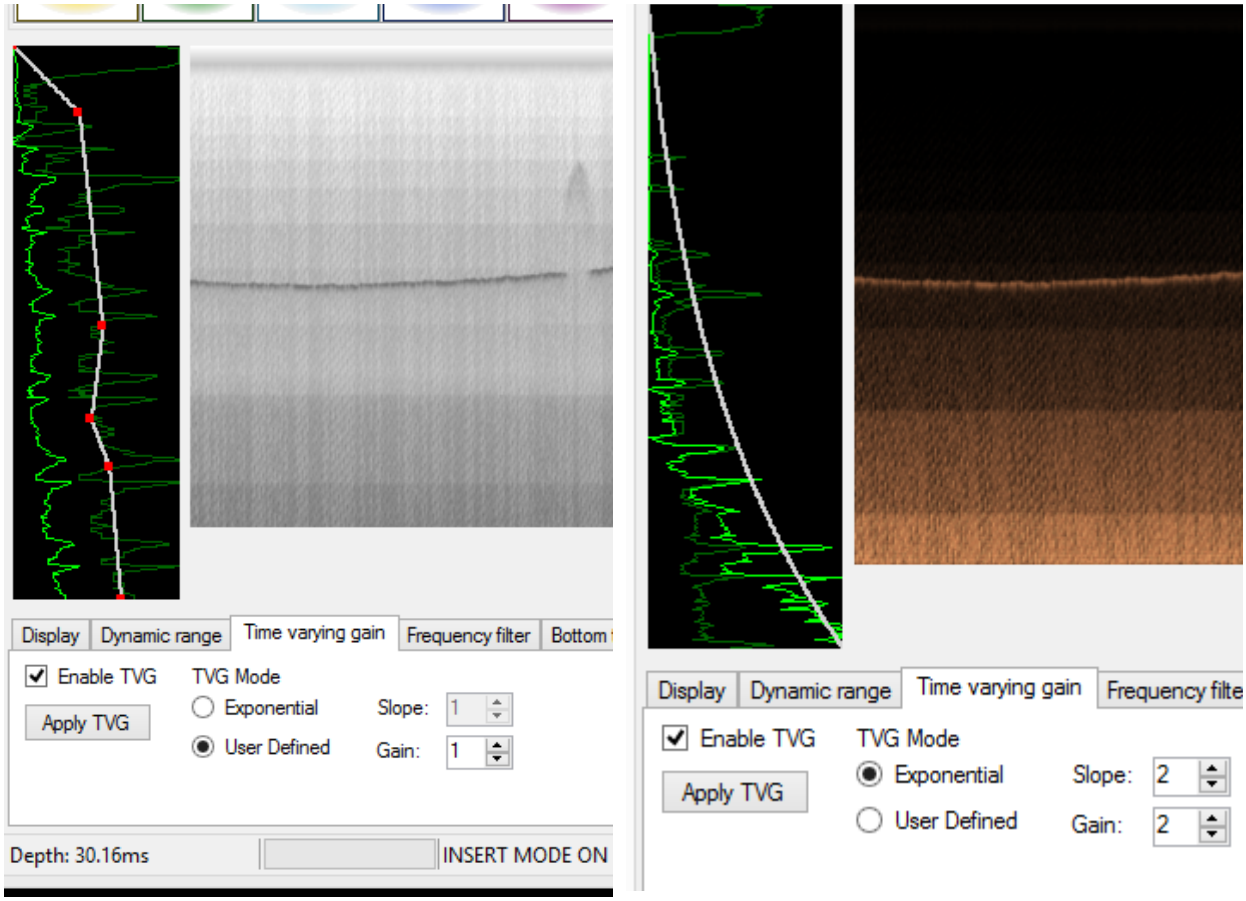


TVG TAB

Adjusting the image to display the trace can be best accomplished in the Time Varied Gain tab. In this tab, there is a section to apply either an exponential gain or a user-defined gain. If one section of the record may be better digitized with a different TVG than another section, the user-defined gain allows you to move red (TVG) points around to create the best image possible.

