Counts Per Minute (CPM) Calculators

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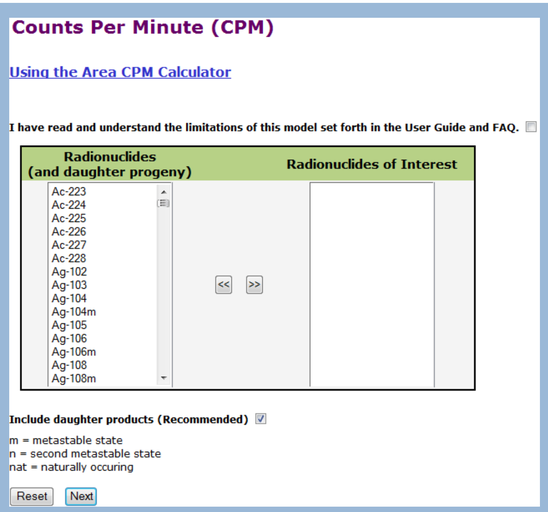
http://epa-cpm.ornl.gov/index.html

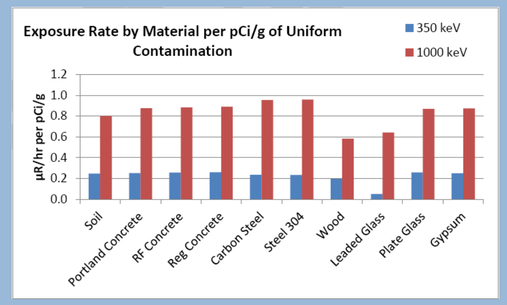
Purpose of CPM Calculators

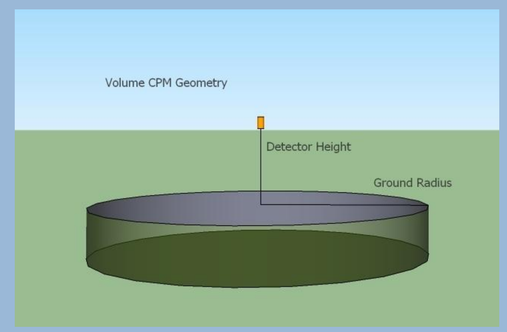
- The CPM calculator is intended for correlating count per minute field survey readings back to risk, dose, or other ARAR based concentrations.
- EPA's PRG and DCC Superfund calculators provide concentrations in pCi/g or pCi/cm^2 for radioactive contamination in soil or hard surfaces.
- Field survey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

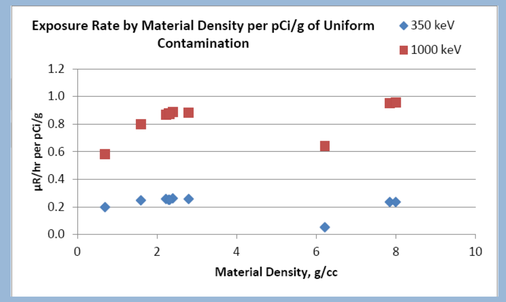
Using the CPM Calculators

- CPM Calculator will account for multiple radionuclides.
- There are 783 radionuclides as choices.
- Users have the choice of four gamma scintillation detectors by Ludlum, models:
  1. 44-2 (0.5"x1" NaI crystal)
  2. 44-10 (1"x1")
  3. 44-62 (2"x2")
  4. 44-20 (3"x3")









Using the Volume CPM

- The volume CPM calculator will incorporate the results of an analysis on the density of different materials and the photonic energy of radionuclides on exposure rate results.
- **Material Density:** The volume CPM tool will address 6 types of materials:
  1. Soil
  2. Drywall
  3. Concrete
  4. Steel
  5. Wood
  6. Glass
- **Photonic Energy:** Volume CPM will adjust for:
  - 8 generic energies (100, 200, 350, 500, 700, 1000, 1400, 2000 keV) closest to radionuclide
  - Or the actual energy for these radionuclides commonly found at Superfund sites (Am-241, Cs-137, I-131, Ra-226, Ra-228, Rn-220, Rn-222, Th-230, Th-232, U-234, U-235, and U-238)
- **Detector Height:** Drywall is assumed at 0.5 cm. The other 5 materials get 3 choices:
  1. 10 cm
  2. 30 cm
  3. 100 cm
- **Source Thickness:** Drywall is assumed 5/8 inch. The other 5 materials get 4 choices that correlate to slope factors used for Superfund risk assessments:
  1. 1 cm
  2. 5 cm
  3. 15 cm
  4. Infinite depth

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 Scenarios

- The CPM calculator has three major sub calculators based on the field survey scenario:
  1. Ground based scanning of surface contamination *(completed)*
  2. Ground based scanning of volumetric contamination *(completed)*
  3. Air based scanning of contamination *(under consideration)*

CPM Calculator Caveats

- 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 backscatter or buildup in the surface.
- The tool does not account for background radiation.

CPM Home | **Area CPM Calculator** | **Area User's Guide** | **Volume CPM Calculator** | **Volume User's Guide** | **Frequently Asked Questions**