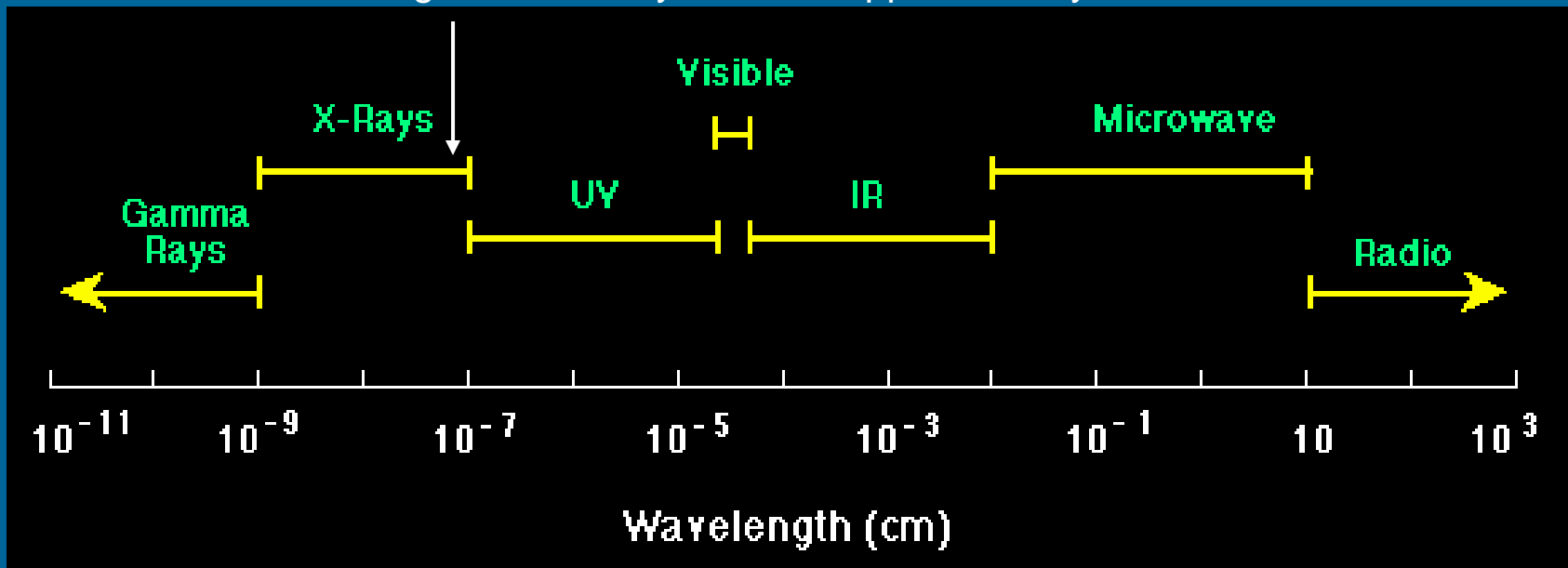


X-Ray Security Screening of People

What Are These Devices?

Backscatter x-ray scanners use low-energy x rays to look for items hidden under clothing.

The wavelength of the x rays used is approximately here.



Backscatter X Ray

- Backscatter x rays are low-energy x rays that are scattered or reflected from the skin, creating an image that can “see through” clothing.
- For comparison, medical x rays are higher-energy x rays that penetrate into and through the body to create an image of organs within.

Backscatter X Ray

- Maximally, the x-ray energy is 50 kV; the dose estimates are based on assuming all of the x rays produced are 50 kV – a very conservative assumption.
- Since a few of the backscatter x rays penetrate the body, there is some energy deposited, giving individuals a small radiation dose – this dose is expressed in millirem or microrem.

Radiation Dose Units

- A millirem or mrem is a unit of effective whole-body radiation dose.
- A microrem or μrem is also a unit of effective whole-body radiation dose and is $1/1,000^{\text{th}}$ of a millirem

