

How to Perform a Meter Survey

What is a Survey Meter?

A survey meter is a portable handheld, electronic instrument consisting of three elements. It is used to detect ionizing radiation. The three elements are a probe, which converts the incident ionizing radiation to an electrical signal which is sent to the electronics package; an electronics package, which converts the electrical signal to a visual indication on the meter scale of the intensity of the ionizing radiation field; and an optional speaker, which provides an audible indication in addition to the visual.

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Choose the correct probe:

Isotope	Preferred Probe
3H	None acceptable – wipe test only
Iodine (123, 125, 131)	NaI / Scintillation
All other Isotopes	Pancake (unless otherwise noted in your lab protocols)

Check Batteries: Each time the meter is used, the batteries should be checked. Turn the dial to “BAT”. As long as the needle is at or above “BAT TEST” (as in the picture) the meter is OK to use. If not, replace the batteries. The meter uses 2 “D” batteries.

Switch to most sensitive scale: Turn the dial to the lowest scale. This will typically be 0.1 or 1 depending on the type of meter you have.

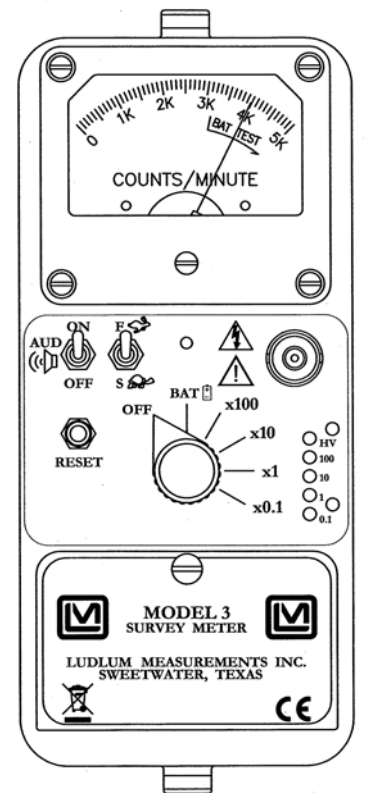
Check Operability: Verify that an instrument does indeed respond to a radiation field. This may be performed by using a known source of radiation in your laboratory.

Take background reading: Take a step back from your experimental setup and check what the meter is reading. Remember this number: anything that is twice background is considered contaminated.

Survey yourself: Each finger should be checked with special attention paid to thumbs. Wrist and forearm areas should be surveyed as well as lab coat sleeves, fronts and pockets. Monitor the tops and bottoms of shoes. Shoe soles are an excellent indicator of the presence or absence of floor contamination. Keep the probe about 1cm from the surface you are checking, but do not touch the surface. Move the probe at a rate of one probe width per second. The slow movement is to make sure you can see both low energy material and small amounts of contamination.

Survey your work area: following the same guidelines for surveying yourself, check the work bench, floor, equipment you’ve used, and anything else that may have come into contact with radioactive material.

Determine your results: Adjust the scale as needed (if the needle is at the 5k mark or is all the way to the right, you should switch to a higher scale by turning the knob). Only read in CPM, even if your meter has mr/hr listed. Multiply the cpm on the meter face by the number of the scale you are on to determine counts. If the counts are twice background, you must clean the area.



Troubleshooting and Other Information

Batteries: Batteries are most frequently the cause of problems with survey meters. They should be changed whenever they are weak. If you are not going to be using the meter for a significant period of time, store it without the batteries in it. Changing weak or dead batteries will greatly increase the life of your instrument as batteries can leak a corrosive liquid, which may destroy the unit or result in costly repairs.

Connection Cable: The cable connecting the probe to the electronics package is an element that should be checked frequently. With prolonged use this cable may become defective, giving either no reading or false high readings sporadically, even in the absence of a radiation field. If you suspect there is a problem with the cable, switch cables with another meter that is working properly. If the meter response is normal, then you have a “bad” cable.

Fluctuations in Readings: It is normal to observe fluctuations on the meter scale, particularly near areas of low contamination. In this event use an average of the meter fluctuation. General background readings found in Yale buildings are usually from 30 – 150 cpm with a pancake probe and 200 – 500 cpm with a scintillation probe.

High Background: If the meter is reading a higher background than you have read in the past, the meter may be contaminated. You may gently wipe the window of the probe with a Kim-wipe to remove contamination and then check background levels again. Also, make sure that you aren't near any sources of radiation when taking background readings.

Needle Doesn't Move: Ensure that the selection dial on the survey meter is on a scale and not stuck between. Check the battery power. Check that the battery cover is secured.

Needle is at Maximum (pinned to the right): If you are still on the lowest scale, change the scale to a higher one. If you are on the highest scale there may be a significant amount of contamination or radioactive material present or the probe itself may have been contaminated. If you take the probe away from the area you are surveying and the needle drops and counts decrease, then there is significant contamination. If you take the probe away from the area you are surveying and the needle remains at maximum, the probe is probably contaminated. If another probe is available, switch probes and survey the one suspected of contamination.

If you have questions or need information on meter supplies, please contact your Safety Advisor or Radiation Safety at 785-3550.