Modeling a Line Source with Volume Sources

Overview

The AERMOD and ISCST3 models do not include a line source type. However, they both support modeling a line source as a set of volume sources. This tutorial demonstrates how to create the set of volume sources in BEEST.

Draw Line

Click the "Show boundaries"  and "Label boundaries"  buttons in the BEEST toolbar on the left side of the screen to display line objects in BEEST. Click the "Add Other"  button and draw the line source on the screen. Click the "Add Other" button again when you are done. You will see a pop-up form on the screen prompting you to name the line; enter a name, such as "Line 1." Your model should now have a line in it, similar to Figure 1.

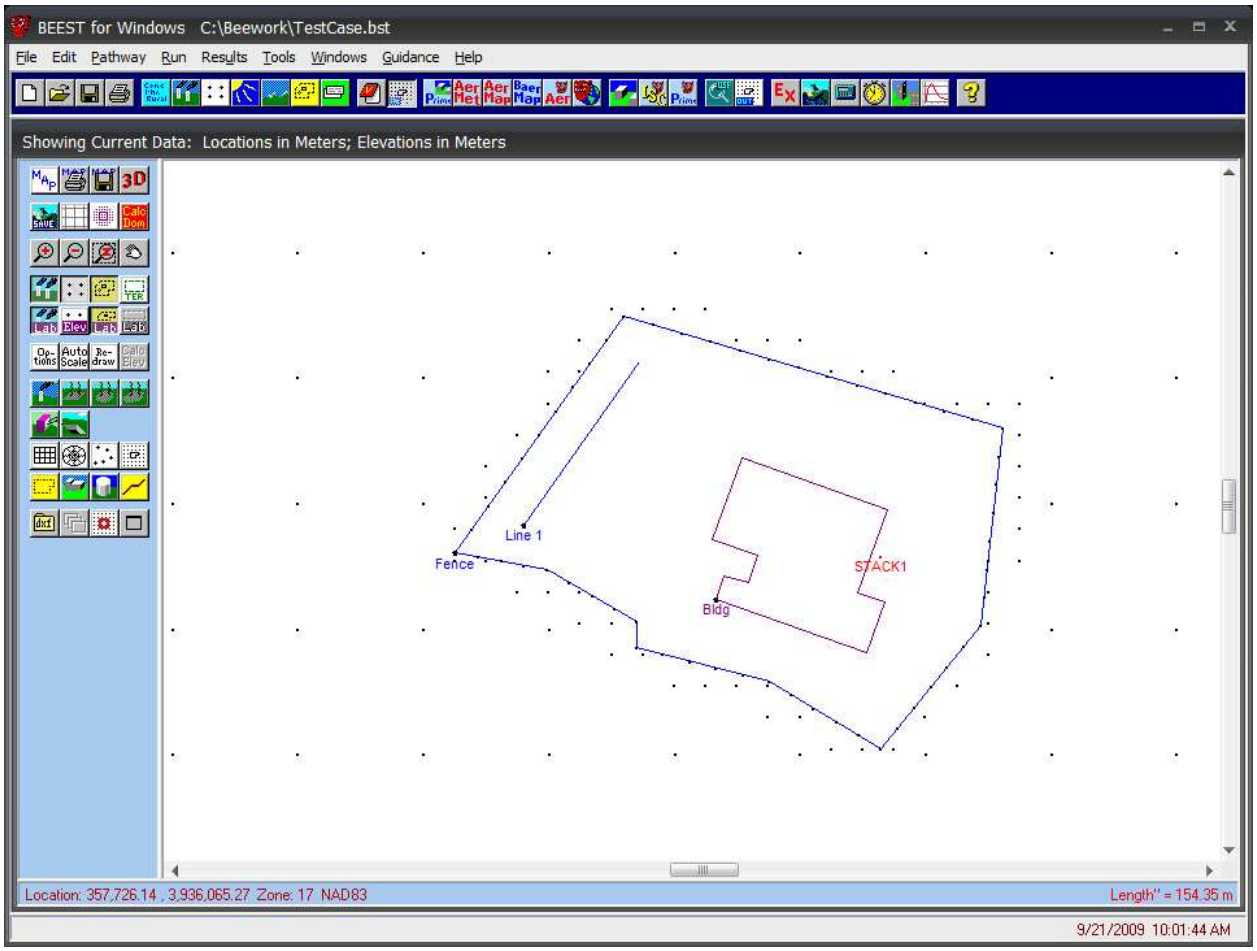

Figure 1: Drawing a line in BEEST.

Create Volume Sources

After drawing the line source, hover the mouse over the black dot above the source name. Right-click to see a pop-up menu and click on the option called “Create Line of Volume Sources.” The form in Figure 2 will appear. Fill in the form and click OK to create the volume sources. Creating the sources does not create a source group for them. The sources will be located along the line, as shown in Figure 3, and will all have the same source parameters.

