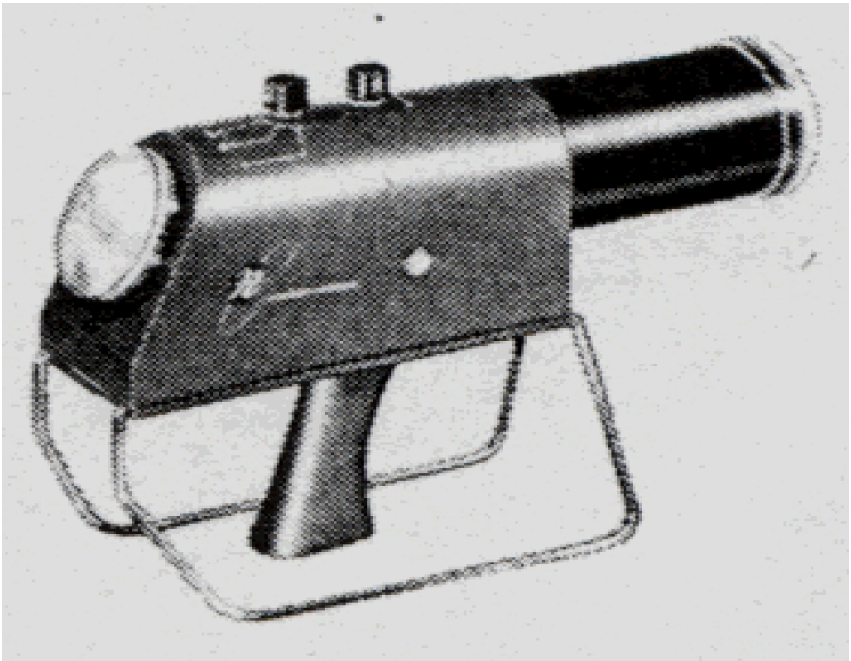
http://national-radiation-instrument-catalog.com/new_page_42.htm

The Cutie Pie Model 2586 was introduced in 1954. It had a 500 cc ionization chamber which could be removed and positioned up to 100 feet away via a cable. This allowed the operated to monitor high radiation intensity. It was useful for beta, gamma and x-ray monitoring. It has a large window covering the entire end of the chamber allowing measurement of betas down to 50 keV. A window shield is provided for allowing x-ray and gamma only monitoring. It has three ranges of 25, 250 and 2500 mR/h. It also has a battery check position on the switch. It has retractable legs for self-standing applications. It came in a medium range, 2.5 R/h, and the high range, 250 R/h, ion chambers. It uses four 30, two 15, and four 1.3 volt batteries. The unit was 3.5" x 8" x 12.5" and weighed 4 lbs. It sold for $345 in 1955. The Model 2586-P was offered in 1957 and sold for $445.



Nuclear Chicago Model 2586 Cutie Pie 1955

The Model 2612 is a battery operated GM counter sold in 1954. It had a choice of thin window or glass wall GM detector for alpha, beta and gammas. The probe is mounted in the handle and easily removed for surveying. Three ranges of 0.2, 2 and 20 mR/h, and 600, 6000 and 60,000 cpm. It uses two 67.5 and two 1.5 volt batteries. The unit is 10” x 4.75” x 5.75” and weighs 10 lbs. The M and P models had different probe sets and were offered in 1957. The Model 2612M sold for $255 and was designed for general beta-gamma survey work and prospecting. The Model 2612P sold for $295 and was designed for monitoring alpha and soft betas as well as harder radiation.

Nuclear Chicago Model 2612

Nuclear Chicago Model 2612

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Converting From CPM to mR/hr

Many radiation survey meters are calibrated to Cs137 or Co60. For Co60, it turns out that the conversion factor for the GM-10 to convert CPM to uR/hr is very close to 1 (0.93, but 1 is close enough for most purposes). This means that 1080 CPM is about equal to 1 mR/hr for Co60. For Cs137, it is closer to 1200 CPM for 1 mR/hr. For those who prefer to use Sieverts, 108 CPM is

about 1 uSv/hr for C060, and for Cs137 it is around 120 CPM per 1 uSv/hr.

