Q: Which Radiation Detection Survey Meter Would Be Best For My Needs?

A: The first decision in selecting a radiation detector survey meter is choosing whether a high-range meter or a low-range meter would best suit your goals and needs. A survey meter will be used to help make critical decisions, such as to flee, how far, and to where. Or, to stay in-place, and if staying then in determining the best protected location in your home or shelter. Then, later, for determining when it is safe again and until then, when and for how long someone could briefly exit the protected area to perform a critical chore, etc.

Key to that high or low range decision should be to first understand and then determine the levels of radiation exposure one should be most concerned about in a nuclear emergency. Then the correct range radiation detector meter best suited for the job will be readily obvious.

The following is compiled from FM 3-7. NBC Field Handbook, 1994. FM 8-9. NATO Handbook on the Medical Aspects of NBC Defensive Operations, 1996. FM 8-10-7. Health Services Support in a Nuclear, Biological, and Chemical Environment, 1996. It is instructive in outlining the levels of radiation and their health effects.

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Expected health effects for an adult assuming the cumulative total radiation exposure was all received within a weeks time.
For children, the effects can be expected at half these dose levels.

TOTAL EXPOSURE	ONSET & DURATION OF INITIAL SYMPTOMS & DISPOSITION
30 to 70 R	From 6-12 hours: none to slight incidence of transient headache and nausea; vomiting in up to 5 percent of personnel in upper part of dose range. Mild lymphocyte depression within 24 hours. Full recovery expected. (Fetus damage possible from 50R and above.)
70 to 150 R	From 2-20 hours: transient mild nausea and vomiting in 5 to 30 percent of personnel. Potential for delayed traumatic and surgical wound healing, minimal clinical effect. Moderate drop in lymphocycte, platelet, and granulocyte counts. Increased susceptibility to opportunistic pathogens. Full recovery expected.
150 to 300 R	From 2 hours to three days: transient to moderate nausea and vomiting in 20 to 70 percent; mild to moderate fatigability and weakness in 25 to 60 percent of personnel. At 3 to 5 weeks: medical care required for 10 to 50%. At high end of range, death may occur to maximum 10%. Anticipated medical problems include infection, bleeding, and fever. Wounding or burns will geometrically increase morbidity and mortality.
300 to 530 R	From 2 hours to three days: transient to moderate nausea and vomiting in 50 to 90 percent; mild to moderate fatigability in 50 to 90 percent of personnel. At 2 to 5 weeks: medical care required for 10 to 80%. At low end of range, less than 10% deaths; at high end, death may occur for more than 50%. Anticipated medical problems include frequent diarrheal stools, anorexia, increased fluid loss, ulceration. Increased infection susceptibility during immunocompromised time-frame. Moderate to severe loss of lymphocytes. Hair loss after 14 days.
530 to 830 R	From 2 hours to two days: moderate to severe nausea and vomiting in 80 to 100 percent of personnel; From 2 hours to six weeks: moderate to severe fatigability and weakness in 90 to 100 percent of personnel. At 10 days to 5 weeks: medical care required for 50 to 100%. At low end of range, death may occur for more than 50% at six weeks. At high end, death may occur for 99% of personnel. Anticipated medical problems include developing pathogenic and opportunistic infections, bleeding, fever, loss of appetite, GI ulcerations, bloody diarrhea, severe fluid and electrolyte shifts, capillary leak, hypotension. Combined with any significant physical trauma, survival rates will approach zero.
830 R Plus	From 30 minutes to 2 days: severe nausea, vomiting, fatigability, weakness, dizziness, and disorientation; moderate to severe fluid imbalance and headache. Bone marrow total depletion within days. CNS symptoms are predominant at higher radiation levels. Few, if any, survivors even with aggressive and immediate medical attention.

It should be readily apparent now that the more dangerous levels of radiation are well beyond the capability of a low-range radiation detector survey meter, such as the CD V-700, which would be maxed out at 50 mR/hr which is only **.**05 R/hr. (A low-range meter is better suited for verifying successful decontamination and/or checking for low-level contamination in food or water.) With that meter alone, and maxed out, you would not know if you just walked into a 1 R/hr field or a potentially fatal 500+ R/hr environment.

Cresson H. Kearny, covers this point, too, in his book Nuclear War Survival Skills, Chapter 10 - Fallout Radiation Meters:

Instruments that measure only milliroentgen-range dose rates are sold for war use by some companies. Since most Americans have no idea what size of radiation doses would incapacitate or kill them, and do not even know that a milliroentgen is 1/1000 of a roentgen, some people buy instruments that are capable of measuring maximum dose rates of only one roentgen or less per hour. The highest dose rate that it can measure, one roentgen per hour, is far too low to be of much use in a nuclear war.

Bottom Line: Low-range and sensitive Geiger counters, like the CD V-700, do have their place, but without a higher-range radiation detector survey meter first, and initially, warning you away from exposure to excessively high levels of lethal radiation, the opportunity to later even use a low-range radiation detector meter may never come!

OK, so if it's a high-range survey meter we would need first, then which Civil Defense high-range survey meter is *'the best'*?

We asked this and other important related questions in all of our conversations with the FEMA technicians and radiological officers we interviewed. They responded;

#1 - Any of the high-range radiation detection Civil Defense meters will work just fine IF it has been properly maintained, stored, and calibrated. Also, calibration no more frequently than every 4-6 years is normally sufficient IF shelf-bound and stored properly, but is much more frequently required if subjected to rough handling, for example, bouncing around in the trunk of a car. Also, they emphasized that the calibration needs to always be with a sufficiently strong enough radioactive source that a mid-scale meter reading can be attained for all the ranges, not just the lower ranges.

#2 - Universally, when pushed to rank them, most all of them said their preference for a particular CD survey meter model was in the following order: CD V-715, CD V-717, CD V-720. Asked to elaborate why this personal preference and most said it was for the lighter weight of the CD V-715 over the other two and the basic KISS principle in that the CD V-715 had no frill 'bells & whistles' that might invite complications in the field. Also, many were openly critical of the CD V-720 design 'feature' of its sliding beta shield for attaining beta readings. They felt it was more of a marketing 'feature' than of any real practical use. They also found it required more maintenance attention as it was more prone to allow the intrusion of humidity and dirt and/or contamination internally.

We also inquired how comfortable they were with used and visibly worn Civil Defense survey meters compared to any of the same type new and largely unused meters available there on their shelves, too. They made it clear that it didn't matter, used or new looking, just so long as it was properly maintained, calibrated, and stored until needed. If called on to respond to a radiological emergency, they would rush out the door with whatever unit, new or used, was known to them to of been properly maintained, calibrated, and stored correctly there.

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