In Figure 2, example values were entered for Sigma Y and Sigma Z, but in a real modeling project these values should be calculated according to the EPA guidance (see Figure 4). For example, if each source is 30 meters long and has a vertical dimension of 5 meters, Sigma Y is 30 meters / 2.15 = 13.95 meters and Sigma Z is 5 meters / 4.3 = 1.16 meters.

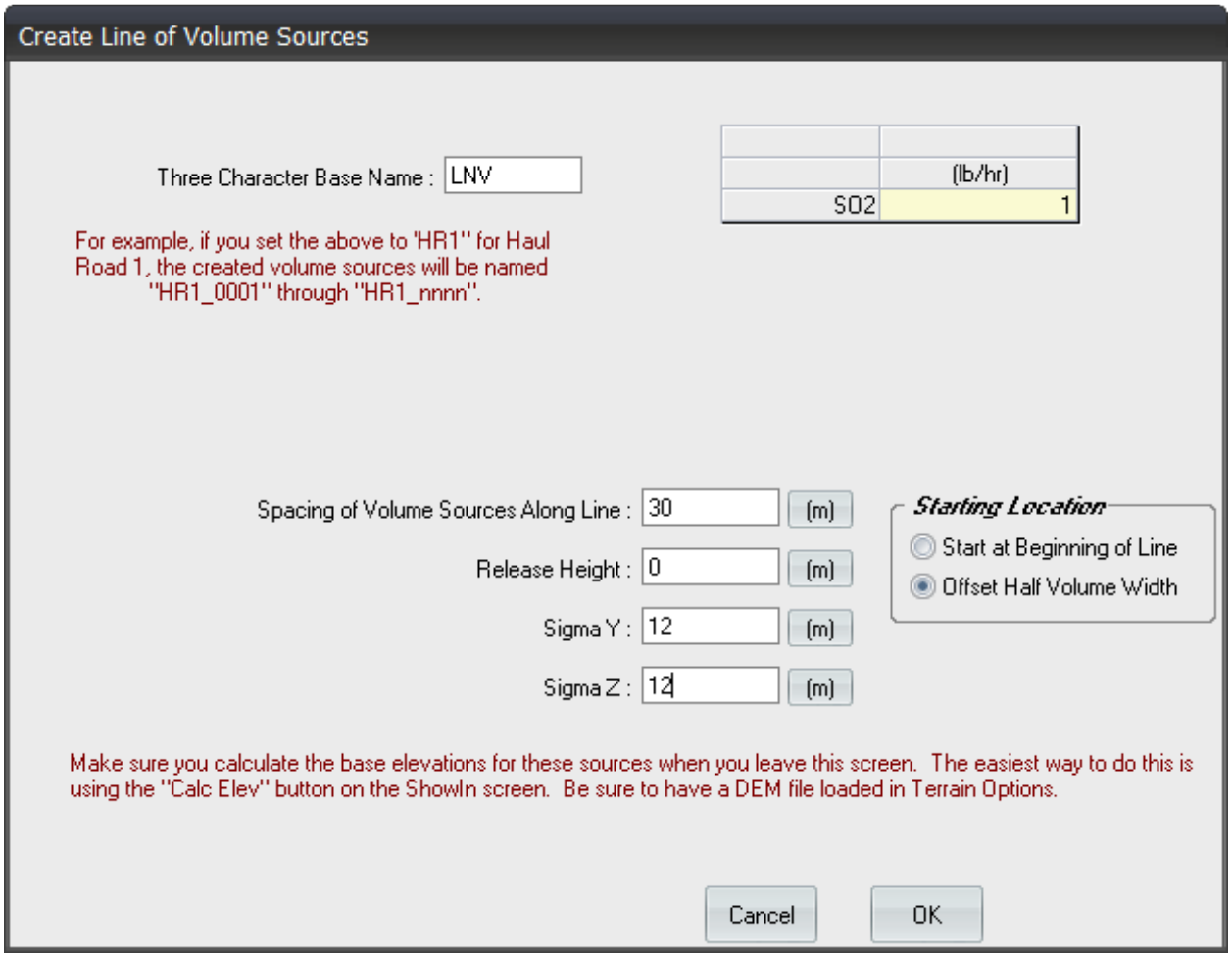

Figure 2: Form for creating volume sources.