For the GM 45, the numbers are closer to 3600 CPM for Co60 and 3000 CPM for Cs137, or 360 CPM and 300 CPM per per 1 uSv/hr, respectively.

Our Rad software lets you enter in a multiplier, which you can use to convert the readings into whatever units you prefer. You would want to enter in the reciprocal of the number of CPM per unit. See the table below:

	Cs137		Co60	
	mR/hr	uSv/hr	mR/hr	uSv/hr
GM-10	0.000833	0.00833	0.000926	0.00926
GM-45	0.000333	0.00333	0.000277	0.00277

There is a graph available showing the relative sensitivity for other gamma energies. For example, at 60 keV (Americium 241) it is 7 for radiation coming through the side. So you would get about 7000 CPM for 1 mR/hr. It is closer to 5 for radiation coming into the front of the tube, through the mica window.

There is a similar graph for the GM-45 also.

You may also wish to take a look at our page that briefly describes the various units of radiation

If you're interested in measuring your local radiation levels, our line of radiation detectors may be of interest to you

http://www.blackcatsystems.com/GM/converting_CPM_mRhr.html

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http://www.hps.org/publicinformation/ate/q4148.html

A conversion from counts per minute (cpm) to dose rate (rads/hr, mrads/hr, etc.) is possible, but the conversion factor depends on the kind of detector being used and on the type of radiation being measured and frequently on the energy of the radiation. The relationship between count rate and dose rate is usually established through empirical calibration procedures in which the detector is exposed in a radiation field of the radiation type and energy of interest at a known dose rate, and the count rate is recorded. If the instrument being used has an adjustable discriminator the observed count rate will also be affected by the setting of the discriminator. Changes to the operating voltage and other operating parameters may also affect the observed count rate.

One commonly used Geiger-Mueller (GM) detector is a pancake type with a facial diameter of approximately two inches. When the detector is connected to a standard portable ratemeter and calibrated to interpret exposure rate (mR/hr) with 662 keV photons from ^{137}Cs the count rate will likely be about 3,000 cpm per mR/hr. It should be noted that this correlation between count rate and exposure rate for the cesium (or any other gamma emitter that is used) applies only when the detector is viewing only the gamma radiation; if unshielded contamination is being viewed by the thin window detector, the beta radiation from the cesium or other possible comtamination will add pronouncedly to the count rate, and the gamma exposure rate/count rate correlation is not valid.

The exposure rate in air, in mR/hr, is approximately equal to the soft tissue dose rate in mrads/hr, which may also be used to estimate the dose equivalent rate in mrem/hr. More exact conversions of

exposure rate to selected dose equivalent values, such as the 1 cm depth personal dose equivalent, may be made using energy-specific conversion factors (for example, see Report 47 of the International Commission on Radiation Units and Measurements [1992] titled "Measurement of Dose Equivalents from External Photon and Electron Radiations").

If other detectors are used the cpm-to-dose rate conversion factors may be very different from the G-M case noted above. For example, a portable 2" x 2" cylindrical sodium iodide (NaI) scintillation detector will expectedly yield a sensitivity to the gamma radiation from ^{137}Cs that is 10 to 100 times greater than the G-M detector. The NaI detector also exhibits a very strong photon energy dependence so that the cpm-to-dose rate conversion factor will change notably as the photon energy changes. Detectors used for gamma measurements are also sometimes used for beta-dose measurements if the detectors are equipped with thin enough entrance windows. Again, the conversion factors for beta-radiation measurements will likely be different from gamma conversion factors and will also change as beta-particle energies change.

Other related questions have appeared on the Health Physics Society's Ask the Experts Website. Go there and scan down the page to the heading "Conversion of survey meter readings to dose" and then view question numbers 82, 128, and 236.

Hope this response is helpful to you.

George Chabot, PhD, CHP

http://www.hps.org/publicinformation/ate/q4148.html