The Exponential gain option allows you to control the slope and the gain. The Gain is easy to explain: it is, in effect, a multiplier to the signal. The Slope controls the sharpness in the rise in the signal. It can be near linear, with a slope of 1, to a large curve with a slope of 6 (the maximum available).

FIGURE 4. *TVG Modes—User-defined (left), Exponential (right)*

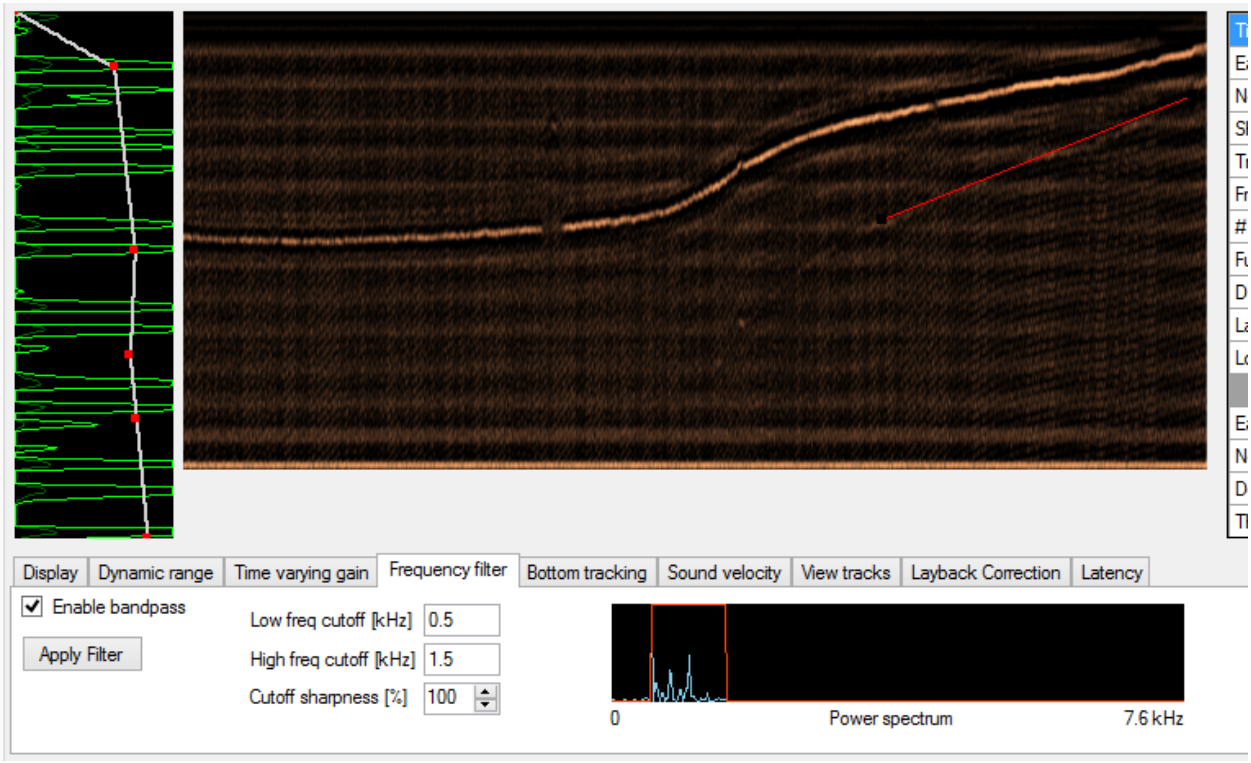


Note: None of the adjustments are applied in the TVG tab until you click [APPLY TVG].

FREQUENCY FILTER

The frequency filter allows you to limit the data that is displayed. There is a minimum and maximum value available. By applying a frequency filter, random noise can be eliminated allowing for a better display to digitize. There is no perfect setting based upon the sonar frequency. It is best to adjust the filter and see the results.

