

Solution and methods:

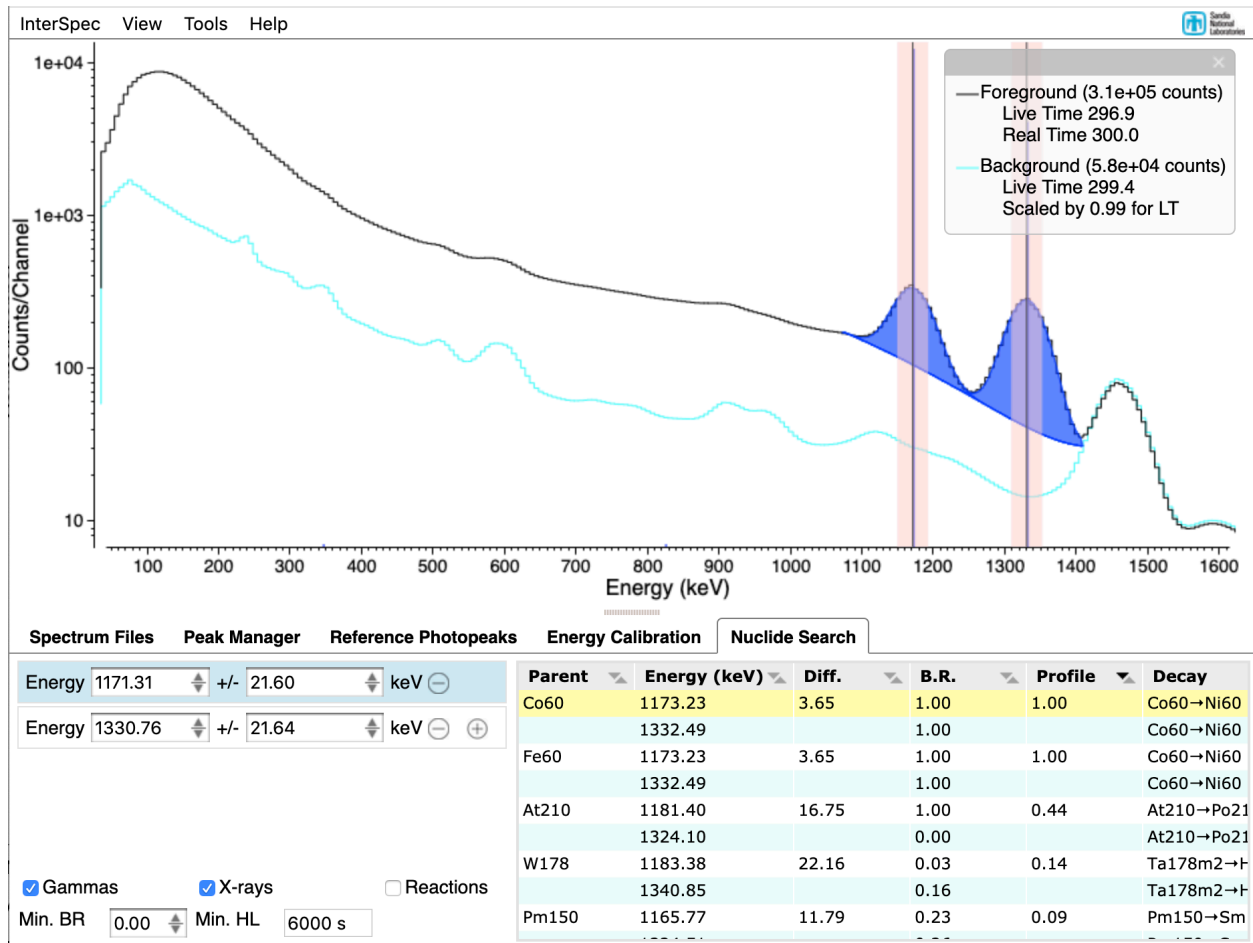


Figure 2 Using the “Nuclide Search” tool in InterSpec to help identify the nuclide.

