Alternate CBL Instructions
Exploring Radiation

Safety Precautions

- If a Geiger counter is used, keep hands, pencils, etc. away from the end of the Geiger tube as the tube window is very thin and fragile.
- Plug equipment into only GFCI-protected receptacles to prevent shock hazard.
- Do not eat, drink, or apply makeup when using radioactive materials.
- Be careful not to crack open the protective plastic case over the radioactive material. Inform your teacher immediately if this exposure happens.
- Use caution when plugging in, using, or unplugging the CBL 2 unit's power supply.

Materials
gamma and beta sources
meterstick
masking tape
CBL 2 unit
link cable
TI graphing calculator
student radiation monitor
DataRad program, available from Vernier

Procedure
The DataRad program must be installed prior to beginning the lab. It is a separate program from DataMate and is designed to work with the Vernier Radiation Monitors. The DataRad program comes as part of a collection of programs in the VST APPS program available from Vernier.

1. Connect the student radiation monitor to the DIG/SONIC port of the CBL 2 unit. Connect the CBL 2 unit to the TI graphing calculator using a link cable. Firmly press the ends into each unit. Turn on the graphing calculator and the student radiation monitor.

2. Start the VST APPS program. From the SELECT A PROGRAM menu select DataRad.

3. Select SETUP. On the SETUP MENU select SET INTERVAL. On the INTERVAL SETTINGS menu select SET INTERVAL. Then enter "20," for example to set the count interval at 20 s. Press ENTER. Select OK to return to the SETUP MENU.

4. To automatically correct your measurements for the background activity do the following: On the SETUP MENU select BACKGROUND CORRECTION. On the BACKGROUND CORRECTION menu select PERFORM now. Enter the number of intervals as "1." Remove any radioactive materials from near the radiation monitor and press ENTER. The background radiation will be monitored for your interval time and the background count will be displayed.

5. Measure the beta and gamma radiation from your sources at various distances. On the SETUP MENU select SINGLE INTERVAL. Press START to begin counting.

6. Note that the radiation monitor has the Geiger tube on the bottom. The calculator screen will display "counting" as it counts radiation particles or rays. When the interval is complete the number of counts per interval will be displayed as well as the scaled value for counts per minute, CPM. Press ENTER to continue.

Alternate lab procedure, using a CBL unit
The RADIATIN program must be installed prior to beginning the lab. It is a separate program from PHYSICS and is designed to work with the Vernier Radiation Monitors. Using TI Connect and a TI GraphLink cable, download the RADIATIN program from a computer to your graphing calculator.

1. Connect the student radiation monitor to Channel 1 of the CBL unit. Connect the CBL unit to the graphing calculator using a link cable. Firmly press the ends into each unit.

2. Turn on the graphing calculator and the student radiation monitor. Start the RADIATIN program. The MAIN MENU will appear.

3. The default sampling is 50. You may want to increase or decrease the sampling rate based on the activity of your sample. If so, then select SET NO. SAMPLE. Enter the sample size you wish to use.

4. From the MAIN MENU select COLLECT DATA. Then select BACKGROUND on the DATA COLLECTION menu. This will allow the CBL unit to determine the effective background rate and adjust other counts you make. After measuring the background you will be prompted to select ADJUST RATE, by subtracting the background count from a measured sample. Enter YES or NO.

5. From the COLLECT DATA menu, select TRIGGER/PROMPT. Enter "1." Measure the beta and gamma radiation from your sources at various distances. Collect your data. When asked to collect MORE DATA, enter "no" and "stop" and "graph". The sample activity may be read from the graph or found in the lists as instructed on the calculator screen. The CBL unit and calculator will measure the time required to collect the number that is set in your sample. The counts per minute then are computed using that data.