Counts Per Minute (CPM) Calculator

Stuart Walker – walker.stuart@epa.gov, (202) 566-1148
Office of Superfund Remediation and Technology Innovation, US Environmental Protection Agency

http://epa-cpm.ornl.gov/index.html

Purpose of CPM Calculator

- The CPM calculator is intended for correlating count per minute field survey readings back to risk, dose, or other ARAR based concentrations.
- EPA's PRG and DCC Superfund calculators provide concentrations in pCi/g or pCi/cm^2 for radioactive contamination in soil or hard surfaces.
- Field survey equipment measures radiation in counts per minute

Guidance on Real-Time

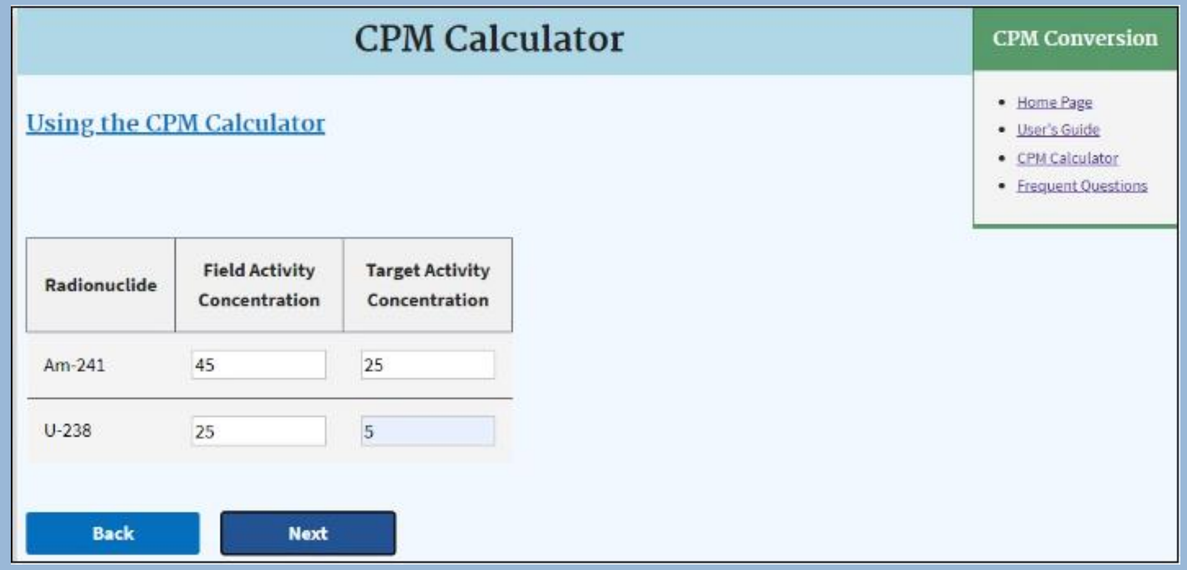
- CERCLA Risk Assessment: Q&A guidance discusses use of real-time measurement of radiation to supplement risk assessments (Q 33).
- ITRC Real-Time Measurement guidance and internet-based training focuses on techniques for using scanning equipment
- MARSSIM discusses field survey approaches