$$1,000 \mu\text{rem} = 1 \text{ mrem}$$

Radiation Dose

0.005 mrem¹ = 1 Backscatter Scan

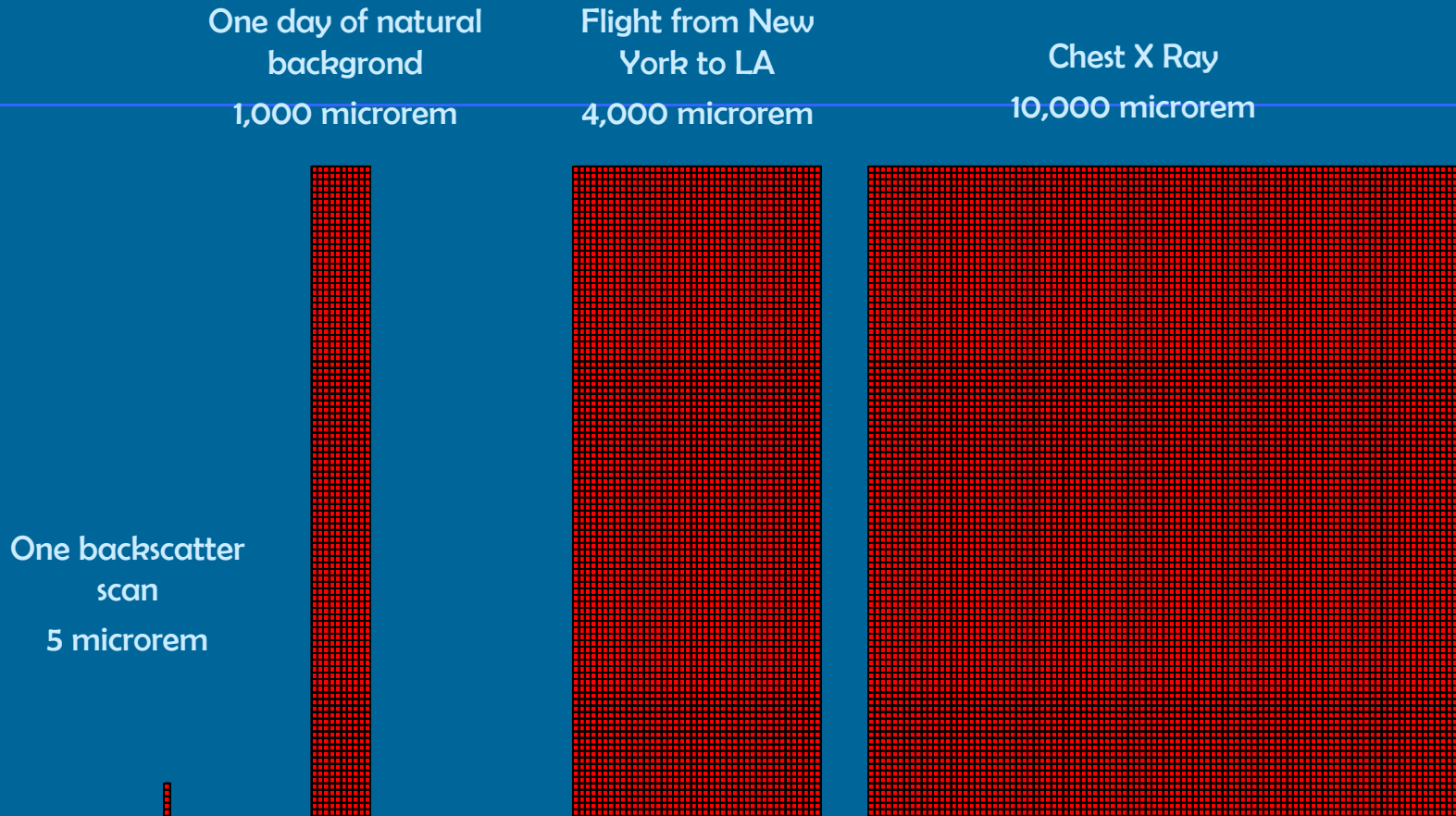
1 mrem/year = Negligible Individual Dose Limit

100 mrem/year = Annual Limit to Public

300 mrem/year = Annual Background Radiation

(includes no medical or human-made sources)

Radiation Dose Comparisons



Each tiny box represents 1 microrem

Radiation Dose

- The National Council on Radiation Protection and Measurements (NCRP) defines a Negligible Individual Dose as 1 mrem/yr.¹
 - 200 scans per year = negligible dose
- 60,000 scans per year = annual natural background radiation dose
 - Over 160 scans per day, 365 days per year

Worth the Benefits?

- “General use systems, like those deployed in airports across the country, are considered safe to use and can be used without regard to the number or type of individuals scanned or the number of individual scans per year.”

Interagency Steering Committee on Radiation Standards (ISCORS)¹

¹ISCORS is comprised of eight federal agencies, three federal observer agencies and two state observer agencies who facilitate consensus on acceptable levels of radiation risk to the public and workers and promote consistent risk approaches in setting and implementing standards for protection from ionizing radiation.

Worth the Benefits?

- “The Health Physics Society believes that exposing people to low levels of ionizing radiation is justified if certain criteria¹ are met.”

Health Physics Society Position Statement PS017-1 available at
http://hps.org/documents/securityscreening_ps017-1.pdf

An FAQ is available at
[http://hps.org/publicinformation/
ate/faqs/backscatterfaq.html](http://hps.org/publicinformation/ate/faqs/backscatterfaq.html)
to answer additional questions
you might have regarding these
security screening devices.

The Health Physics Society would like to thank Gordon Tannahill for developing this program and to the HPS Homeland Security members for their review of the content.