FIGURE 5. Frequency Filter Tab



BOTTOM TRACKING

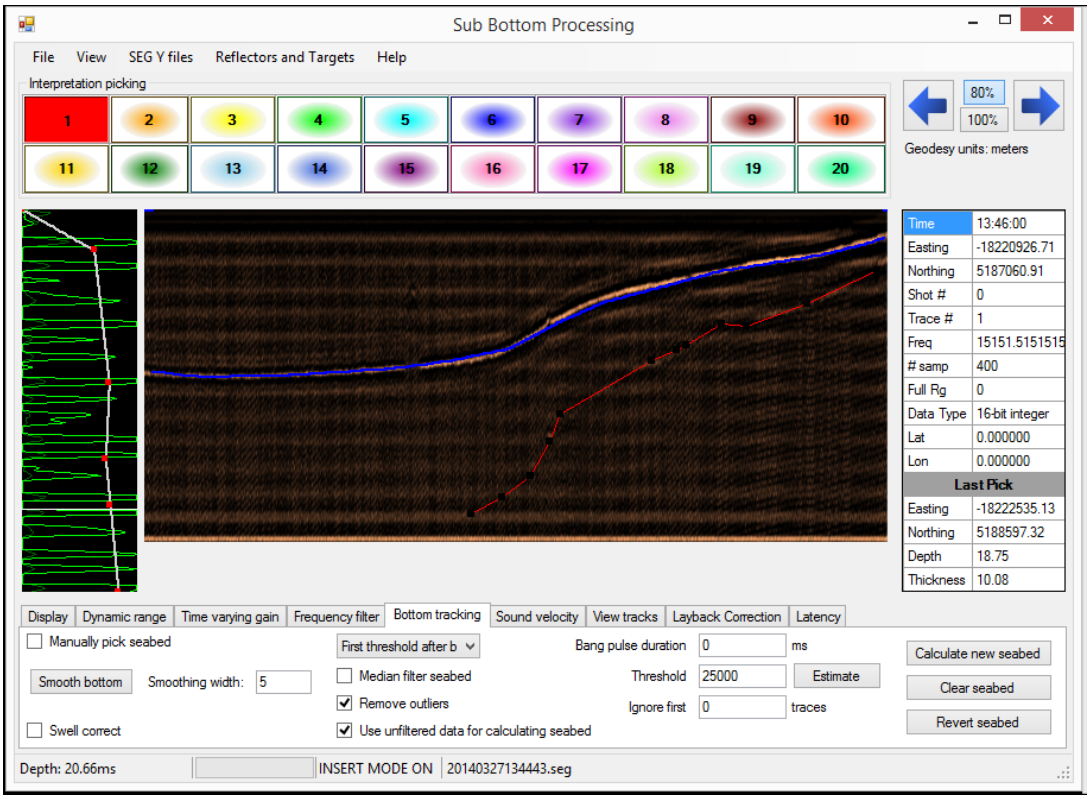
The bottom tracking appears as a blue line where the bottom has been detected. If you are using 3rd party files, the bottom may not have been detected.

Automatic Bottom Tracking: There is a feature to automatically detect the bottom, but a Threshold must be set.

Manual Bottom Tracking: If there is a lot of noise in the water column, it is best to manually digitize the bottom:

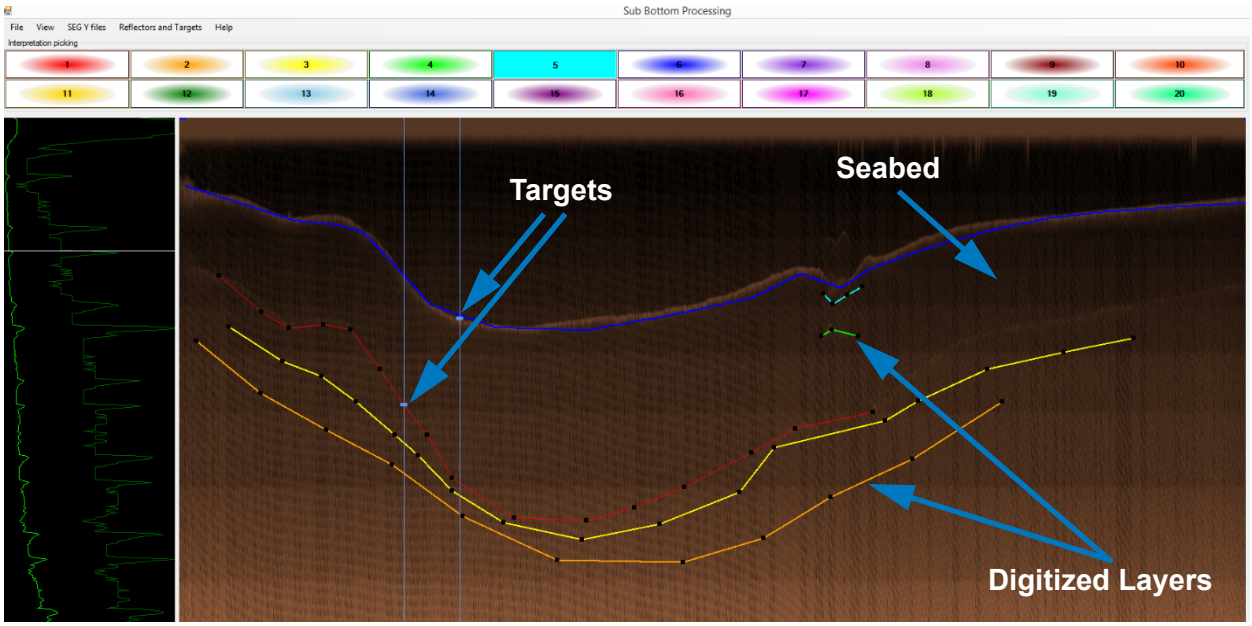
1. **Select the check box to Manually Pick Seabed**. This will convert the cursor to a digitizer.
2. **Digitize the bottom location**.
3. **Clear the Manually Pick Seabed check box** to finalize the digitized bottom track.

FIGURE 6. *The Bottom Track is Shown in Blue*



When digitizing the layers, you have 20 layers from which to choose. Each layer is color-coded so they can be differentiated in the display.

FIGURE 7. *Digitizing Multiple Sub-bottom Layers*

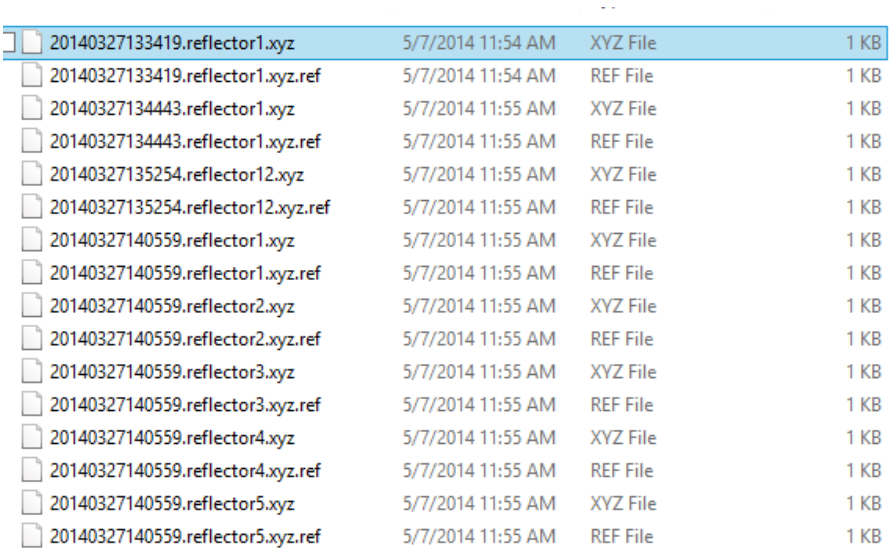


There is another folder that is created that is labeled SBP. In that folder is the information regarding that processing session so that if the files are reopened in the SUB-BOTTOM PROCESSOR program, the layer can be continued to be digitized.

MARKING TARGETS

Targets can be marked using the right mouse button. When you mark a target, the targets are stored in a SBP.tgt file in the project folder.

FIGURE 8. *Sample SBP Target File*



EXPORTING DATA

If this is a 3rd party SEG-Y file, all you can export is the XYZ for each layer. The XYZ points define the depth of that layer and the file name tells you which layer it describes. Each XYZ file has a corresponding metadata file (*.REF) with information that pertains to the digitized data. It includes sound speed for both water and sediment, how it was output (depth, isopach or both), the UTM zone and any other information. You can review the contents of the REF file using a text editor.