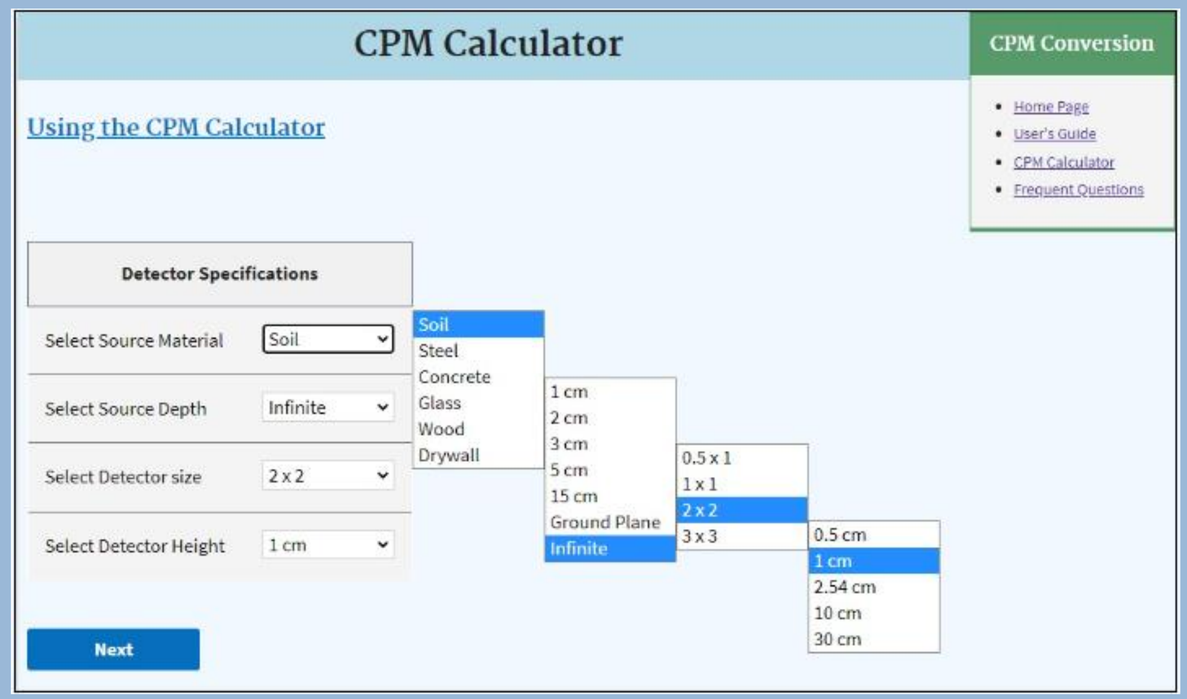
CPM Calculator Limitation

- The CPM tool is intended to facilitate use of Real Time measurement techniques to supplement sampling **NOT** replace sampling.
- The CPM tool only addresses gamma emitters.
- The CPM tool assumes uniform contamination.
- The surface should not be shielded by water or other material.
- The tool does not account for background radiation.

Using the CPM Calculators

- CPM Calculator will account for multiple radionuclides.
- There are 783 radionuclides as choices.
- Users have the choice of 4 cylindrical NaI scintillation detector configurations:
  1. 0.5"x1"
  2. 1"x1"
  3. 2"x2"
  4. 3"x3"





Using the CPM

- The CPM calculator incorporates the results of an analysis on the density of different materials and the photonic energy of radionuclides on exposure rate results.
- **Material Density:** The CPM tool addresses 6 types of materials:
  1. Soil
  2. Drywall
  3. Concrete
  4. Steel
  5. Wood
  6. Glass
- **Photonic Energy:** Volume CPM will adjust for:
  - 19 generic energies between 20 keV and 3 MeV (0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.6, 0.8, 1.0, 1.5, 2.0, and 3.0 MeV) closest to radionuclide
  - Or the actual energy for these radionuclides commonly found at Superfund sites (Am- 241, Co-60, Ba-137m/Cs-137, Pu-238, Pu-239, Pu-240, Ra-226, Ra-228, Tc-99, Th-228, Th-230, Th-232, U-234, U-235, U-238/Pa-234m)
- **Detector Height:** 5 choices:
  1. 0.5 cm
  2. 1 cm
  3. 2.54 cm
  4. 10 cm
  5. 30 cm
- **Source Thickness:** There are 7 choices:
  1. Ground plane
  2. 1 cm
  3. 2 cm
  4. 3 cm
  5. 5 cm
  6. 15 cm
  7. Infinite depth