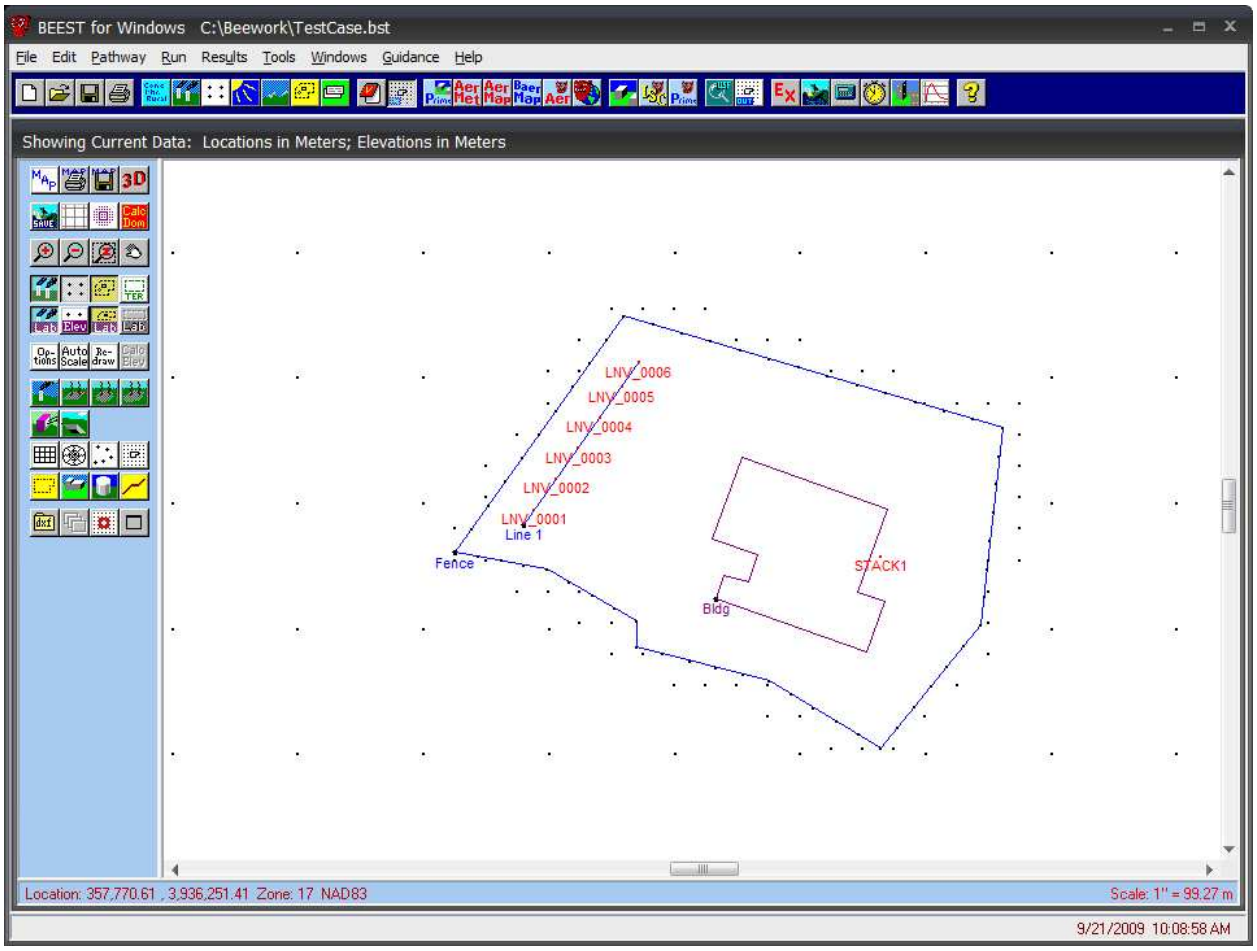

Figure 3: Volume sources in BEEST.

SUMMARY OF SUGGESTED PROCEDURES FOR ESTIMATING INITIAL LATERAL DIMENSIONS σ_{yo} AND INITIAL VERTICAL DIMENSIONS σ_{zo} FOR VOLUME AND LINE SOURCES

Type of Source	Procedure for Obtaining Initial Dimension
(a) Initial Lateral Dimensions (σ_{yo})	
Single Volume Source	σ_{yo} = length of side divided by 4.3
Line Source Represented by Adjacent Volume Sources (see Figure 1-8(a))	σ_{yo} = length of side divided by 2.15
Line Source Represented by Separated Volume Sources (see Figure 1-8(b))	σ_{yo} = center to center distance divided by 2.15
(b) Initial Vertical Dimensions (σ_{zo})	
Surface-Based Source ($h_e \sim 0$)	σ_{zo} = vertical dimension of source divided by 2.15
Elevated Source ($h_e > 0$) on or Adjacent to a Building	σ_{zo} = building height divided by 2.15
Elevated Source ($h_e > 0$) not on or Adjacent to a Building	σ_{zo} = vertical dimension of source divided by 4.3

Figure 4: Calculating Sigma Y and Sigma Z.