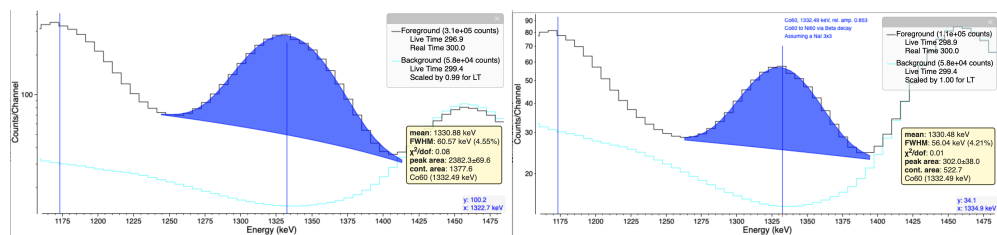


Figure 3 Fits to the 1332.49 keV peak in the near (left) and far (right) spectra.

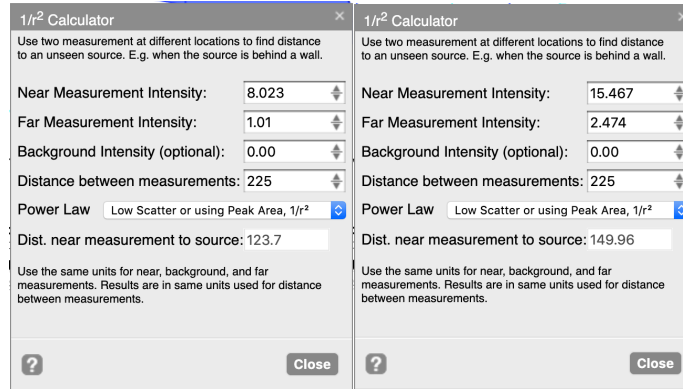


Figure 4 $1/r^2$ calculations using the 1332.49 keV peak of Co-60 (left), and both Co-60 peaks (right).

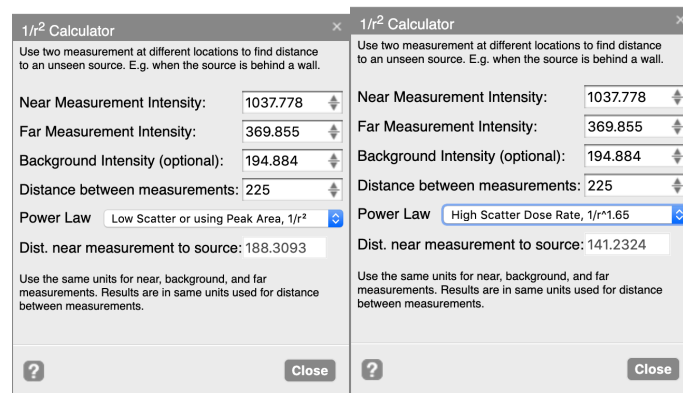


Figure 5 $1/r^2$ calculation using the full spectrum counts, including accounting for background, assuming no scatter (left) and a high scatter environment (right).

- The nuclide present is Co-60. In Figure 2 the “Nuclide Search” tool is used after verifying the energy calibration is good using the background peaks. Sorting search results by the “Profile” column is usually the best (and default) column to sort results by.
- Because of the environmental scattering of the source, using the dose-rate reported by the detector, or whole spectrum counts may not be the best inputs for a $1/r^2$ calculation.

Using the 1332.49 keV peak area, the near measurement has 8.023 ± 0.23 cps, and the far measurement has 1.01 ± 0.13 cps; using the “ $1/r^2$ Calculator” in InterSpec gives the source to be 124 cm inside of the container.

If both Co-60 peaks are used, the near measurement has 15.47 cps, and the far measurement has 2.47 cps, giving a distance 150 cm. These calculations can respectively be seen in Figure 4.

For comparison, if the full spectrum count rate is used, and the background accounted for, a distance of 188 cm if $1/r^2$ is assumed; if $1/r^{1.65}$ is for a high scatter environment, 141 cm is found. These calculations can be seen in Figure 5.

Truth-level answer: 150 cm.